
**COLLEGE OF BUSINESS AND ECONOMICS**

**GIKONDO CAMPUS**

**Master thesis submitted to the University of Rwanda**

# THE IMPACT OF EXPANSIONARY FISCAL POLICY ON ECONOMIC GROWTH (1992-2015) CASE STUDY: RWANDA

A Dissertation submitted to College of Business and Economics, School of Business in Partial fulfillment of the academic requirements for the award of Master's Degree in the Economics.

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**Kigali, June 2017**

## DECLARATION

I, hereby do declare that this project is my original work and it has never been presented by any other student in any university or other institution of higher learning as far as I know. I thus declare that this work is mine under supervision of Dr Claudine UWERA,

UMUTONI Christine

**Signature: ……** Date: …. / …. / 2017

APPROVAL

I, Dr. Claudine UWERA**,** hereby certify that, I have been supervisor of UMUTONI Christine for this work and the student had followed carefully my guidance, I allow her to submit and defend this Thesis in Partial Fulfillment of Academic Requirements for the Award of Master's Degree in Science of Economics at University of Rwanda, Postgraduate Program, Gikondo Campus.

Date……/……./ 2017

Dr. Claudine UWERA

Signature of supervisor ……..

## DEDICATION

This thesis is dedicated to:

My God
To my husband;

To my Children;

To all my family;

And to all my classmates and friends

## ACKNOWLEDGEMENTS

First, I thank the almighty God for protecting, strengthening and inspiring me during my life in general and in this research in particular.

Special appreciations are expressed to all lecturers from University of Rwanda, Postgraduate Program, Gikondo Campus especially for all lecturers of Science of Economics; for their contribution in educating Rwandans and to all the academic staff of University of Rwanda, for sharing their knowledge and expertise throughout courses and conferences and to administrative staff.

Special thanks are extended to my husband GASIGWA Eugene; my friends and colleagues of class since they become great motivators in this work. I am profoundly grateful to my supervisor Dr. Claudine UWERA, for her hard support, her attention, time, encouragement and guidance made me successfully complete within time.

May God bless you richly.

**LIST OF ABBREVIATIONS**

| | |
|---|---|
| ADF | : Augmented Dickey-Fuller |
| BNR/NBR | : Banque National du Rwanda/National Bank of Rwanda |
| COE | : Compensation of Employees |
| Dr. | : Doctor |
| ECM | : Error Correction Model |
| Eviews3.1 | : Economic Views |
| GDI | : Gross Domestic Income |
| GDP | : Gross Domestic Product |
| GMI | : Gross mixed income |
| GNI | : Gross national income |
| GNP | : Gross National Product |
| GOS | : Gross Operating surplus |
| GVA | : Gross Value Added |
| LGDP | : Logarithm of Gross Domestic Product |
| MINECOFIN | : Ministry of Finance and Economics Planning |
| NISR | : National Institute of Statistic of Rwanda |
| NNI | : Net National Income |
| OECD | : Organization for Economic Co-operation and Development |
| OLS | : Ordinary Least Squares |
| Prof | : Professor |
| U.S | : United States |
| USA | : United States of America |
| VAR | : Vector Autoregressive |
| B | : Betta |
| $\varepsilon_t$ | : error term |

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**ABSTRACT**

In this research we used different methods to analyze the impact of expansionary fiscal policy on economic growth in Rwanda like empirical analysis.

Findings have shown that there is a strong relationship between economic growth and tax and the government expenditure. The strong relationship between those variables is explained by the R square which is closer to1. the final results shows that the R Square is equal to 98%, economic growth is stationary at lag 2, 1st difference and function with intercept, It implies that the data are co-integrated in the long run, Government expenditure are stationary at lag 5, at second difference and function with None, It implies that the data are co-integrated in the long run, Taxes is stationary at lag 3, at the Second difference and function with none, It implies that the data are co-integrated in the long run, Residual is stationary at lag 0, at the first difference and function of level-trend and intercept, It implies that the data are co-integrated in the long run.

In fact taxes haves a negative relationship with economic growth, and government expenditures have a positive relationship with economic growth. Subsequently,

When tax rate increases by 1 percent, the economic growth reduces by 16.8 percent and when government expenditure increase by 1 percent the economic growth increase by 15.4 percent.

In our research we recommended government policy makers to reduce tax rate for helping investors to invest more in the economy of the country and we recommend policy maker to develop efficient allocation of public expenditures in order to stimulate job creation and equitable redistribution of wealth among citizens.

**Key words:** Tax rate, Fiscal policy, Government expenditures, Economic growth

# CHAPTER 1: GENERAL INTRODUCTION

## 1.1. Background of the study

In many countries today government intervenes in carrying out fundamental functions such as allocation, stabilization, distribution and regulation especially where or when market proves failure or its results is socially unacceptable. And also governments particularly in developing countries intervene to attain macroeconomic objectives such as economic growth and development, full employment, price stability and poverty reduction and focus on the developed countries government intervene to attain macroeconomic objectives such as the common interest of political economic actors in a system that fosters efficiency enhancing public economic action(Franzese, Robert J.r, 2002), Theoretically there is a debate on the question if expansionary fiscal policy stimulates economic growth; (World Bank, 2014).

One viewpoint state that government involvement in economic activity is vital for economic growth, but an opposing view holds that government operations are inherently bureaucratic and inefficient and therefore prevent rather than promotes growth. Supporters of government intervention in economic activity sustain that such intervention can stimulate long term growth. They mention that government's participation in ensuring the efficiency in resource allocation, regulation of markets, stabilization of the economy, and reduction of social conflicts as some of the ways in which government could facilitate economic growth. In the context of endogenous growth, government role in promoting accumulation of knowledge, research and development, productive public investment, human capital development, law and order can stimulate growth both in the short and long-run; (Easterly and Rebelo, 1993).

In the light of discussion the question that comes to the fore is what has been the impact of expansionary fiscal policy on economic growth in the country over the twenty four years? The objective of the work therefore is to contribute to the debate by investigating the Impact of expansionary fiscal policy on economic growth in Rwanda over the past twenty four years.

The classical economic were in view that the only object of taxation was to raise government revenue. But with the changes in circumstances and ideologies, the aim of taxes has also been

changed. These days apart from the object of rising the public revenue, taxes is levied to affect consumption, productions and distributions with a view to ensuring the social welfare though the economic development of a country. For economic development of a county, tax can be used as an important tool in the following manner. Taxes are the most important sources of public revenue. The imposition of tax leads to diversion of resources from the taxed to the non-taxed sector. The revenue is allocated on various productive sectors in the country with a view to increasing the overall growth of a country. National revenues may be used to encourage development activities in the less development areas of the country where normal investors are not willing to invest ;( Shiras; 2002).

In fact Rwanda, the law no 55/2007 of 30/11/2007 governing the National Bank of Rwanda sanctions the Central Bank as a national institution with legal personality and independence in operational, administrative and financial areas. The Bank preserves this autonomy in pursuit of macroeconomic missions. However, fiscal discipline is required for achieving the objectives of the monetary and exchange rate policy. Unsound fiscal policy usually create expectations leading to political pressures on the Bank to either accommodate higher inflation or lower interest rate in order to lessen the debt of the Government sector; (BNR, 2014).

In view of this, the Rwanda's expansionary fiscal policy coordination focus on different areas including the area of supply shocks, treasury management and investments. The central bank also participates in the issuing and distribution of treasury securities, transactions relating to public debt servicing, negotiation of securities, as well as the issue of advance to government at most 11% of the state current revenue collected during the previous financial year; (RRA, 2015).

In Rwanda also for policymakers to attain the desired optimal mix of macroeconomic objectives of growth and price stability there is a need for mutual complementarily of these two policies. In fact, the interaction between monetary and fiscal policies relates that both types of policies have an impact on key macroeconomic variables, which creates the need for interdependency in pursuit of their policy objectives. In practice, a single policy cannot achieve the desired macroeconomic objectives without employing a macroeconomic policy framework in which all policies are steered toward the same objectives; (RRA, 2015).

## 1.2. Problem statement

Expansionary fiscal policy has been very essential to the formulation of government plans in Rwanda but the theory can help policy makers to set up this policy is so very insufficient because many authors talk about the expansionary fiscal policy with other things like with budget deficit rather than to talk about the expansionary fiscal policy with the economic growth. For an objective of optimal growth, the government is likely to increase its investment expenditures and other cost on the provision of infrastructure facilities and mobilizing subsidies to the private sector. In much the same way, government can decrease unemployment to attain its wish for level of stabilization and minimize poverty through the use of suitable fiscal policy measures.

In Rwanda, the economic growth relies on tax base and government expenditures. The efficient tax collection and the good management of government expenditures can boost the economic growth. The inefficiency of tax collection and the corruption in government expenditures can be a factor which retaliate the economic growth in Rwanda (Yoriko Nakamura and April Williamson, 2000-2013).

## 1.3. Objectives of the research

### 1.3.1. General objective

The overall objective of this study is to analyze the effects of expansionary fiscal policy on economic growth in Rwanda.

### 1.3.2. Specific objectives

To attain this, the following specific objectives underlie this research:

- ✓ To assess the correlation among expansionary fiscal policy components and economic growth.
- ✓ To provide recommendations regarding on how expansionary fiscal policy components can control economic growth.

## 1.4. Research questions

- ✓ Is there any economic relationship between expansionary fiscal policy components and economic growth?

### 1.5. Research Hypothesis

In conducting the research hypothesis of this study we use the null hypothesis and alternative hypothesis, where the null hypothesis will state that the expansionary fiscal Policy components has no influence on the growing of economy in Rwanda (Ho=0)and the alternative hypothesis ($H_1$>0) will state that the expansionary fiscal Policy components has an effect on the growing of economy in Rwanda.

### 1.6. Scope of the study

This study was limited in time scope, geographical scope, and content scope.

#### 1.6.1 .Geographical scope

The study was carried out in Rwanda as developing Country.

#### 1.6.2 Content scope

The research is about the impact of expansionary fiscal policy on economic growth in Rwanda.

#### 1.6.3 Time Scope

The study covered the period from 1992-2015.

### 1.7 .Significance of the study

The significance of the study focused on Personal interest, scientific interest and Social Interest.

#### 1.7.1. Personal Interest

The study will help the researcher to acquire additional knowledge, skills and experience necessary to conduct a research on fiscal policy area.

#### 1.7.2. Scientific interest

The findings of this research will helpful to other researchers who will be interested in conducting research in the similar domain as it will constitute a secondary data in UR-CBE Library.

### 1.7.3. Social Interest

To Government of Rwanda, to other institutions like Rwanda Revenue Authority to Ministry of finance and economics planning in distribution of expenditures, the recommendations of this research will help them to identify the areas of improvements.

## 1.7. Research structure

This research has been made up with five chapters presented as follow:

The first chapter is composed by the introductory part of the study which includes background of the study, statement of the problem, research objectives, research questions, research hypotheses, the significance of the study, the scope of the study and organization of the study; it generally gives an overview of what the study is intended to analyze.

The second chapter concerned the literature review relating to the subject, where the definitions of the key concepts used in this research topic are identified and explained. The third chapter presented the research methodology and described the methodologies that have been used in order to achieve the setting research objectives while concrete results and presentation have been discussed in chapter four where the research questions have been verified in order to be accepted or to be rejected.

The fourth chapter represented the data analysis and the interpretations of the results were obtained by using the research methodology in chapter three. Finally, chapter five is a concluding chapter, summarizing the findings of the study and then provides the recommendations.

# CHAPTER TWO:
# LITERATURE REVIEW

## 2.0. Introduction

In the part of literature review, the researcher has reviewed the available theoretical literature and previous empirical research on matters concerning the impact of expansionary fiscal policy on economic growth. This chapter includes the following sections: definition of key concepts, related review, theoretical review, empirical review, the conceptual framework, and the critiques of existing literature, the summary and the research gaps.

## 2.1. Definition of key concepts

### 2.1.1. Expansionary fiscal policy

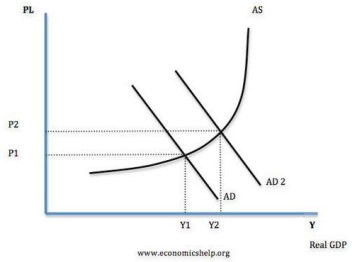
The expansionary fiscal policy is when the government uses its budgeting tools to add capital to the economy. These tools are either increased spending or tax cuts.

Expansionary fiscal policy is designed to stimulate the economy during or anticipation of a business cycle reduction. This is accomplished by increasing aggregate expenditures and aggregate demand through an increase in government spending (both government purchases and transfer payments) or a decrease in taxes. Both of these policies increase aggregate demand while contributing to deficits or drawing down of budget surpluses. Classical macroeconomics considers the expansionary fiscal policy to be an effective strategy for the government to counterbalance the natural depression in spending and economic activity that takes place during a recession (Pagano Marco,1990).

**The impacts of expansionary fiscal policy?**

Expansionary fiscal policy involves government attempts to increase aggregate demand. It will involve higher government spending and / or lower tax. In theory, higher government spending will increase aggregate demand (AD=C+I+G+X-M) and lead to higher economic growth.

**Graph 1: Expansionary Fiscal Policy**




Lower taxes should increase disposable income of consumers leading to higher levels of consumer spending. This should also increase aggregate demand and could lead to higher economic growth.

Expansionary Fiscal policy can also lead to inflation because of the higher demand in the economy.

**Evaluation of Expansionary Fiscal Policy**

The impact of expansionary fiscal policy will depend on many factors:

What else is happening in the economy? E.g. US tried to cut taxes in 2008. In theory, this lower tax should boost spending. However, the economy is experiencing falling house prices, lower confidence and a shortage of credit; because of all these factors expansionary fiscal policy is relatively ineffective it is like a criticism on the expansionary fiscal policy (www.economichelp.org).

**2.1.2. Gross domestic product**

Gross domestic product (GDP) is the monetary value of all the finished goods and services produced within a country's borders in a specific time period

Gross Domestic Product is the best way to measure a country's economy. GDP is the total value of everything produced by all the people and companies in the country. it doesn't matter if they are citizens or foreign owned companies. If they are located within the country's boundaries, the government counts their production as GDP (Neil.Singer,1972).

Economic growth is the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percent rate of increase in real gross domestic product, or real GDP. An increase in growth caused by more efficient use of inputs is

referred to as intensive growth. GDP growth caused only by increases in inputs such as capital, population or territory is called extensive growth; (Halevi Joseph, 2012).

## 2.2. Theoretical framework

### 2.2.1. The expansionary fiscal policy overview

Governments use the expansionary fiscal policy to influence the level of aggregate demand in the economy, in an effort to achieve economic objectives of price stability, full employment, and economic growth. Keynesian economics suggests that increasing government spending and decreasing tax rates are the best ways to stimulate aggregate demand. Keynesians argue this method be used in times of recession or low economic activity as an essential tool for building the framework for strong economic growth and working towards full employment. In theory, the resulting deficits would be paid for by an expanded economy during the boom that would follow; this was the reasoning behind the New Deal; (Giavazzi,1990).

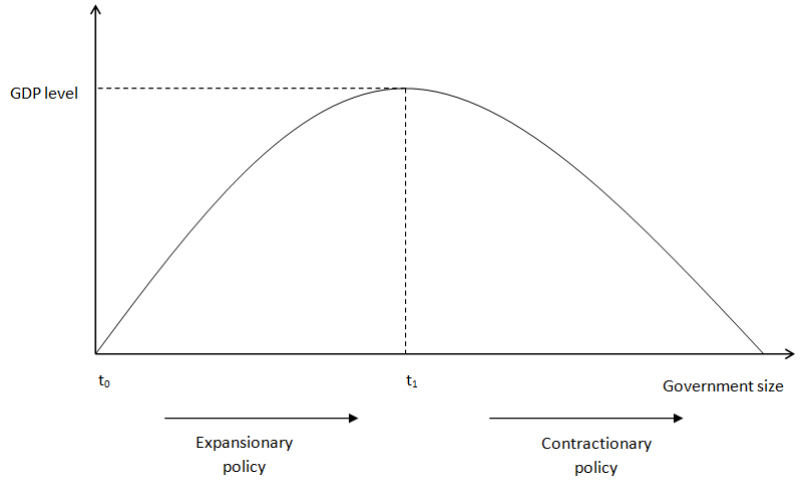
Keynesian theory posits that removing spending from the economy will reduce levels of aggregate demand and contract the economy, thus stabilizing prices. This causes a lower aggregate demand for goods and services, contrary to the objective of a fiscal stimulus but economists still debate the effectiveness of fiscal stimulus (Michael, 2010).

In the classical view, the expansionary fiscal policy also decreases net exports, which has a mitigating effect on national output and income. When government borrowing increases interest rates it attracts foreign capital from foreign investors. This is because, all other things being equal, the bonds issued from a country executing expansionary fiscal policy now offer a higher rate of return. In other words, companies wanting to finance projects must compete with their government for capital so they offer higher rates of return. To purchase bonds originating from a certain country, foreign investors must obtain that country's currency. Therefore, when foreign capital flows into the country undergoing fiscal expansion, demand for that country's currency increases. The increased demand causes that country's currency to appreciate; (Bergman, 2010).

**The Armey Curve and Expansionary Fiscal Policy**

A related principle that requires government's deep consideration when deciding to use either an expansionary fiscal policy or a contractionary fiscal policy is the Armey curve. See the diagram below.

**Figure 1 : The Armey Curve Analysis**




There is time when government expenditure need to be increased for the economy to realise economic growth(Nademi, Abounoori and Kalmazi, 2005). Referring to the diagram above, any reduction in government expenditure on civil service salaries and other recurrent expenditure below $t_1$ is counterproductive. An expansionary fiscal policy is also counterproductive at all points of government size beyond $t_1$. If we assume that Zimbabwean government's size is in the $t_0$ to $t_1$ range, then we recommend an expansionary fiscal policy for growing the economy (Vedder and Gallaway, 1998).

## 2.2.2 THE ECONOMIC GROWTH

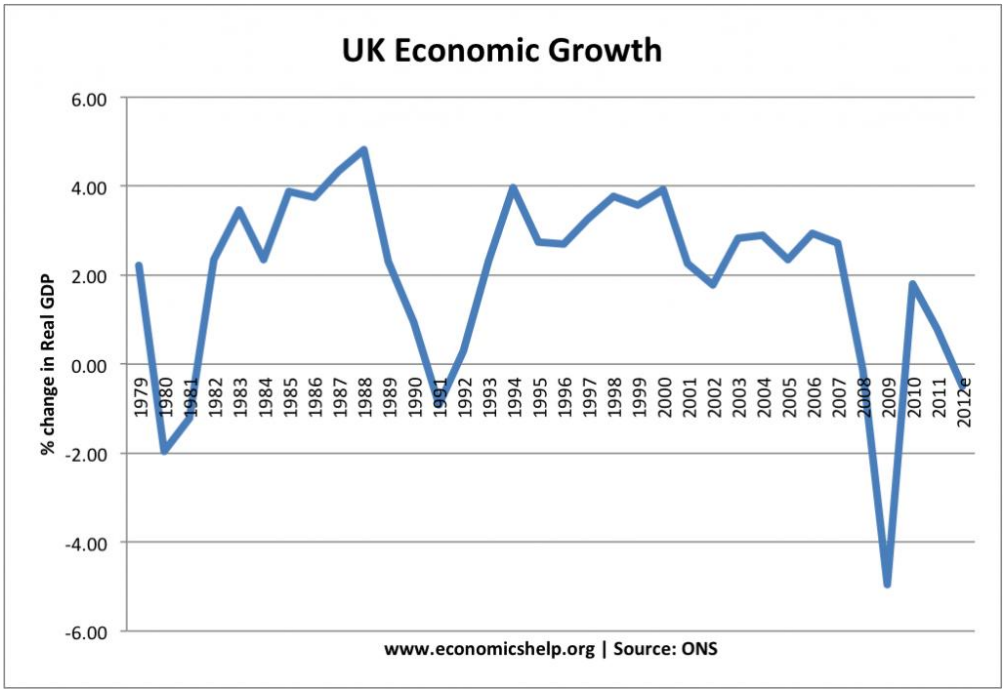
Economic growth is an increase in the capacity of an economy to produce goods and services, compared from one period of time to another. It can be measured in nominal or real terms, the latter of which is adjusted for inflation. Traditionally, aggregate economic growth is measured in terms of gross national product (**GNP)** or gross domestic product (GDP), although alternative metrics are sometimes used.

(Economic Growth http://www.investopedia.com).

Economic growth is caused by two main factors:

1. an increase in aggregate demand (AD)
2. an increase in aggregate supply (productive capacity)

**Figure 2: Economic growth in UK as an example**




**Demand side causes**

In the short term, economic growth is caused by an increase in aggregate demand (AD). If there is spare capacity in the economy then an increase in AD will cause a higher level of real GDP.

AD= C + I + G + X- M

- C= Consumer spending
- I = Investment (gross fixed capital investment)
- G = Government spending
- X = Exports
- M = Imports

**Graph 2 : Graph showing increase in AD**

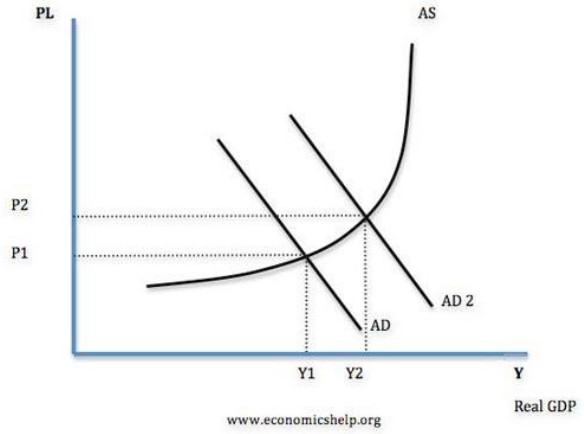
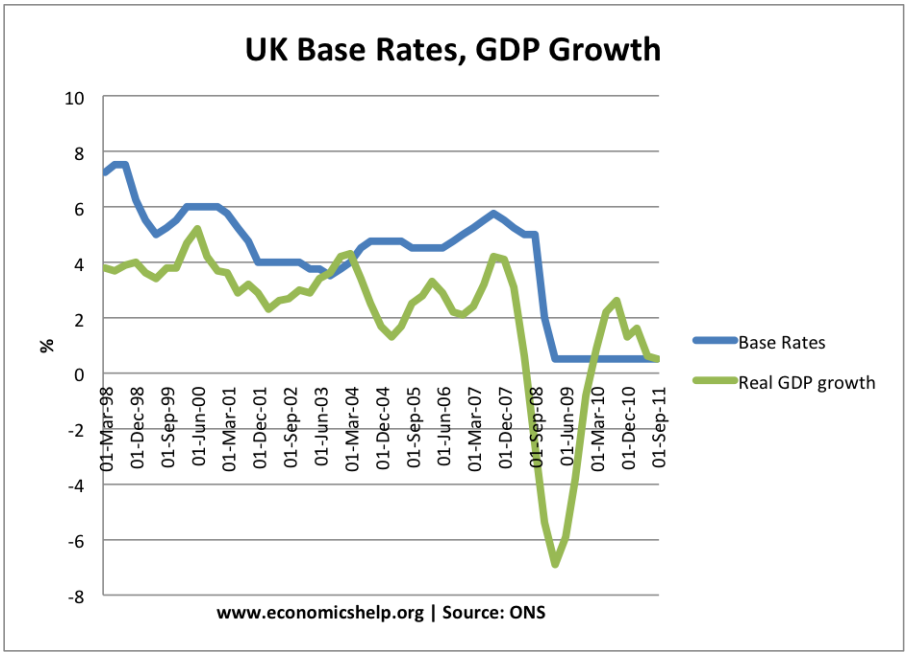



**Figure 3 : AD can increase for the following reasons:**

- Lower interest rates – Lower interest rates reduce the cost of borrowing and so encourage spending and investment.




In 2008, base rates were cut to 0.5% to try and stimulate economic growth.

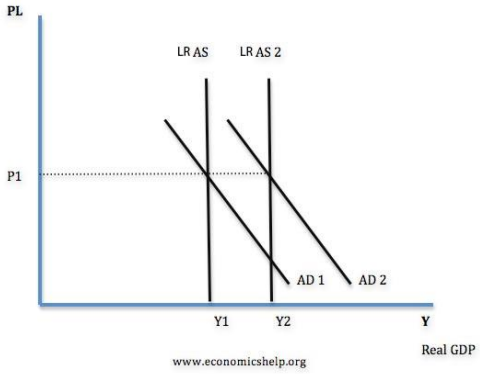
- Increased wages. Higher real wages increase disposable income and encourages consumer spending.
- Increased government spending (G). e.g. government investment on building new roads.
- Fall in value of sterling which makes exports cheaper and increases quantity of exports(X).
- Increased consumer confidence, which encourages spending (C).

- Lower income tax which increases disposable income of consumers and increases consumer spending (C).
- Rising house prices, which create a positive wealth effect and encourages homeowners to spend more.

**2. Long term economic growth**

This requires an increase in the long run aggregate supply (productive capacity) as well as AD.

**Graph 3: Diagram showing long run economic growth**




LRAS or potential growth can increase for the following reasons:

1. Increased capital. e.g. investment in new factories or investment in infrastructure, such as roads and telephones.
2. Increase in working population, e.g. through immigration, higher birth rate.
3. Increase in labour productivity, through better education and training or improved technology.

**Figure 4 : UK Labour Productivity Growth**


more on [labour productivity]

4. Discovering new raw materials.

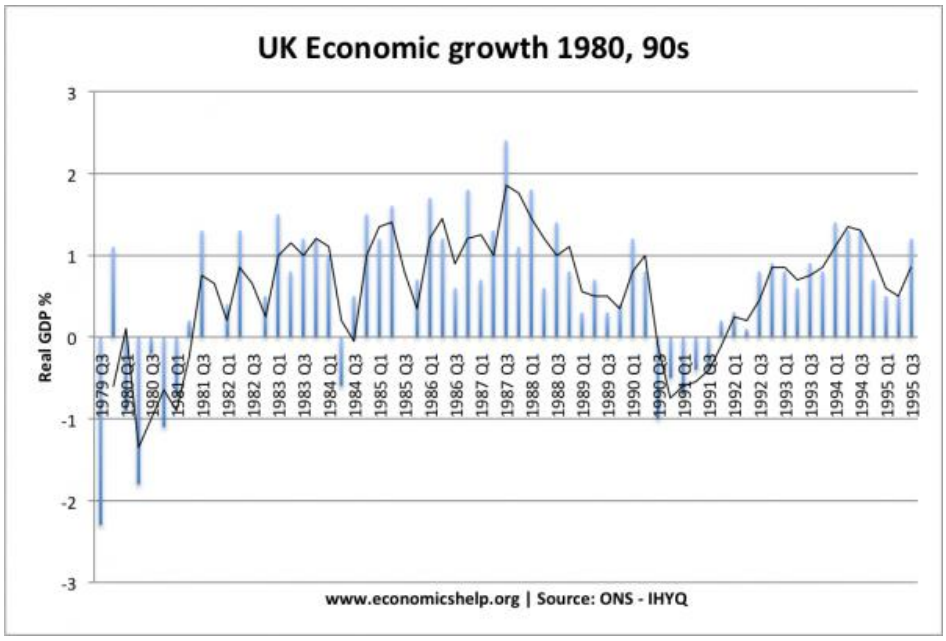
5. Technological improvements to improve the productivity of capital and labour e.g. Microcomputers and the internet have both contributed to increased economic growth.

**Other factors affecting economic growth**

- Economic and political stability. Stability is important for reassuring firms it is a good idea to invest in increasing capacity. If we see a rise in uncertainty, confidence tends to fall and this can cause firms to delay investment.
- Low inflation. Low inflation is a good climate for encouraging business investment. High inflation increases volatility.

**Figure 5 : Periods of economic growth in UK**

**1980s boom**




In the 1980s, the UK achieved rapid rates of economic growth, this was caused by

- Cuts in income tax, increasing disposable income
- Boom in house prices, which caused a positive wealth effect
- Rise in confidence, especially amongst south
- Low real interest rates

**The Related Reviews**

### 2.2.3. Expansionary fiscal policy and employment

After the increase in aggregate demand drives up production in the economy, the theory predicts that the labor market will be the next beneficiary. As producers increase their production and expand their operations to meet the new demand, they will, in theory, also hire new workers to support their growth; (Arthur, 2003).

### 2.2.4 EMPICAL EVIDENCE

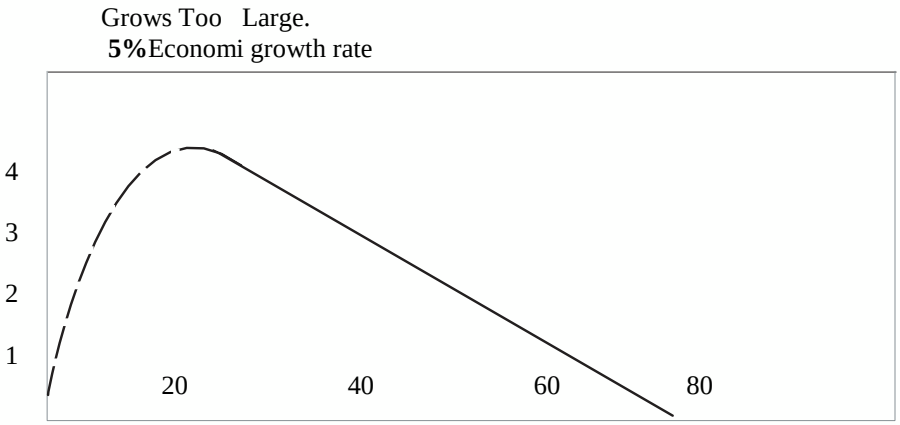
So what does the academic literature say about the empirical relationship between taxes and economic growth? While there are a variety of methods and data sources, the results consistently point to significant negative effects of taxes on economic growth even after controlling for various other factors such as government spending, business cycle conditions,

and monetary policy. In this review of the literature, I find twenty-six such studies going back to 1983, and all but three of those studies, and every study in the last fifteen years, find a negative effect of taxes on growth of those studies that distinguish between types of taxes, **corporate income** taxes are found to be most harmful, followed by **personal income taxes, consumption taxes** and **property taxes**.

These results support the Neo-classical view that income and wealth must first be produced and then consumed, meaning that taxes on the factors of production, i.e., capital and labor, are particularly disruptive of wealth creation(William,2012).

Indeed, almost every economist would agree that there are circumstances in
Which lower levels of government spending would enhance economic growth and other circumstances in which higher levels of government spending would be desirable.
If government spending is zero, presumably there will be very little economic growth because enforcing contracts, protecting property, and developing an infrastructure would be very difficult if there were no government at all. In other words, some government spending is necessary for the successful operation of the rule of law. Figure below illustrates this point. Economic activity is very low or nonexistent in the absence of government, but it jumps dramatically as core functions of government are financed (Daniel Mitchell, 2015.

**Figure 6 : HE Rahn : Economy shrinks when Government**




Government Spending as Percentage GDP

Source: Peter Brimelow" Why the deficits is the wrong Numbers .‟Farbes , March 15,1993.

## 2.2.5 GOVERNMENT EXPENDITURES

Government expenditure, also known as government spending, refers to the resources a government allocates to achieve its strategic objectives and satisfy the needs of the members of the nation. Governments spend money on health care, education, Social Security benefits, and infrastructure and defense activities. Annual government budgets specify the breakdown of funds for a fiscal year. Total government expenditure includes federal government expenditure, as well as state and local government expenditure (www.ehow.com).

Policymakers are divided as to whether government expansion helps or hinders economic growth. Advocates of bigger government argue that government programs provide valuable "public goods" such as education and infrastructure. They also claim that increases in government spending can bolster economic growth by putting money into people's pockets.

Proponents of smaller government have the opposite view. They explain that government is too big and that higher spending undermines economic growth by transferring additional resources from the productive sector of the economy to government, which uses them less efficiently. They also warn that an expanding public sector complicates efforts to implement pro-growth policies-such as fundamental tax reform and personal retirement accounts- because critics can

use the existence of budget deficits as a reason to oppose policies that would strengthen the economy (Daniel Mitchell, 2015).

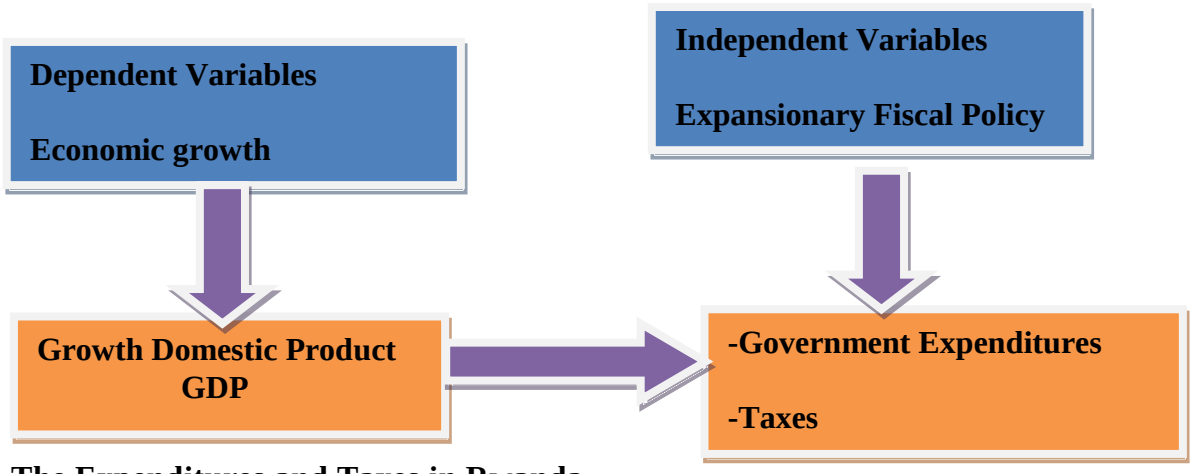
### 2.2.6 TAXES

Taxes are generally an involuntary fee levied on individuals that is enforced by a government entity, whether local, regional or national in order to finance government activities. In economics, taxes fall on whoever pays the burden of the tax, whether this is the entity being taxed, like a business, or the end consumers of the business's goods(William;2013).

### 2.2.7 Conceptual Framework

Below are indicated independent and depending variables included in the research topic impact of expansionary fiscal policy on economic growth in Rwanda. The conceptual framework interlinks independent and dependent variables as depicted in the figure below:

**Figure 7: Conceptual Framework**




**The Expenditures and Taxes in Rwanda**

**Table 1 : Revenue (Provisional)**

| *(billion Rwf)* | **Proj.** | **Prov.** |
|---|---|---|
| **Total revenue** | 460.5 | 447.3 |
| Tax revenue | 416.1 | 406.3 |
| Direct taxes | 166.9 | 166.3 |
| Taxes on goods and services | 218.9 | 211.2 |
| Taxes on international trade | 30.2 | 28.8 |
| Non-tax revenue | 44.4 | 41.0 |
| of which PKO (incl. CAR&Juba) | 31.5 | 29.8 |
| of which Other (including LG fees) | 12.9 | 11.2 |

Source: MINECOFIN in the Report done in 2014

### 2.2.8 Tax Revenue Collections

In the area of domestic tax revenue collections, provisional data is reporting the accrual of tax revenue amounting to RWF 406.3 billion as against RWF 416.1 billion projected for the period. There was therefore a shortfall in tax revenue collections of RWF 9.8 billion. Whilst collections from direct taxes were on track, taxes on goods and services and taxes on international trade accounted for the shortfall.

In the case of taxes on goods and services, collections of RWF 211.2 billion registered a shortfall of RWF 7.8 billion as against RWF 218.9 billion estimated for the period. Both excise taxes and VAT collections contributed to the shortfall. The shortfall from excise taxes was due to lower sales of the local beer as well as lower excise taxes from imports on account of lower import of petroleum products and wine and liquors. The shortfall from VAT collections was mainly due to lower than expected accrual of receipts from the implementation of the electronic machines ( EBM) as well as lower than expected imports mentioned above resulting in lower collections from import VAT.

With respect to taxes on international trade, collections of RWF 28.8 billion were RWF 1.4billion lower than the RWF 30.2 billion projected for the period. The shortfall was due to lower than expected imports in 2014 especially of taxable consumer goods. Import of consumer goods in 2014 rose only marginally by 5.2% compared to an increase of 22.6% projected for the year. Major contributors to the shortfall were rice, edible oils and fats, furniture and other construction accessories including tubes and pipes.

**2.2.9 EXPENDITURES**

| | Proj. | Prov. |
|---|---|---|
| **Total expenditure and net lending** | 830.1 | 758.9 |
| **Current expenditure** | 428.2 | 426.5 |
| Wages and salaries | 105.7 | 101.9 |
| Purchases of goods and services | 90.8 | 101.6 |
| Interest payments | 21.4 | 21.8 |
| Domestic Int (paid) | 7.9 | 8.2 |
| External Int (due) | 13.5 | 13.6 |
| Transfers | 149.7 | 140.3 |
| Exceptional social expenditure | 60.6 | 60.9 |
| **Capital expenditure** | 339.0 | 307.6 |
| Domestic | 167.4 | 128.6 |
| Foreign | 171.7 | 179.0 |
| **Net lending** | | |
| Source: MINECOFIN | 24.8 | 62.8 |

With regards to total spending, the resource shortfall mentioned above together with delayed implementation of projects led to lower spending both on commitment and payment basis than projected for the July- December 2014 period. Accordingly total expenditure and net lending of RWF 758.9 billion was RWF 71.2 billion lower than the RWF 830.1 billion estimated for the period. Capital spending and expenditures under net lending contributed to this lower overall spending. RWF 758.9 billion was RWF 71.2 billion lower than the RWF 830.1 billion estimated for the period. Capital spending and expenditures under net lending contributed to this lower overall spending.

**2.2.10. Economic growth in Rwanda**

Rwanda's economy has remained on a strong growth path with real gross domestic product

(GDP) growth increasing to 8.8% in 2011 from 7.6% in 2010 higher than the initial projection of 7.0%. Growth was driven in 2011 by good harvests thanks to the crop-intensification programme, leading to an 8.2% expansion in the agriculture sector, an increase in exports largely due to rising commodity prices and high domestic demand supported by expanding credit to the private sector. Industry reported the highest growth rate, 15.1%, owing to a rebound in mining and construction, which grew by 15.5% and 22.3% respectively; (BNR, 2013).

Expansion in government spending and recovery in tourism have also contributed to growth. Growth in services at 7.2% was lower than the 9.6% reported in 2010, owing to slower growth in transport and communications as well as in financial services. GDP growth is projected to go down to 7.6% in 2012 as programmed fiscal consolidation reduces aggregate demand and also on account of global economic uncertainties. Inflation is still single-digit but rising, having increased from 0.2% at end-2010 to 8.3% year-on-year in December 2011, and leading to a rise in average headline inflation from 2.3% in 2010 to 5.6% in 2011. Average headline inflation is projected to edge further upwards to 6.0% and 6.9% in 2012 and 2013 respectively, reflecting growing fuel prices and the high energy share of imports, estimated at 18% in 2011; (BNR, 2013).

The medium-term outlook remains favorable with GDP growth projected to benefit from increased capital spending to finance the government's strategic investments programme, from increased agriculture productivity due to greater investments in agricultural infrastructure and inputs (livestock infrastructure, fertilizers, and seeds), and from a rebound in the services sector. The current-account deficit is projected to persist in the short-to-medium term owing to capital imports associated with the planned large public sector investments. Moreover, sustained efforts to diversify the export base will be necessary to reduce vulnerabilities to external shocks. The factors most affecting youth unemployment adversely are the problem of skills mismatch with an average skills deficit of 40%, and limited job growth and expansion; (MINECOFIN, 2015).

As a result, over 42% of young people are either unemployed or underemployed in subsistence agriculture. Strong policy frameworks, for skills development and job creation for both urban and rural areas and to increase gender equality, are already in place, but more needs to be done to translate these policies into tangible impacts. Several programmes to address youth unemployment have been developed, but there is no systematic interlinkage

between these various initiatives and their coverage remains limited; (MINECOFIN, 2015).

### 2.2.11 Critiques of the existing literature relevant to the research topic

In today's economy, any economic policymaker seeks to expand the money supply to encourage economic growth or combat inflationary price increases, which comes in the form of tax cuts, transfer payments, rebates and increased government spending.

One criticism of this theory comes from the increasingly powerful role technology is playing in productivity and efficiency. As the Internet, smart computers, and cheap sensors work congruently as part of the Internet of Things, many companies are finding ways to increase productivity without the need for major hiring initiatives. Many attribute this to so-called jobless recoveries. There are a few fiscal programs that tend automatically to apply demand stimulus during a recession and demand restraint during an economic boom. Programs of this type are called automatic stabilizers. They are automatic in that, without any new legislative action, they tend to increase the budget deficit (or reduce the surplus) during a recession and increase the surplus (or reduce the deficit) during an economic boom; (Sullivan, 2003).The unemployment compensation system provides an example. This system levies a payroll tax on employment and uses the revenues to provide benefits to workers who are unemployed. When an economy begins to dip into a recession, the government will pay out more money in unemployment benefits as the number of

A laid-off and unemployed worker expands. Simultaneously, the revenues derived from the employment tax will decline because fewer workers are paying into the system.

. (Sullivan, 2003).

## 2.3. Research gap

The expansionary fiscal policy is one of several stabilization policies available to the federal government to address business cycle problems. The previous research theories get into the act of stimulating the economy through expansionary fiscal policy and those theories talked about the expansionary fiscal policy to boost economic growth in the world economy, but there are so few authors that showed how the government should reduce taxes by increasing its expenditures by using empirical analysis that why I have been interested to write on this study by using empirical analysis and I am sure that my work will help many readers here and worldwide in the economic growth.

# CHAPTER THREE:

# RESEARCH METHODOLOGY

## 3.0. Introduction

This chapter presents the methods and techniques, the model, estimation techniques and types of data used in this study in investigating the causality of the expansionary fiscal policy to the improvement of economic growth in Rwanda.

## 3.1 Meaning of research methodology

Research methodology refers to a way to systematically solve the problem. It may be understood as a science of studying how research is done scientifically. (C.R Kothari 2004).

According to Grawitz (2002) research methodology is defined as procedures used in making symmetric observation or otherwise obtaining data, evidence, or information as part of a research project or study. Research methodology uses techniques and methods in order to achieve its objectives. Research methodology looks at the style to be used in the study. This study analyzes the impact of expansionary fiscal policy on economic growth in Rwanda for a period of 23 years starting from 1992 to 2015. The period was chosen because it is long enough to provide realistic findings and available. The Growth Domestic Product, Government expenditures and Taxes were observed on an annual basis.

## 3.2. Research Methods

It seems appropriate at this stage to explain the difference between research methods and research methodology. According to (C.R K Kothari 2004), Research methods may be understood as all those techniques that are used for conduction of research. Research methods or techniques, thus, refer to the methods the researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research, particularly the applied research, to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible. Under this research, research methods can be put into the following three groups:

1. In the first group, we include those methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;
2. The second group consists of those statistical techniques which are used for establishing relationships between the data and the unknowns;
3. The third group consists of those methods which are used to evaluate the accuracy of the results obtained.

### 3.2.1 Econometrics method

This method uses E-views and to estimate by Ordinary Least Square (OLS), the Parameters of model to be identified. These parameters values were used on hypothesis test in order to determine the level of significance in model thus to confirm or reject hypothesis on whether expansionary fiscal policy has a long run relationship on economic growth. Although there is different ways of econometrics methodology (school of thought), the researcher presents here the classical methodology which still to be a dominating one in empirical research in economics and other social and behavioral sciences. (Gujarati. N.D, (2004). Broadly speaking, traditional econometric methodology proceeds along the following lines: Statement of theory or hypothesis, Specification of the mathematical model of the theory, Specification of the statistical, or econometric model, Obtaining the data, Estimation of the parameters of the econometric model, Hypothesis testing, Forecasting or prediction and Using the model for control or policy purposes.

### 3.2.2 Analytical method

This method used to analyze systematically the information and data collected. It will also help the researcher to analyze the data collected and to show the long run relationship between expansionary fiscal policy and economic growth in Rwanda.

### 3.2.3. Statistical method

This is the numerical way that helped the researcher to present the data in graphs, tables and draws. In this study, data analysis and presentation will be conducted using tables and graphs in order to facilitate reading and understanding of our work.

### 3.3. Research Techniques

According to Welman.J.C and Kruger S.J (2001) technique is defined as all resources and processes that enable researchers to gather data and information on the research topic. These includes questionnaire, interviews, secondary source of data or documentary technique and so on. As other scientific works, to collect data of this research, the following technique was used:

#### 3.3.1. Documentation /Secondary Data

Secondary data means data that are already available i.e., they refer to the data which have already been collected and analyzed by someone else. When the researcher utilizes secondary data, then he has to look into various sources from where he can obtain them. In this case he is certainly not confronted with the problems that are usually associated with the collection of original data. Secondary data may either be published data or unpublished data. Usually published data are available in: Various publications of the central, state are local governments; Various publications of foreign governments or of international bodies and their subsidiary organizations; Technical and trade journals, Books, magazines and newspapers; Reports and publications of various associations connected with business and industry, banks, stock exchanges, etc.; Reports prepared by research scholars, universities, economists, etc. in different fields; Public records and statistics, historical documents, and other sources of published information.

The sources of unpublished data are many; they may be found in diaries, letters, unpublished biographies and autobiographies and also may be available with scholars and research workers, trade associations, labor bureaus and other public/ private individuals and organizations. Secondary data source is most used during this research where data of Growth Domestic Products; Government expenditures; and Taxes; are collected from MINECOFIN and in NBR archives.

#### 3.3.2. Computer programs

The whole work of analyzing the data was done with the help of computer programs. One search program that was used extensively in the study is E-Views 3.1. The choice of E-Views 3.1 program is constrained by the availability of programs and the appropriateness to

handle the task at hand. This program is chosen because it is appropriate for this kind of research and can handle the estimations envisaged.

### 3.4 Model specification and rationale of variables

In this section the researcher shows how he has proceeded in his analysis of the economic problem. The start-up of the model is the specification of a mathematical model. The mathematical model is an equation that express relation between dependent and independent variables; the changes in the dependent variables is explained by 100% changes occurred on the independent variables, The estimated model analyzes the impact of expansionary fiscal policy on economic growth in Rwanda.

The Growth Domestic Product(GDP) is the only dependent variable which is under consideration for simplification of testing variables and other variables, Government expenditures and Taxes are independent variables. So the Growth Domestic Products stand for the performance is hypothetically assumed to be a function of Government Expenditures, and Taxes.

Once we assume that all changes in dependent variable are not 100% explained by changes in independent variables, we have to add on the mathematical model error term to present other factors that may have influence on the dependent variable. The model becomes an econometric model because of this error term. Normally, to find a neat relationship among variables is impossible, that is why there is introduction of a disturbance term or error term to represent other factors that may have influence on dependent variable.

### 3.4 .The Data Used

Secondary data was gathered for this study. Review of available literature was used for collecting secondary data accordingly and this is very good method as argued by (Kumar, 2005). The data needed for this research has been collected from the archives of MINECOFIN,NBR.

**Table 2: The Used Data(in billion)**

| YEAR | GDP | GEXP | TAXES |
|---|---|---|---|
| 1992 | 279.56 | 66.48 | 43.79 |
| 1993 | 287.19 | 68.25 | 43.51 |
| 1994 | 218.12 | 26.59 | 7.44 |
| 1995 | 290.12 | 69.39 | 61.39 |
| 1996 | 386.56 | 95.29 | 70.51 |
| 1997 | 441.98 | 109.67 | 95.42 |
| 1998 | 482.65 | 117.43 | 98.49 |
| 1999 | 513.89 | 161.61 | 128.74 |
| 2000 | 548.91 | 147.46 | 144.69 |
| 2001 | 580.84 | 166.68 | 149.75 |
| 2002 | 635.52 | 191.89 | 171.22 |
| 2003 | 857.33 | 214.96 | 197.88 |
| 2004 | 940.78 | 266.83 | 275.02 |
| 2005 | 1274.59 | 332.86 | 344.09 |
| 2006 | 1416.45 | 386.56 | 376.42 |
| 2007 | 1548.72 | 490.74 | 464.21 |
| 2008 | 1862.38 | 649.74 | 659.63 |
| 2009 | 2187.11 | 754.28 | 727.96 |
| 2010 | 2351.15 | 879.36 | 828.25 |
| 2011 | 2554.82 | 998.12 | 984.79 |
| 2012 | 2768.73 | 1174.54 | 1043.41 |
| 2013 | 2987.39 | 1452.59 | 1258.18 |
| 2014 | 3219.64 | 1731.56 | 1463.91 |
| 2015 | 3628.33 | 2014.76 | 1901.65 |

***Source: Secondary Data, NBR&MINECOFIN, Annual Report, 1992-2015***

### 3.5. Specification of The model

The Growth Domestic Product (GDP) will be used as the dependent variable and Government Expenditures (GEX) and Taxes, as independent variables in the estimation.

The Econometric Model will be presented as follows:

$GDP_t = \beta_0 + \beta_1 GEX_t + \beta_2 Taxes_t + \varepsilon_t$ Where, **GDP** Stands for Growth Domestic Product as measurement of performance, **GEX** Stands for **Government Expenditure, Taxes** Stands for Taxes**,** and $\boldsymbol{\varepsilon_t}$ Stands for **Error term.**

In this research, quantitative methods with secondary data analyzed by computer program called «E-VIEWS 3.1» will be considered.

βo is constant term and β1,β2, are coefficients respectively to be estimated empirically in the econometric model. In addition, the qualitative and quantitative impacts of each of these variables on Profitability or improvement of economic growth. A lot of other information is also obtained. For instance, it will be possible to know what the different partial elasticity that pertained by each variable is. The augmented Duckey-Fuller Unit Root Test will be used for the purpose of data analysis throughout the research. According to Gujarati (1999: 455-467), it is this test which detects the stationary of a variable. Many other tests will also be conducted. According to Gujarati (1999: 377-398), the Durbin-Watson test, the Runs test or the examination of the residuals are techniques that will be used in relation to the problem of serial correlation.

### 3.6. Model estimation

Computer program is used to estimate our model; such program is called E-views 3.1. The parameters are estimated by applying Ordinary Least Square (OLS), These parameters values were used on hypothesis test in order to determine the level of significance in model thus to confirm or reject hypothesis on whether expansionary fiscal policy has a long run relationship on economic growth in Rwanda for a period of 1992-2015

### 3.7. Testing the model

#### 3.7.1. Stationary and co-integration test

Due to spurious regression resulting from non-stationary series in the regressions, we have conducted the tests for stationary, using ADF to check whether the residual series are white noise. As many time series data are not stationary, this has pushed some econometrics to develop other theories for time series analysis. ENGLE and GRANGER assumed that a linear combination of two or more non-stationary time series may be stationary. The main requirement is that these series are in the same moment, it means that they integrated by the same order or the highest order is at least on two series. If this linear combination exists, the non-stationary series are said to be co integrated. The linear combination that is stationary is

said to be the co integrating equation and may be taken as the long run relationship between variables. All tests were run within E-views3.1.

### 3.7.2.2 Test of autocorrelation

The term autocorrelation may be defined as "correlation between members of series of observations ordered in time as in time series data or space as in cross-sectional data. In the regression context, the classical linear regression model assumes that such autocorrelation does not exist in the disturbances $\mathcal{E}_i$. Durbin-Watson, and Breush-Godfrey test are used to test the presence of autocorrelation in long run.

### 3.8.2. Limitations of the study

In most cases, researchers are confronted with a number of problems while conducting the research. These included the following:

- ✓ Difficult availability of reliable source of secondary data that is available to scholars without administrative constraints and bureaucracy; the researcher made effort to get enough time to access all relevant information.
- ✓ Access to some documents is often very difficult for they are taken to be confidential: the researcher was more tactful and diplomatic to collect all needed information.

# CHAPTER FOUR:

# MODEL ESTIMATION AND FINDINGS

## 4.1. Introduction

This chapter analyzes the impact of expansionary fiscal policy on economic growth in Rwanda with econometric test of stationary, co-integration, whether the independent variables have or not the effect on the economic growth in Rwanda as the case study. As an econometrics is the application of mathematics, statistical methods, to economic data and is described as the branch of economics that aims to give empirical content to economic relations.

This section consists of testing if there is long run relationship (cointegration) between expansionary fiscal policy " the government expenditures (GEXP) exceed Revenues (Taxes) " and Economic growth (GDP) by using years data over the period from 1992 up to 2015.

Therefore, the transformations of variables in Logarithm form as they will be interpreted in percentage.

**GDP**= Log (GDP)

**GEXP**= Log (GEXP)

**TAXES**=Log (TAXES)

Our model become: $GDP = \beta_0 + \beta_1 \mathbf{GEXP} - \beta_2 \mathbf{Taxes} + \varepsilon_t$

The stationary of **Economic growth** and **expansionary fiscal policy variables** is examined by using ADF unit root test and the length of lags to be used is determined using Akaike and schwaz criteria. Following tables were produced by using EVIEWS and shows clearly how lags corresponding to different variables (GDP, GEXP, TAXES and error terms).

### 4.1.1 Time series Properties of the Data

Prior to carrying out the model, it is necessary to examine the time series properties of the variables included in it. This allows one to determine whether or not the regression is

spurious. For this purpose stationary of the data set is checked by using a simple appropriate test named Dickey- Fuller. The lag length used in the test is determined using the AKAIKE (AIC) and the Schwartz Bayesian Criterion (SBC) mainly. According to this criterion, the model to be preferred should have the smallest AKAIKE or the smallest SBC.

### 4.1.2 The Impact of expansionary fiscal policy on economic growth in Rwanda (GDP) The econometric Approach

The exogenous variables in the model are Government expenditure (GEX), Taxes and Error Terms ($\mathcal{E}_t$ ) means others determinants can influence growth and the endogenous variable are economic growth(GDP)**.**

### 4.2 USED DATA

Data is found in the appendix, all the data has been NBR&MINECOFIN Database from 1992 to 2015. All the data are time series and cover the period from 1992 to 2015.

### 4.2.1 Estimation of Econometric Model

Econometric techniques are used to estimate economic models, which ultimately allow you to explain how various factors affect some outcome of economic growth or to forecast future events. The ordinary least squares (OLS) technique is the most popular method of performing regression analysis and estimating econometric models, because in standard situations (meaning the model satisfies a series of statistical assumptions) it produces optimal (the best possible) results**.**

### 4.2.2. Test of the Econometric Model of Government Expenditures, Taxes and the Performance on Economic growth in the long run

| | | | |
|---|---|---|---|
| Date: 07/03/16 Time: 14:14 | | | |
| n Sample(adjusted): 1992 2015 | | | |
| Included observations: 22 after adjusting endpoints | | | |
| Standard errors & t-statistics in parentheses | | | |
| $GDP=\beta_O+\beta_1 GEXP(-1)-\beta_2 TAXES(-1)+\mathcal{E}_t$ | | | |
| | GEXP | TAXES | GDP2 |
| GEXP(-1) | 0.154078 | -0.439004 | -0.148405 |

| | | | |
|---|---|---|---|
| | (0.94820) | (1.77736) | (0.42603) |
| | (0.16249) | (-0.24700) | (-0.34835) |
| GEXP(-2) | 0.094914 | -0.324202 | -0.206730 |
| | (0.95526) | (1.79058) | (0.42920) |
| | (0.09936) | (-0.18106) | (-0.48167) |
| TAXES(-1) | -0.168018 | -0.028498 | -0.012870 |
| | (0.52394) | (0.98210) | (0.23541) |
| | (-0.32068) | (-0.02902) | (-0.05467) |
| TAXES(-2) | -0.233723 | -0.015754 | -0.041436 |
| | (0.41718) | (0.78198) | (0.18744) |
| | (-0.56025) | (-0.02015) | (-0.22107) |
| GDP2(-1) | 1.238562 | 2.013170 | 1.177278 |
| | (0.95149) | (1.78351) | (0.42750) |
| | (1.30171) | (1.12877) | (2.75385) |
| GDP2(-2) | 0.352808 | 0.482885 | 0.353163 |
| | (1.03579) | (1.94153) | (0.46538) |
| | (0.34062) | (0.24871) | (0.75887) |
| C | -4.298320 | -6.903914 | -1.217457 |
| | (1.77021) | (3.31817) | (0.79536) |
| | (-2.42814) | (-2.08064) | (-1.53071) |
| R-squared | 0.956270 | 0.882122 | 0.983983 |
| Adj. R-squared | 0.938779 | 0.834971 | 0.977577 |
| Sum sq. resids | 1.227768 | 4.313818 | 0.247849 |
| S.E. equation | 0.286096 | 0.536272 | 0.128543 |
| F-statistic | 54.66956 | 18.70844 | 153.5879 |
| Log likelihood | 0.527646 | -13.29524 | 18.12911 |
| Akaike AIC | 0.588396 | 1.845022 | -1.011737 |

| | | | |
|---|---|---|---|
| Schwarz SC | 0.935546 | 2.192172 | -0.664588 |
| Mean dependent | 5.777837 | 5.634071 | 6.956102 |
| S.D. dependent | 1.156274 | 1.320097 | 0.858417 |
| Determinant Residual Covariance | | 1.51E-06 | |
| Log Likelihood | | 53.78427 | |
| Akaike Information Criteria | | -2.980388 | |
| Schwarz Criteria | | -1.938938 | |

**Source: Eviews3**

### 4.2.3 The estimated parameters of econometric model:

GDP=-4.298 + 0.1540 GEXP (-1) – 0.168 TAXES (-1)

As estimated parameters of econometric model seen above, it is clearly observed that one coefficient of explanatory variable (GEXP) is expected to affect positively the dependent variable(GDP) and the other coefficient of explanatory variable(Taxes) is expected to affect negatively the dependent variable(GDP), The impact of expansionary fiscal policy on economic growth in Rwanda from 1992-2015 substituted the equation showed that one unit change in economic growth almost increased by 15.4% respectively the reduction of Taxes by 16.8% due to the unit change of economic growth from 1992-2015.

### 4.2.4. Test of the Econometric Model of Government Expenditures, Taxes and the Performance on Growth domestic products in the short run

| Dependent Variable: D(GDP2,2) | | | | |
|---|---|---|---|---|
| Method: Least Squares | | | | |
| Date: 06/28/16 Time: 16:09 | | | | |
| Sample(adjusted): 2002 2014 | | | | |
| Included observations: 8 | | | | |
| Excluded observations: 5 after adjusting endpoints | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(GEXP,3) | 0.443607 | 0.661705 | -0.670400 | 0.5393 |

| | | | | |
|---|---|---|---|---|
| D(TAXES,3) | 0.710901 | 0.362170 | 1.962894 | 0.1212 |
| E(-1) | 0.248445 | 0.089627 | 2.771981 | 0.0502 |
| C | 0.776760 | 0.264355 | 2.938319 | 0.0425 |
| R-squared | 0.679458 | Mean dependent var | | 0.040174 |
| Adjusted R-squared | -0.439051 | S.D. dependent var | | 0.133836 |
| S.E. of regression | 0.100239 | Akaike info criterion | | -1.455675 |
| Sum squared resid | 0.040191 | Schwarz criterion | | -1.415954 |
| Log likelihood | 9.822700 | F-statistic | | 2.826286 |
| Durbin-Watson stat | 2.916462 | Prob(F-statistic) | | 0.170638 |

Source eviews 3.1

$\Delta GDP = 0.776760+0.443607D\Delta(GEXP)+0.710901\Delta(TAXES) +0.248445U_{t-1}$

The slopes of the coefficient are in line with a priori (predictions). The Coefficients are positive on Government expenditure, and for the taxes at 5% level of significant. That is a percentage change in GDP (Economic growth) that will increase per unit change in Government expenditure and will increase per unit change in Taxes. The R-square test is used to show the total variation of the dependent variable that can be explained by the independent variable. The $R^2$ is equal to **67.9%** of the dependent variable (Gross Domestic product) can be explained by the change in Government Expenditure, and change in Taxes.

### 4.2.5 Test of Individual significance of Parameters

During the interpretation, we used a significance level of 5% (two tailed test) to test the significance of the influence of expansionary fiscal policy on the economic growth in Rwanda and this research topic has been presented into econometric model which explain the effects of each independent variable on the dependent variable.

**Lets: $GDP=\beta_O+\beta_1 GEXP(-1)-\beta_2 TAXES(-1)+\mathcal{E}_t$**

#### 4.2.5.1. Government Expenditure

$H_0=0$, Government expenditure has no impact on economic growth, taken as null hypothesis.

$H_1>0$, government expenditure has statistically impact on the economic growth.

By considering its probability (0.5393) which is greater than 5% level of significance, we

found that B1 is statistically significant by an increase of 44.32%. Thus the government expenditure have a significant positive impact on the performance of economic growth in Rwanda in the Short run.

#### 4.2.5.2. Taxes

$H_0$=0, Taxes have no impact on economic growth, taken as null hypothesis.
$H_1$>0, taxes have statistically impact on the economic growth.

The t-statistic calculated in absolute is 1.96 in econometric Model as it is found in the estimation table, whereas the critical value 5%. Therefore the calculated t-statistics is greater than the critical value: we reject Ho. B2 is statistically significant. Thus the taxes have a significant positive impact on the economic growth in Rwanda in the Short run.

#### 4.2.5.3. Residual (Others Factors can influence the Economic growth)

$H_0$=0, Residual have no impact on economic growth, taken as null hypothesis.
$H_1$>0, Residual have statistically impact on the economic growth.

The t-statistic calculated is 2.77 in econometric Model as it is found in the estimation table, whereas the critical value 5%. Therefore the calculated t-statistics is greater than the critical value: we reject Ho. The residual is statistically significant. Thus there are other factors which have a significant positive impact in the increase of economic growth in Rwanda except government expenditure and taxes in the Short run.

### 4.3. Test for stationary

The footstep of this analysis is to determine whether the series are stationary or not. The ADF was used to test for stationary of these series as it provides a superior test to DF, especially in case the residuals of the regression could be serially correlated. The lag length has been automatically selected by AIC from eleven proposed lags and all three possibilities have been tested: Neither intercept nor trend, intercept but no trend and both intercept and trend.

**Table 3: STATIONARITY OF GROSS DOMESTIC PRODUCT**

Null Hypothesis: D (GDP, 2) has a unit root

(Automatic - based on SC and Akaike, Used lag=2)

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | **-3.056535** | 1% | Critical Value* | -3.8067 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% | Critical Value | **-3.0199** | |
| | | 10% | Critical Value | -2.6502 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 18:37 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GDP(-1)) | -1.131187 | 0.370088 | -3.056535 | 0.0075 | |
| D(GDP(-1),2) | 0.235594 | 0.224432 | 1.049735 | 0.3094 | The probability of the intercept is less than 5%; So, it is significant |
| D(GDP(-2),2) | 0.093518 | 0.155294 | 0.602199 | 0.5555 | |
| C | 0.139617 | 0.050010 | 2.791765 | 0.0131 | |
| R-squared | 0.492736 | Mean dependent var | | -0.008287 | |
| Adjusted R-squared | 0.397624 | S.D. dependent var | | 0.106629 | |
| S.E. of regression | 0.082758 | Akaike info criterion | | - | |

| | | | | |
|---|---|---|---|---|
| | | | 1.968947 | |
| Sum squared resid | 0.109581 | Schwarz criterion | -1.769801 | |
| Log likelihood | 23.68947 | F-statistic | 5.180581 | |
| Durbin-Watson stat | 2.275321 | Prob(F-statistic) | 0.010835 | |

Source :E-views 3

**Interpretation:**

As the absolute value /ADF/ of -3.05 is greater than /5%/ critical value of -3.0199, Gross Domestic Product (economic growth) is stationary at lag 2, 1st difference and function with intercept, It implies that the data are co-integrated in the long run**.**

**Table 4: .STATIONARITY OF GOVERNMENT EXPENDITURE**

| | | | | |
|---|---|---|---|---|
| Null Hypothesis: GEXP has a unit root<br>Exogenous: Constant<br>Lag Length: 5 (Automatic - based on SIC, max lag=5) | | | | |
| ADF Test Statistic | **-2.391408** | 1% Critical Value* | -2.7275 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% Critical Value | **-1.9642** | |
| | | 10% Critical Value | -1.6269 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | |
| Augmented Dickey-Fuller Test Equation<br>Dependent Variable: D(GEXP,3)<br>Method: Least Squares<br>Date: 06/27/16 Time: 13:23<br>Sample(adjusted): 2000 2015<br>Included observations: 16 after adjusting endpoints | | | | |

| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
|---|---|---|---|---|---|
| D(GEXP(-1),2) | -1.824033 | 0.762745 | -2.391408 | 0.0379 | |
| D(GEXP(-1),3) | 0.488034 | 0.595009 | 0.820212 | 0.4312 | |
| D(GEXP(-2),3) | 0.395489 | 0.493285 | 0.801746 | 0.4413 | |
| D(GEXP(-3),3) | 0.431333 | 0.338488 | 1.274292 | 0.2314 | |
| D(GEXP(-4),3) | 0.258347 | 0.165741 | 1.558736 | 0.1501 | |
| D(GEXP(-5),3) | 0.026936 | 0.076359 | 0.352754 | 0.7316 | |
| R-squared | 0.959893 | Mean dependent var | | -0.017198 | |
| Adjusted R-squared | 0.939839 | S.D. dependent var | | 0.256410 | |
| S.E. of regression | 0.062891 | Akaike info criterion | | -2.414816 | |
| Sum squared resid | 0.039553 | Schwarz criterion | | -2.125095 | |
| Log likelihood | 25.31853 | Durbin-Watson stat | | 1.655474 | |

As the absolute value /ADF/ of 2.391408 is greater than /5%/ critical value of -1.9642, Government expenditure are stationary at lag 5, at second difference and function with None, It implies that the data are co-integrated in the long run.

**Table 5:.STATIONARITY OF TAXES**

**SECOND DIFFERENCE AND NONE**

**Null Hypothesis: TAXES has a unit root**

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, max lag=3)

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | **-3.366242** | 1% | Critical Value* | -2.7057 | |
| | | 5% | Critical Value | **-1.9614** | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 10% | Critical Value | -1.6257 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 20:05 | | | | | |
| Sample(adjusted): 1998 2015 | | | | | |
| Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(TAXES(-1),2) | -1.800713 | 0.534933 | -3.366242 | 0.0046 | |
| D(TAXES(-1),3) | 0.337455 | 0.339744 | 0.993263 | 0.3374 | |
| D(TAXES(-2),3) | 0.157401 | 0.161457 | 0.974881 | 0.3462 | |
| D(TAXES(-3),3) | 0.018720 | 0.057797 | 0.323897 | 0.7508 | |
| R-squared | 0.830962 | Mean dependent var | | -0.002992 | |
| Adjusted R-squared | 0.794739 | S.D. dependent var | | 0.264742 | |
| S.E. of regression | 0.119943 | Akaike info criterion | | -1.210467 | |
| Sum squared resid | 0.201409 | Schwarz criterion | | -1.012607 | |
| Log likelihood | 14.89420 | Durbin-Watson stat | | 2.067616 | |

As the absolute value /ADF/ of -3.366242 is greater than /5%/ critical value of -1.9614, Taxes is stationary at lag 3, at the Second difference and function with none, It implies that the data are co-integrated in the long run.

**Table 6 : TEST FOR THE STATIONARY RESIDUALS**

**Null Hypothesis: TAXES has a unit root**

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, max lag=0)

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | **-8.983295** | 1% | Critical Value* | -9.0170 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% | Critical Value | **-5.5367** | |
| | | 10% | Critical Value | -4.2061 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |

Dependent Variable: D(E)

Method: Least Squares

Date: 06/28/16 Time: 11:13

Sample(adjusted): 2002 2013

Included observations: 4

Excluded observations: 8 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|

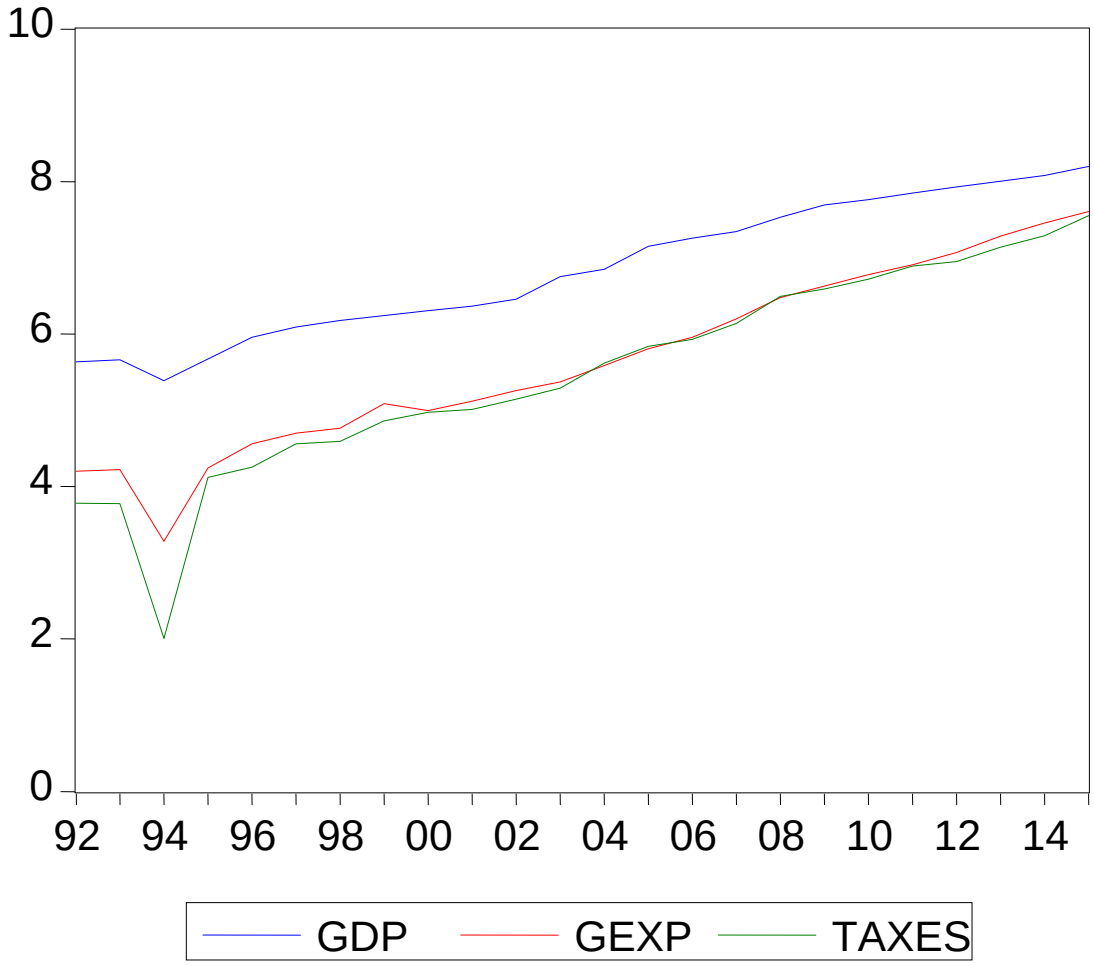
| | | | | | |
|---|---|---|---|---|---|
| E(-1) | -1.587965 | 0.176769 | -8.983295 | 0.0706 | The probability of the Trends is greater than 5%; it is not significant |
| C | -3.968762 | 0.689139 | -5.759017 | 0.1095 | |
| @TREND(1992) | -0.038238 | 0.037891 | -1.009163 | 0.4971 | |
| R-squared | 0.988223 | Mean dependent var | | 0.593949 | |
| Adjusted R-squared | 0.964668 | S.D. dependent var | | 1.560983 | |
| S.E. of regression | 0.293414 | Akaike info criterion | | 0.499243 | |
| Sum squared resid | 0.086092 | Schwarz criterion | | 0.038964 | |
| Log likelihood | 2.001513 | F-statistic | | 41.95465 | |
| Prob(F-statistic) | 0.108523 | | | | |

As the absolute value /ADF/ of -8.983295 is greater than /5%/ critical value of -5.5367, Residual is stationary at lag 0, at the first difference and function of level-trend and intercept, It implies that the data are co-integrated in the long run.

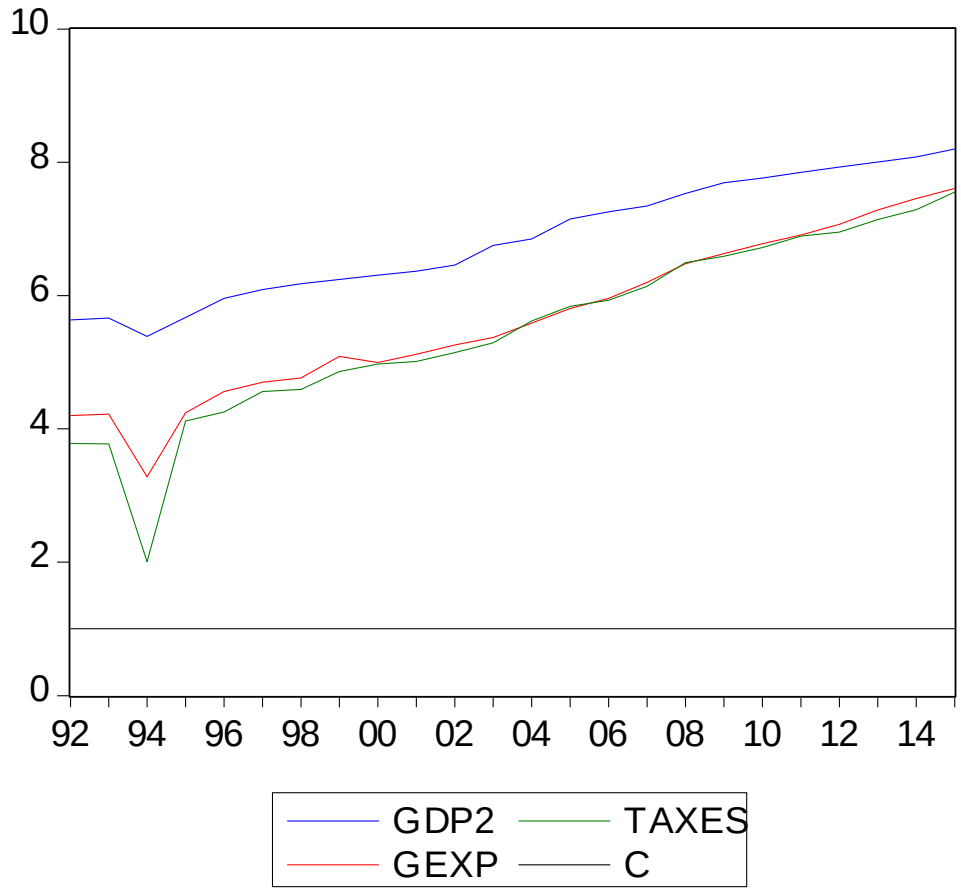
## GRAPHICAL REPRESENTATION

We can also observe that situation of stationary between variable GDP and GEXP, TAXES at first difference through the graphs below:

Graph 4 : Graph 1: GDP GEXP TAXES



**Graph 5 : GDP GEXP TAXES C**

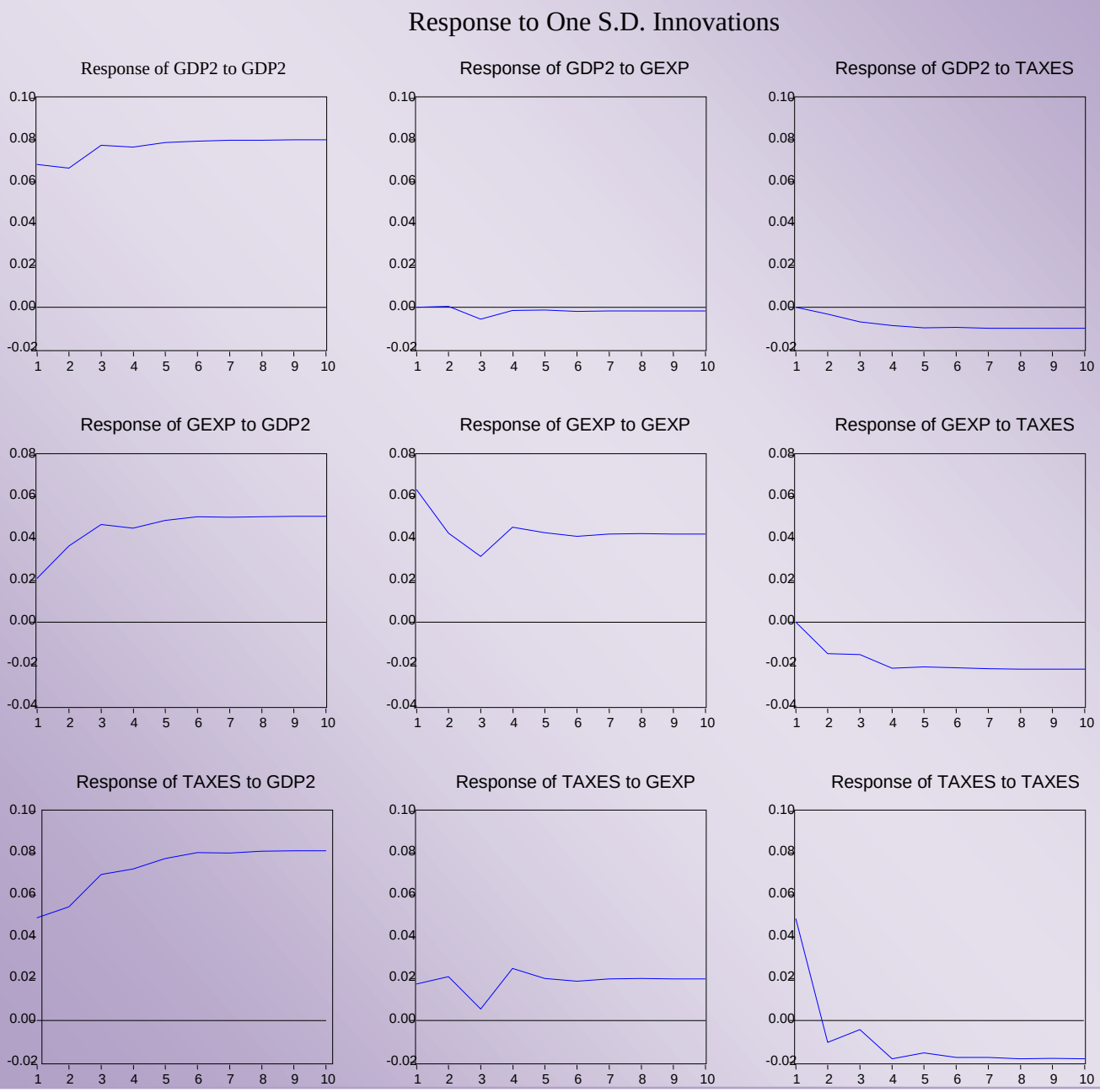



**Interpretation**

According to the table 3.3 figures we conclude that there is a strong impact of tax and government expenditures because of significant relationship of tax reduction and increase in government expenditures on the total GDP. This relationship is explained by the $R^2$ which is closing to 1. This is also illustrated by the adjusted $R^2$ which is also closing to 1.

GEXP on lag (-1) and lag (-2) are contributing on GDP as the T-calculated and standard errors illustrated in the estimate VAR (Vector Auto regression Estimate).We also found that tax lag(-2) contributed on GDP significantly this is proved by the T-Statistic and standard error .From the the estimate VAR( Vector auto regression Estimate)the intercept is negative because of lag 2 for tax and government expenditures on change in GDP(economic growth).

## Graph 6 : Multiple Graph of GDP GEXP AND TAXES



## INTERPRATATION

The above nine figures are useful in the interpretation of the relationship between change in GDP and tax together with GEXP from the first figure we observed that GDP of previous year has a high an impact on GDP of current year.

We also observed that GDP has a small impact on government expenditure as illustrated by the second graph.

The third graph shows that GDP has a small impact on tax because the contribution of GDP on tax tends to be zero.

The fourth graph shows that the government expenditure has a very significant impact on GDP because the contribution of government expenditure is positive and it is having an increasing a positive slop.

The fifth graph shows that Government expenditure as a decreasing contribution on government expenditure and finally the contribution become constant for more years.

The sixth graph shows that government expenditures have a negative contribution on taxes because it is negatively related to the tax (when tax rate increases government expenditures reduce and vice versa).

The seventh graph shows the significant impact of taxes on GDP and it is positive tending to 0.1 which is 10%, the contribution increase at a good rhythm.

The eighth graph shows the low contribution of taxes on government expenditure and this is explained by the negative relationship between tax and government expenditures.

Finally, we found that the last figure which is ninth shows the very big decrease of relationship between taxes on tax. As the contribution is illustrated by the negative slop of tax contribution on tax among different years.

# CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.0 Discussion

This chapter presents a summary of the main findings as well as discussion on their policy implications. It further offers the main conclusion and a number of recommendations for Rwanda's policy makers and finally acknowledges the limitations of the study.

## 5.1. Summary of findings and policy implications

The main objective of the study was to examine how the fiscal policy variables impact on economic growth in Rwanda. The examination was done by regressing economic growth on three Expansionary fiscal variables (Gross Domestic Product, Government Expenditures and Taxes) using VAR model.

The adoption of VAR model was motivated by the need to capture the short-run and long-run dynamics. The VAR approach to cointegration advanced by pasaran et al. (2001) was used to estimate the impact of expansionary fiscal variables on economic growth for the period (1992-2015).

The results of the bounds test for cointegration proved that the expansionary fiscal variables affect Rwanda's economic growth in the long run. It indicates that the economic growth effect of expansionary fiscal policy is not only a short-term phenomenon but also a long term one as well. This is in line with the conclusions made by the endogenous growth models with respect to the impact of the expansionary fiscal variables on economic growth.

On the expansionary fiscal variables, the regression indicates that there is a significant positive relationship between Government expenditure and economic growth. The regression shows that there is a non significant positive relationship between GDP and Taxes. This implies that the government expenditure contributes passively to the growth and the non significance of taxes contributes negatively to the growth.

In this interval of year(1992-2015) Government of Rwanda use the policy of expansionary fiscal policy to influence the level of aggregate demand in the economy, in an effort to achieve economic objectives of price stability, full employment, and economic growth.

Keynesian economics suggests that increasing government spending and decreasing tax rates are the best ways to stimulate aggregate demand.

## 5.2. Conclusion and recommendations

From an evaluation of the overall analysis and results, it can be concluded that the government expenditure have had significant long-run impacts on economic growth in Rwanda and the taxes have had long run non significant impact on economic growth in Rwanda.

Among predicament that often features in the designing of recommendations for studies of this nature has been the biasness normally associated with evaluating a particular policy on the basis of its effect on output and not welfare which is the ultimate objective. In light of this, the study follows the usual approach in assuming that economic growth shares as positive relation with welfare advancement. Based on the findings and theirs implications reported in the preceding section. The study recommends the following policy measures to help government achieve the desired GDP growth in Rwanda:

## 5.3. Policy implications and recommendations

The following recommendations are widely supported to the:

- To improve the level of investment in different domains.

- Policy maker can take the method of decreasing tax rate then increasing the method of collecting taxes like the use of electronic billing machine (EBM) in collection of taxes.

- To avoid the corruption in distribution and in stabilization of government expenditures in order to get on the sustainability of economic growth.

- Government must focus on the prioritization of government expenditures in order to avoid unemployment and to stimulate the purchasing power between the populations.

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# APPENDICES

**Data not Processed with E-Views**

**Macroeconomic data of Rwanda (in billion Rwf)**

| YEAR | GDP | GEXP | TAXES |
|---|---|---|---|
| 1992 | 279.56 | 66.48 | 43.79 |
| 1993 | 287.19 | 68.25 | 43.51 |
| 1994 | 218.12 | 26.59 | 7.44 |
| 1995 | 290.12 | 69.39 | 61.39 |
| 1996 | 386.56 | 95.29 | 70.51 |
| 1997 | 441.98 | 109.67 | 95.42 |
| 1998 | 482.65 | 117.43 | 98.49 |
| 1999 | 513.89 | 161.61 | 128.74 |
| 2000 | 548.91 | 147.46 | 144.69 |
| 2001 | 580.84 | 166.68 | 149.75 |
| 2002 | 635.52 | 191.89 | 171.22 |
| 2003 | 857.33 | 214.96 | 197.88 |
| 2004 | 940.78 | 266.83 | 275.02 |
| 2005 | 1274.59 | 332.86 | 344.09 |
| 2006 | 1416.45 | 386.56 | 376.42 |
| 2007 | 1548.72 | 490.74 | 464.21 |
| 2008 | 1862.38 | 649.74 | 659.63 |
| 2009 | 2187.11 | 754.28 | 727.96 |
| 2010 | 2351.15 | 879.36 | 828.25 |
| 2011 | 2554.82 | 998.12 | 984.79 |
| 2012 | 2768.73 | 1174.54 | 1043.41 |
| 2013 | 2987.39 | 1452.59 | 1258.18 |
| 2014 | 3219.64 | 1731.56 | 1463.91 |
| 2015 | 3628.33 | 2014.76 | 1901.65 |

***Source: Secondary Data, NBR&MINECOFIN, Annual Report, 1992-2015***

**GDP: Gross Domestic Product; GEXP: Government Expenditures and TAXES (Government revenues)**

**Test the Stationary of Growth Domestic Products (GDP)**

**Table 2: Level and trend and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -1.587358 | 1% Critical Value* | | -4.4691 | |
| | | 5% Critical Value | | -3.6454 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 10% Critical Value | | -3.2602 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 16:23 | | | | | |
| Sample(adjusted): 1995 2015 | | | | | |
| Included observations: 21 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| GDP(-1) | -0.388373 | 0.244666 | -1.587358 | 0.1320 | The probability of the TRENDS is greater than 5%; it is not significant |
| D(GDP(-1)) | 0.072273 | 0.183816 | 0.393182 | 0.6994 | |
| D(GDP(-2)) | -0.020408 | 0.170862 | -0.119444 | 0.9064 | |
| C | 2.195821 | 1.245404 | 1.763140 | 0.0970 | |
| @TREND(1992) | 0.046974 | 0.032377 | 1.450868 | 0.1661 | |
| R-squared | 0.309728 | Mean dependent var | | 0.133880 | |
| Adjusted R-squared | 0.137160 | S.D. dependent var | | 0.085524 | |
| S.E. of regression | 0.079442 | Akaike info criterion | | -2.023318 | |
| Sum squared resid | 0.100977 | Schwarz criterion | | -1.774623 | |
| Log likelihood | 26.24484 | F-statistic | | 1.794818 | |

| | | | |
|---|---|---|---|
| Durbin-Watson stat | 1.521012 | Prob(F-statistic) | 0.179254 |

**Table 3: Eviews table at Level and Intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -1.545617 | 1% | Critical Value* | -3.7856 | |
| | | 5% | Critical Value | -3.0114 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 10% | Critical Value | -2.6457 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 16:39 | | | | | |
| Sample(adjusted): 1995 2015 | | | | | |
| Included observations: 21 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| GDP(-1) | -0.034809 | 0.022521 | -1.545617 | 0.1406 | |
| D(GDP(-1)) | -0.092523 | 0.149146 | -0.620350 | 0.5433 | |
| D(GDP(-2)) | -0.152427 | 0.149243 | -1.021337 | 0.3214 | The probability of the intercept is less than 5%; it is significant |
| C | 0.401805 | 0.153303 | 2.620978 | 0.0179 | |
| R-squared | 0.218913 | Mean dependent var | | 0.133880 | |
| Adjusted R-squared | 0.081075 | S.D. dependent var | | 0.085524 | |
| S.E. of regression | 0.081983 | Akaike info criterion | | -1.994956 | |
| Sum squared resid | 0.114262 | Schwarz criterion | | - | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 1.796000 | |
| Log likelihood | 24.94704 | F-statistic | | 1.588184 | |
| Durbin-Watson stat | 1.653413 | Prob(F-statistic) | | 0.229088 | |

**Level with none (Neither intercept &trend nor intercept)**

**Table 4: Eviews table at the level with none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | 4.581866 | 1% | Critical Value* | -2.6819 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 5% | Critical Value | -1.9583 | |
| | | 10% | Critical Value | -1.6242 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 16:56 | | | | | |
| Sample(adjusted): 1995 2015 | | | | | |
| Included observations: 21 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| GDP(-1) | 0.023093 | 0.005040 | 4.581866 | 0.0002 | |
| D(GDP(-1)) | -0.091671 | 0.171750 | -0.533750 | 0.6000 | |
| D(GDP(-2)) | -0.180097 | 0.171431 | -1.050546 | 0.3074 | |
| R-squared | -0.096716 | Mean dependent var | | 0.133880 | |
| Adjusted R-squared | -0.218573 | S.D. dependent var | | 0.085524 | |
| S.E. of regression | 0.094409 | Akaike info criterion | | -1.750805 | |
| Sum squared resid | 0.160434 | Schwarz criterion | | -1.601587 | |

| | | | | | |
|---|---|---|---|---|---|
| Log likelihood | 21.38345 | Durbin-Watson stat | | 1.274315 | |

**FIRST DIFFERENCE AND TREND INTERCPET**

**Table 5: Eviews table at first difference and trend intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.067886 | 1% | Critical Value* | -4.5000 | ADF is greater than critical value at 5%; there is unit root, then it is not stationary as well. |
| | | 5% | Critical Value | -3.6591 | |
| | | 10% | Critical Value | -3.2677 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 17:52 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GDP(-1)) | -1.173506 | 0.382513 | -3.067886 | 0.0078 | |
| D(GDP(-1),2) | 0.226875 | 0.228981 | 0.990802 | 0.3375 | The probability of the trend is greater than 5%; it is not significant |
| D(GDP(-2),2) | 0.086485 | 0.158539 | 0.545514 | 0.5934 | |
| C | 0.176253 | 0.075926 | 2.321364 | 0.0348 | |
| @TREND(1992) | -0.002279 | 0.003503 | -0.650661 | 0.5251 | |
| R-squared | 0.506660 | Mean dependent var | | -0.008287 | |
| Adjusted R-squared | 0.375102 | S.D. dependent var | | 0.106629 | |
| S.E. of regression | 0.084290 | Akaike info criterion | | - | |

| | | | | |
|---|---|---|---|---|
| | | | 1.896781 | |
| Sum squared resid | 0.106573 | Schwarz criterion | - | |
| | | | 1.647847 | |
| Log likelihood | 23.96781 | F-statistic | 3.851245 | |
| Durbin-Watson stat | 2.187060 | Prob(F-statistic) | 0.023979 | |

**FIRST DIFFERENCE AND INTERCEPT**

**Table 6: Eviews table at first difference and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.056535 | 1% | Critical Value* | -3.8067 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% | Critical Value | -3.0199 | |
| | | 10% | Critical Value | -2.6502 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GDP,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/26/16 Time: 18:37 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GDP(-1)) | -1.131187 | 0.370088 | -3.056535 | 0.0075 | |
| D(GDP(-1),2) | 0.235594 | 0.224432 | 1.049735 | 0.3094 | The probability of the intercept is less than 5%; So, it is significant |
| D(GDP(-2),2) | 0.093518 | 0.155294 | 0.602199 | 0.5555 | |
| C | 0.139617 | 0.050010 | 2.791765 | 0.0131 | |
| R-squared | 0.492736 | Mean dependent var | | - | |

| | | | | |
|---|---|---|---|---|
| | | | 0.008287 | |
| Adjusted R-squared | 0.397624 | S.D. dependent var | 0.106629 | |
| S.E. of regression | 0.082758 | Akaike info criterion | -1.968947 | |
| Sum squared resid | 0.109581 | Schwarz criterion | -1.769801 | |
| Log likelihood | 23.68947 | F-statistic | 5.180581 | |
| Durbin-Watson stat | 2.275321 | Prob(F-statistic) | 0.010835 | |

**LEVEL AND TREND AND INTERCEPT**

**Table 8: Eviews table at Level-Trend and Intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.538727 | 1% | Critical Value* | -4.5743 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 5% | Critical Value | -3.6920 | |
| | | 10% | Critical Value | -3.2856 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 10:12 | | | | | |
| Sample(adjusted): 1998 2015 | | | | | |
| Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| GEXP(-1) | -0.792191 | 0.223863 | -3.538727 | 0.0054 | The probability of the trend is less than 5%; it is significant |
| D(GEXP(-1)) | 0.126898 | 0.148928 | 0.852073 | 0.4141 | |
| D(GEXP(-2)) | 0.267049 | 0.155086 | 1.721934 | 0.1158 | |

| | | | | | |
|---|---|---|---|---|---|
| D(GEXP(-3)) | 0.371654 | 0.166349 | 2.234180 | 0.0495 | |
| D(GEXP(-4)) | 0.206459 | 0.091949 | 2.245352 | 0.0486 | |
| D(GEXP(-5)) | -0.051081 | 0.066025 | -0.773663 | 0.4570 | |
| C | 2.685756 | 0.710492 | 3.780138 | 0.0036 | |
| @TREND(1992) | 0.140459 | 0.038232 | 3.673863 | 0.0043 | |
| R-squared | 0.862991 | Mean dependent var | | 0.161710 | |
| Adjusted R-squared | 0.767084 | S.D. dependent var | | 0.088474 | |
| S.E. of regression | 0.042699 | Akaike info criterion | | -3.168191 | |
| Sum squared resid | 0.018232 | Schwarz criterion | | -2.772471 | |
| Log likelihood | 36.51372 | F-statistic | | 8.998251 | |
| Durbin-Watson stat | 1.786248 | Prob(F-statistic) | | 0.001256 | |

**INTERPRETATION**

**Level and Intercept**

**Table 9: Eviews table at Level and Intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | 1.516643 | 1% | Critical Value* | -3.8572 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 5% | Critical Value | -3.0400 | |
| | | 10% | Critical Value | -2.6608 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 11:08 | | | | | |
| Sample(adjusted): 1998 2015 | | | | | |
| Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficien | Std. Error | t-Statistic | Prob. | |

| | | | | | |
|---|---|---|---|---|---|
| t | | | | | |
| GEXP(-1) | 0.028860 | 0.019029 | 1.516643 | 0.1576 | |
| D(GEXP(-1)) | -0.078213 | 0.201792 | -0.387594 | 0.7057 | The probability of the intercept is greater than 5%; it is not significant |
| D(GEXP(-2)) | -0.075645 | 0.181083 | -0.417738 | 0.6842 | |
| D(GEXP(-3)) | -0.157606 | 0.121568 | -1.296445 | 0.2214 | |
| D(GEXP(-4)) | -0.069973 | 0.077244 | -0.905863 | 0.3844 | |
| D(GEXP(-5)) | -0.236368 | 0.062279 | -3.795325 | 0.0030 | |
| C | 0.092357 | 0.117800 | 0.784017 | 0.4496 | |
| R-squared | 0.678066 | Mean dependent var | | 0.161710 | |
| Adjusted R-squared | 0.502465 | S.D. dependent var | | 0.088474 | |
| S.E. of regression | 0.062406 | Akaike info criterion | | -2.425003 | |
| Sum squared resid | 0.042840 | Schwarz criterion | | -2.078748 | |
| Log likelihood | 28.82503 | F-statistic | | 3.861409 | |
| Durbin-Watson stat | 1.799581 | Prob(F-statistic) | | 0.025405 | |

**LEVEL AND NONE**

**Table 10: Eviews table at Level and None**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | 4.219123 | 1% | Critical Value* | -2.7057 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well |
| | | 5% | Critical Value | -1.9614 | |
| | | 10% | Critical Value | -1.6257 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP) | | | | | |
| Method: Least Squares | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Date: 06/27/16 Time: 11:21<br>Sample(adjusted): 1998 2015<br>Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| GEXP(-1) | 0.041548 | 0.009848 | 4.219123 | 0.0012 | |
| D(GEXP(-1)) | -0.088833 | 0.198078 | -0.448474 | 0.6618 | |
| D(GEXP(-2)) | -0.060564 | 0.177144 | -0.341890 | 0.7383 | |
| D(GEXP(-3)) | -0.111009 | 0.104332 | -1.063993 | 0.3083 | |
| D(GEXP(-4)) | -0.049066 | 0.071322 | -0.687955 | 0.5046 | |
| D(GEXP(-5)) | -0.226379 | 0.059975 | -3.774566 | 0.0026 | |
| R-squared | 0.660076 | Mean dependent var | | 0.161710 | |
| Adjusted R-squared | 0.518441 | S.D. dependent var | | 0.088474 | |
| S.E. of regression | 0.061396 | Akaike info criterion | | -2.481740 | |
| Sum squared resid | 0.045234 | Schwarz criterion | | -2.184949 | |
| Log likelihood | 28.33566 | Durbin-Watson stat | | 1.647762 | |

**FIRST DIFFERENCE AND TREND - INTERCEPT**

Table 11: Eviews table at first difference and trend intercept **INTERPRETATION**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.293537 | 1% | Critical Value* | -4.6193 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.7119 | |
| | | 10% | Critical Value | -3.2964 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root.<br><br>Augmented Dickey-Fuller Test Equation | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Dependent Variable: D(GEXP,2)<br>Method: Least Squares<br>Date: 06/27/16 Time: 11:30<br>Sample(adjusted): 1999 2015<br>Included observations: 17 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1)) | -1.277332 | 0.556927 | -2.293537 | 0.0475 | The probability of the trend is greater than 5%; it is not significant |
| D(GEXP(-1),2) | 0.271463 | 0.359881 | 0.754313 | 0.4699 | |
| D(GEXP(-2),2) | 0.373059 | 0.307711 | 1.212365 | 0.2562 | |
| D(GEXP(-3),2) | 0.472649 | 0.243558 | 1.940603 | 0.0842 | |
| D(GEXP(-4),2) | 0.275421 | 0.141789 | 1.942465 | 0.0840 | |
| D(GEXP(-5),2) | 0.009999 | 0.087332 | 0.114497 | 0.9114 | |
| C | 0.191753 | 0.082335 | 2.328931 | 0.0448 | |
| @TREND(1992) | 0.001796 | 0.003703 | 0.485093 | 0.6392 | |
| R-squared | 0.914981 | Mean dependent var | | 0.004889 | |
| Adjusted R-squared | 0.848855 | S.D. dependent var | | 0.143075 | |
| S.E. of regression | 0.055624 | Akaike info criterion | | -2.635219 | |
| Sum squared resid | 0.027846 | Schwarz criterion | | -2.243119 | |
| Log likelihood | 30.39936 | F-statistic | | 13.83690 | |
| Durbin-Watson stat | 1.664486 | Prob(F-statistic) | | 0.000369 | |

**FIRST DIFFERENCE AND INTERCEPT**

**Table 12: Eviews table at first difference and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.470062 | 1% | Critical Value* | -3.8877 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |

| | | | | | |
|---|---|---|---|---|---|
| | | 5% Critical Value | | -3.0521 | |
| | | 10% Critical Value | | -2.6672 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 11:43 | | | | | |
| Sample(adjusted): 1999 2015 | | | | | |
| Included observations: 17 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1)) | -1.140823 | 0.461860 | -2.470062 | 0.0331 | |
| D(GEXP(-1),2) | 0.209697 | 0.323478 | 0.648258 | 0.5314 | |
| D(GEXP(-2),2) | 0.340979 | 0.288802 | 1.180664 | 0.2651 | |
| D(GEXP(-3),2) | 0.458034 | 0.232263 | 1.972053 | 0.0769 | The probability of the constant is less than 5%; it is significant |
| D(GEXP(-4),2) | 0.256628 | 0.131076 | 1.957863 | 0.0787 | |
| D(GEXP(-5),2) | -0.006176 | 0.077568 | -0.079619 | 0.9381 | |
| C | 0.197088 | 0.078416 | 2.513375 | 0.0307 | |
| R-squared | 0.912758 | Mean dependent var | | 0.004889 | |
| Adjusted R-squared | 0.860412 | S.D. dependent var | | 0.143075 | |
| S.E. of regression | 0.053455 | Akaike info criterion | | -2.727056 | |
| Sum squared resid | 0.028574 | Schwarz criterion | | -2.383968 | |
| Log likelihood | 30.17998 | F-statistic | | 17.43723 | |
| Durbin-Watson stat | 1.682263 | Prob(F-statistic) | | 0.000091 | |

**FIRST DIFFERENCE AND NONE**

**Table 13: Eviews table at first difference and none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | 0.028267 | 1% | Critical Value* | -2.7158 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -1.9627 | |
| | | 10% | Critical Value | -1.6262 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 12:04 | | | | | |
| Sample(adjusted): 1999 2015 | | | | | |
| Included observations: 17 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1)) | 0.002733 | 0.096675 | 0.028267 | 0.9780 | |
| D(GEXP(-1),2) | -0.497686 | 0.194204 | -2.562700 | 0.0264 | |
| D(GEXP(-2),2) | -0.254940 | 0.200833 | -1.269414 | 0.2305 | |
| D(GEXP(-3),2) | 0.027319 | 0.190942 | 0.143073 | 0.8888 | |
| D(GEXP(-4),2) | 0.013965 | 0.107973 | 0.129339 | 0.8994 | |
| D(GEXP(-5),2) | -0.144746 | 0.066454 | -2.178143 | 0.0520 | |
| R-squared | 0.857646 | Mean dependent var | | 0.004889 | |
| Adjusted R-squared | 0.792940 | S.D. dependent var | | 0.143075 | |
| S.E. of regression | 0.065105 | Akaike info criterion | | -2.355078 | |
| Sum squared resid | 0.046625 | Schwarz criterion | | -2.061002 | |
| Log likelihood | 26.01816 | Durbin-Watson stat | | 1.670664 | |

**Table 14: Second difference and intercept with trend**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.090214 | 1% | Critical Value* | -4.6712 | |
| | | 5% | Critical Value | -3.7347 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 10% | Critical Value | -3.3086 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 12:56 | | | | | |
| Sample(adjusted): 2000 2015 | | | | | |
| Included observations: 16 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1),2) | -1.794701 | 0.858621 | -2.090214 | 0.0700 | |
| D(GEXP(-1),3) | 0.447584 | 0.690279 | 0.648411 | 0.5349 | The probability of the constant is greater than 5%; it is not significant |
| D(GEXP(-2),3) | 0.363165 | 0.577119 | 0.629272 | 0.5467 | |
| D(GEXP(-3),3) | 0.414516 | 0.392101 | 1.057167 | 0.3213 | |
| D(GEXP(-4),3) | 0.257623 | 0.185717 | 1.387179 | 0.2028 | |
| D(GEXP(-5),3) | 0.029615 | 0.085699 | 0.345572 | 0.7386 | |
| C | 0.017711 | 0.073892 | 0.239680 | 0.8166 | |
| @TREND(1992) | -0.001117 | 0.004391 | -0.254433 | 0.8056 | |
| R-squared | 0.960218 | Mean dependent var | | -0.017198 | |
| Adjusted R-squared | 0.925409 | S.D. dependent var | | 0.256410 | |
| S.E. of regression | 0.070029 | Akaike info criterion | | -2.172956 | |
| Sum squared resid | 0.039233 | Schwarz criterion | | - | |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 1.786661 | |
| Log likelihood | 25.38365 | F-statistic | | 27.58504 | |
| Durbin-Watson stat | 1.688595 | Prob(F-statistic) | | 0.000054 | |

**Table 15: Second difference and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.267472 | 1% | Critical Value* | -3.9228 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.0659 | |
| | | 10% | Critical Value | -2.6745 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 13:15 | | | | | |
| Sample(adjusted): 2000 2015 | | | | | |
| Included observations: 16 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1),2) | -1.825070 | 0.804892 | -2.267472 | 0.0496 | |
| D(GEXP(-1),3) | 0.490468 | 0.633650 | 0.774037 | 0.4588 | |
| D(GEXP(-2),3) | 0.398315 | 0.530427 | 0.750933 | 0.4719 | The probability of the constant is greater than 5%; it is not significant |
| D(GEXP(-3),3) | 0.433342 | 0.364500 | 1.188868 | 0.2649 | |
| D(GEXP(-4),3) | 0.258862 | 0.175742 | 1.472964 | 0.1749 | |

| | | | | | |
|---|---|---|---|---|---|
| D(GEXP(-5),3) | 0.026904 | 0.080494 | 0.334238 | 0.7459 | |
| C | -0.000477 | 0.017716 | -0.026933 | 0.9791 | |
| R-squared | 0.959896 | Mean dependent var | | -0.017198 | |
| Adjusted R-squared | 0.933160 | S.D. dependent var | | 0.256410 | |
| S.E. of regression | 0.066291 | Akaike info criterion | | -2.289896 | |
| Sum squared resid | 0.039550 | Schwarz criterion | | -1.951889 | |
| Log likelihood | 25.31917 | F-statistic | | 35.90271 | |
| Durbin-Watson stat | 1.655247 | Prob(F-statistic) | | 0.000009 | |

**INTERPRETATION**

**Table 16: Second difference and none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.391408 | 1% | Critical Value* | -2.7275 | |
| | | 5% | Critical Value | -1.9642 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 10% | Critical Value | -1.6269 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(GEXP,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 13:23 | | | | | |
| Sample(adjusted): 2000 2015 | | | | | |
| Included observations: 16 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(GEXP(-1),2) | -1.824033 | 0.762745 | -2.391408 | 0.0379 | |
| D(GEXP(-1),3) | 0.488034 | 0.595009 | 0.820212 | 0.4312 | |
| D(GEXP(-2),3) | 0.395489 | 0.493285 | 0.801746 | 0.4413 | |

| | | | | | |
|---|---|---|---|---|---|
| D(GEXP(-3),3) | 0.431333 | 0.338488 | 1.274292 | 0.2314 | |
| D(GEXP(-4),3) | 0.258347 | 0.165741 | 1.558736 | 0.1501 | |
| D(GEXP(-5),3) | 0.026936 | 0.076359 | 0.352754 | 0.7316 | |
| R-squared | 0.959893 | Mean dependent var | | -0.017198 | |
| Adjusted R-squared | 0.939839 | S.D. dependent var | | 0.256410 | |
| S.E. of regression | 0.062891 | Akaike info criterion | | -2.414816 | |
| Sum squared resid | 0.039553 | Schwarz criterion | | -2.125095 | |
| Log likelihood | 25.31853 | Durbin-Watson stat | | 1.655474 | |

**Conclusion:**

Basing on the results figured in this table above, where ADF Test statistic **(-2.391408)**< 5% Critical value (**-1.9642**); Based on this assumption with respect to our hypothesis, we have enough confidence to conclude that by Using the ADF Test statistic by considering None and second difference, H1 (presence of unit root) can be rejected at 5% for variable **GEXP**. In other words, **GEXP** become stationary after second difference with none because ADF test statistic value is less than the test critical value.

**GDP**~ I(1),**GDP is integrated on order one and GEXP**~ I(2); **GDP=$\alpha O$+$\alpha_1$GEXP+$\varepsilon_t$;** Based on the this model we are going to test simultaneously **GDP** and **GEXP** to check if there are long run relationship between this variables.

And I am going to continue to do on the variable of TAXES and the error term.

**LEVEL TREND AND INTERCEPT**

**Table 18: E-Views table at the level-trend and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.249959 | 1% | Critical Value* | -4.5000 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.6591 | |
| | | 10% | Critical Value | -3.2677 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(TAXES)

Method: Least Squares

Date: 06/27/16 Time: 14:38

Sample(adjusted): 1996 2015

Included observations: 20 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| TAXES(-1) | -0.609683 | 0.270975 | -2.249959 | 0.0411 | |
| D(TAXES(-1)) | 0.083573 | 0.106888 | 0.781873 | 0.4473 | The probability of the constant is less than 5%; it is significant |
| D(TAXES(-2)) | 0.072940 | 0.077048 | 0.946685 | 0.3599 | |
| D(TAXES(-3)) | -0.012948 | 0.050306 | -0.257394 | 0.8006 | |
| C | 2.176266 | 0.880812 | 2.470750 | 0.0269 | |
| @TREND(1992) | 0.107426 | 0.047978 | 2.239057 | 0.0419 | |
| R-squared | 0.433461 | Mean dependent var | | 0.171662 | |
| Adjusted R-squared | 0.231125 | S.D. dependent var | | 0.094011 | |
| S.E. of regression | 0.082434 | Akaike info criterion | | -1.910304 | |
| Sum squared resid | 0.095136 | Schwarz criterion | | -1.611585 | |
| Log likelihood | 25.10304 | F-statistic | | 2.142289 | |
| Durbin-Watson stat | 1.817282 | Prob(F-statistic) | | 0.120114 | |

**LEVEL AND INTERCEPT**

**Table 19: E-Views table at the level and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -0.199949 | 1% | Critical Value* | -3.8067 | |
| | | 5% | Critical Value | -3.0199 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 10% | Critical Value | -2.6502 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 14:50 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |

| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
|---|---|---|---|---|---|
| TAXES(-1) | -0.004978 | 0.024895 | -0.199949 | 0.8442 | The probability of the constant is greater than 5%; it is not significant |
| D(TAXES(-1)) | -0.058989 | 0.096661 | -0.610267 | 0.5508 | |
| D(TAXES(-2)) | -0.026302 | 0.070954 | -0.370687 | 0.7161 | |
| D(TAXES(-3)) | -0.078694 | 0.045988 | -1.711177 | 0.1076 | |
| C | 0.232612 | 0.168079 | 1.383946 | 0.1866 | |
| R-squared | 0.230584 | Mean dependent var | | 0.171662 | |
| Adjusted R-squared | 0.025407 | S.D. dependent var | | 0.094011 | |
| S.E. of regression | 0.092809 | Akaike info criterion | | -1.704219 | |
| Sum squared resid | 0.129204 | Schwarz criterion | | -1.455286 | |
| Log likelihood | 22.04219 | F-statistic | | 1.123828 | |
| Durbin-Watson stat | 1.920590 | Prob(F-statistic) | | 0.382184 | |

**INTERPRETATION**

Using augmented Dickey Fuller (ADF) test statistic by including a constant (intercept) without trend and second level, the unit root cannot be rejected at 5% means that there is unit root for variable TAXES but there is not stationary and the intercepts is not significant; thus we need to do other test on second level and none as in the following table

**LEVEL AND NONE**

**Table 20: E-Views table at the level- and none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | 4.520834 | 1% | Critical Value* | -2.6889 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -1.9592 | |
| | | 10% | Critical Value | -1.6246 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 15:08 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| TAXES(-1) | 0.028420 | 0.006286 | 4.520834 | 0.0003 | |
| D(TAXES(-1)) | 0.033303 | 0.071946 | 0.462896 | 0.6497 | |
| D(TAXES(-2)) | 0.031708 | 0.058864 | 0.538659 | 0.5975 | |
| D(TAXES(-3)) | -0.054033 | 0.043591 | -1.239532 | 0.2330 | |
| R-squared | 0.132340 | Mean dependent var | | 0.171662 | |
| Adjusted R-squared | -0.030347 | S.D. dependent var | | 0.094011 | |
| S.E. of regression | 0.095427 | Akaike info criterion | | -1.684050 | |
| Sum squared resid | 0.145702 | Schwarz criterion | | -1.484904 | |
| Log likelihood | 20.84050 | Durbin-Watson stat | | 2.005689 | |

**FIRST DIFFERENCE AND INTERCEPT WITH TREND**

**Table 21: First difference and intercept with trend**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -2.591533 | 1% | Critical Value* | -4.5348 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.6746 | |
| | | 10% | Critical Value | -3.2762 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 15:25 | | | | | |
| Sample(adjusted): 1997 2015 | | | | | |
| Included observations: 19 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(TAXES(-1)) | -1.014458 | 0.391451 | -2.591533 | 0.0224 | The probability of the constant is greater than 5%; it is not significant |
| D(TAXES(-1),2) | -0.029565 | 0.218052 | -0.135586 | 0.8942 | |
| D(TAXES(-2),2) | 0.001108 | 0.120801 | 0.009170 | 0.9928 | |
| D(TAXES(-3),2) | -0.034353 | 0.054005 | -0.636104 | 0.5357 | |
| C | 0.156205 | 0.123486 | 1.264962 | 0.2281 | |
| @TREND(1992) | 0.001183 | 0.005075 | 0.233217 | 0.8192 | |
| R-squared | 0.689828 | Mean dependent var | | 0.006479 | |
| Adjusted R-squared | 0.570532 | S.D. dependent var | | 0.149564 | |
| S.E. of regression | 0.098015 | Akaike info criterion | | -1.555308 | |
| Sum squared resid | 0.124890 | Schwarz criterion | | -1.257064 | |

| | | | | | |
|---|---|---|---|---|---|
| Log likelihood | 20.77543 | F-statistic | | 5.782458 | |
| Durbin-Watson stat | 1.923988 | Prob(F-statistic) | | 0.005030 | |

**FIRST DIFFERENCE AND INTERCEPT WITHOUT TREND**

**Table 22: First difference and intercept without trend**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -0.199949 | 1% | Critical Value* | -3.8067 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.0199 | |
| | | 10% | Critical Value | -2.6502 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 15:41 | | | | | |
| Sample(adjusted): 1996 2015 | | | | | |
| Included observations: 20 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| TAXES(-1) | -0.004978 | 0.024895 | -0.199949 | 0.8442 | The probability of the constant is greater than 5%; it is not significant |
| D(TAXES(-1)) | -0.058989 | 0.096661 | -0.610267 | 0.5508 | |
| D(TAXES(-2)) | -0.026302 | 0.070954 | -0.370687 | 0.7161 | |
| D(TAXES(-3)) | -0.078694 | 0.045988 | -1.711177 | 0.1076 | |
| C | 0.232612 | 0.168079 | 1.383946 | 0.1866 | |
| R-squared | 0.230584 | Mean dependent var | | 0.171662 | |
| Adjusted R-squared | 0.025407 | S.D. dependent var | | 0.094011 | |

| | | | | |
|---|---|---|---|---|
| S.E. of regression | 0.092809 | Akaike info criterion | -1.704219 | |
| Sum squared resid | 0.129204 | Schwarz criterion | -1.455286 | |
| Log likelihood | 22.04219 | F-statistic | 1.123828 | |
| Durbin-Watson stat | 1.920590 | Prob(F-statistic) | 0.382184 | |

**FIRST DIFFERENCE AND NONE**

**Table 23: First difference and none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -1.187813 | 1% Critical Value* | | -2.6968 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% Critical Value | | -1.9602 | |
| | | 10% Critical Value | | -1.6251 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES,2) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 15:54 | | | | | |
| Sample(adjusted): 1997 2015 | | | | | |
| Included observations: 19 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(TAXES(-1)) | -0.167667 | 0.141156 | -1.187813 | 0.2534 | |
| D(TAXES(-1),2) | -0.329890 | 0.153310 | -2.151782 | 0.0481 | |
| D(TAXES(-2),2) | -0.173233 | 0.092413 | -1.874547 | 0.0805 | |
| D(TAXES(-3),2) | -0.119733 | 0.043660 | -2.742382 | 0.0151 | |
| R-squared | 0.529994 | Mean dependent var | | 0.006479 | |
| Adjusted R-squared | 0.435993 | S.D. dependent var | | 0.149564 | |
| S.E. of regression | 0.112323 | Akaike info criterion | | -1.350214 | |
| Sum squared resid | 0.189247 | Schwarz criterion | | - | |

| | | | | |
|---|---|---|---|---|
| | | | 1.151385 | |
| Log likelihood | 16.82703 | Durbin-Watson stat | 2.032593 | |

**SECOND DIFFERENCE AND INTERCEPT WITH TREND**

**Table 24: First difference and intercept with trend**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.342377 | 1% | Critical Value* | -4.5743 | ADF is greater than critical value at 5%; there is unit root and it is not stationary as well. |
| | | 5% | Critical Value | -3.6920 | |
| | | 10% | Critical Value | -3.2856 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 18:58 | | | | | |
| Sample(adjusted): 1998 2015 | | | | | |
| Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| D(TAXES(-1),2) | -2.043978 | 0.611534 | -3.342377 | 0.0059 | The probability of the constant is greater than 5%; it is not significant |
| D(TAXES(-1),3) | 0.513653 | 0.398231 | 1.289835 | 0.2214 | |
| D(TAXES(-2),3) | 0.216381 | 0.179135 | 1.207920 | 0.2503 | |
| D(TAXES(-3),3) | 0.030672 | 0.061453 | 0.499113 | 0.6267 | |
| C | -0.108982 | 0.107668 | -1.012206 | 0.3314 | |
| @TREND(1992) | 0.006514 | 0.006640 | 0.980953 | 0.3460 | |
| R-squared | 0.844281 | Mean dependent var | | -0.002992 | |
| Adjusted R-squared | 0.779399 | S.D. dependent var | | 0.264742 | |
| S.E. of regression | 0.124345 | Akaike info criterion | | -1.070319 | |

| | | | | |
|---|---|---|---|---|
| Sum squared resid | 0.185539 | Schwarz criterion | -0.773529 | |
| Log likelihood | 15.63287 | F-statistic | 13.01241 | |
| Durbin-Watson stat | 1.968244 | Prob(F-statistic) | 0.000169 | |

**INTERPRETATION**

Using augmented Dickey Fuller (ADF) test statistic by including second difference with a constant (intercept) with trend, the unit root cannot be rejected at 5% means that there is unit root for variable **TAXES** but there is not stationary and that there is not significant because trend is greater than critical significance of five percentage; thus we need to do other test on second difference and intercept as in the following table.

**SECOND DIFFERENCE AND INTERCEPT WITHOUT TREND**

**Table 25: First difference and intercept without trend**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.204466 | 1% | Critical Value* | -3.8572 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% | Critical Value | -3.0400 | |
| | | 10% | Critical Value | -2.6608 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root.<br>Augmented Dickey-Fuller Test Equation<br>Dependent Variable: D(TAXES,3)<br>Method: Least Squares<br>Date: 06/27/16 Time: 19:33<br>Sample(adjusted): 1998 2015<br>Included observations: 18 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | | |
| D(TAXES(-1),2) | -1.838907 | 0.573858 | -3.204466 | | |
| D(TAXES(-1),3) | 0.364536 | 0.367542 | 0.991820 | | The probability of the |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | intercept is greater than 5%; So, it is significant |
| D(TAXES(-2),3) | 0.167502 | 0.171815 | 0.974895 | 0.3474 | |
| D(TAXES(-3),3) | 0.021152 | 0.060594 | 0.349072 | 0.7326 | |
| C | -0.007944 | 0.031313 | -0.253692 | 0.8037 | |
| R-squared | 0.831794 | Mean dependent var | | -0.002992 | |
| Adjusted R-squared | 0.780039 | S.D. dependent var | | 0.264742 | |
| S.E. of regression | 0.124164 | Akaike info criterion | | -1.104294 | |
| Sum squared resid | 0.200417 | Schwarz criterion | | -0.856969 | |
| Log likelihood | 14.93865 | F-statistic | | 16.07160 | |
| Durbin-Watson stat | 2.039332 | Prob(F-statistic) | | 0.000060 | |

**SECOND DIFFERENCE AND NONE**

**Table 26: First difference and none**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -3.366242 | 1% | Critical Value* | -2.7057 | |
| | | 5% | Critical Value | -1.9614 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 10% | Critical Value | -1.6257 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root. | | | | | |
| Augmented Dickey-Fuller Test Equation | | | | | |
| Dependent Variable: D(TAXES,3) | | | | | |
| Method: Least Squares | | | | | |
| Date: 06/27/16 Time: 20:05 | | | | | |
| Sample(adjusted): 1998 2015 | | | | | |
| Included observations: 18 after adjusting endpoints | | | | | |

| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
|---|---|---|---|---|---|
| D(TAXES(-1),2) | -1.800713 | 0.534933 | -3.366242 | 0.0046 | |
| D(TAXES(-1),3) | 0.337455 | 0.339744 | 0.993263 | 0.3374 | |
| D(TAXES(-2),3) | 0.157401 | 0.161457 | 0.974881 | 0.3462 | |
| D(TAXES(-3),3) | 0.018720 | 0.057797 | 0.323897 | 0.7508 | |
| R-squared | 0.830962 | Mean dependent var | | -0.002992 | |
| Adjusted R-squared | 0.794739 | S.D. dependent var | | 0.264742 | |
| S.E. of regression | 0.119943 | Akaike info criterion | | -1.210467 | |
| Sum squared resid | 0.201409 | Schwarz criterion | | -1.012607 | |
| Log likelihood | 14.89420 | Durbin-Watson stat | | 2.067616 | |

**INTERPRETATION:**

Basing on the results figured in this table above, where ADF Test statistic **(-3.366242)**< 5% Critical value (**-1.9614**); Based on this assumption with respect to our hypothesis, we have enough confidence to conclude that by using the ADF Test statistic by considering None and second difference, H1 (presence of unit root) can be rejected at 5% for variable **TAXES**. In other words, **TAXES** become stationary after second difference with none because ADF test statistic value is less than the test critical value.

**GDP**~ I(1),**GDP is integrated on order one and GEXP**~ I(2),**TAXES**~ I(2),;

**GDP=$\alpha O$+$\alpha_1$GEXP- $\alpha_2$ TAXES +$\varepsilon_t$,** based on the this model we are going to test simultaneously **GDP** ,**GEXP and TAXES** to check if there are long term relationship between this variables.

And I am going to continue to do on the error term.

**TEST FOR THE STATIONARY RESIDUALS**

Calculation of Lag k with trend and intercept

**Table 27: Lags with trend and intercept**

| K | AC | SC |
|---|---|---|
| 0 | -1.308868 | -1.161830 |
| 1 | -1.141689 | -0.952876 |
| 2 | -1.140263 | -0.938219 |
| 3 | -0.859162 | -0.799581 |

**K=0**

**LEVEL-TREND AND INTERCEPT**

**Table 28: The level-trend and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -8.983295 | 1% | Critical Value* | -9.0170 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 5% | Critical Value | -5.5367 | |
| | | 10% | Critical Value | -4.2061 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root.<br>Augmented Dickey-Fuller Test Equation<br>Dependent Variable: D(E)<br>Method: Least Squares<br>Date: 06/28/16 Time: 11:13<br>Sample(adjusted): 2002 2013<br>Included observations: 4<br>Excluded observations: 8 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| E(-1) | -1.587965 | 0.176769 | -8.983295 | 0.0706 | The probability of the Trends is greater than 5%; it is not significant |
| C | -3.968762 | 0.689139 | -5.759017 | 0.1095 | |

| | | | | | |
|---|---|---|---|---|---|
| @TREND(1992) | -0.038238 | 0.037891 | -1.009163 | 0.4971 | |
| R-squared | 0.988223 | Mean dependent var | | 0.593949 | |
| Adjusted R-squared | 0.964668 | S.D. dependent var | | 1.560983 | |
| S.E. of regression | 0.293414 | Akaike info criterion | | 0.499243 | |
| Sum squared resid | 0.086092 | Schwarz criterion | | 0.038964 | |
| Log likelihood | 2.001513 | F-statistic | | 41.95465 | |
| Prob(F-statistic) | 0.108523 | | | | |

**LEVEL- INTERCEPT**

**Table 29: The level-trend and intercept**

| | | | | | |
|---|---|---|---|---|---|
| ADF Test Statistic | -9.062827 | 1% Critical Value* | | -6.7615 | |
| | | 5% Critical Value | | -4.0691 | ADF is less than critical value at 5%; there is no unit root and it is stationary as well. |
| | | 10% Critical Value | | -3.2066 | |
| *MacKinnon critical values for rejection of hypothesis of a unit root.<br>Augmented Dickey-Fuller Test Equation<br>Dependent Variable: D(E)<br>Method: Least Squares<br>Date: 06/28/16 Time: 11:29<br>Sample(adjusted): 2002 2013<br>Included observations: 4<br>Excluded observations: 8 after adjusting endpoints | | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. | |
| E(-1) | -1.534015 | 0.169264 | -9.062827 | 0.0120 | The probability of the Intercept is less than 5%; it is significant |
| C | -4.367835 | 0.566978 | -7.703717 | 0.0164 | |
| R-squared | 0.976229 | Mean dependent var | | 0.593949 | |
| Adjusted R-squared | 0.964343 | S.D. dependent var | | 1.560983 | |

| | | | |
|---|---|---|---|
| S.E. of regression | 0.294762 | Akaike info criterion | 0.701554 |
| Sum squared resid | 0.173769 | Schwarz criterion | 0.394701 |
| Log likelihood | 0.596893 | F-statistic | 82.13483 |
| Prob(F-statistic) | 0.011957 | | |

**Table 30: equation in the E-Views**

| Dependent Variable: D(GDP2,2) | | | | |
|---|---|---|---|---|
| Method: Least Squares | | | | |
| Date: 06/28/16 Time: 13:33 | | | | |
| Sample(adjusted): 1995 2015 | | | | |
| Included observations: 21 after adjusting endpoints | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(GEXP,3) | 0.181439 | 0.134939 | 1.344600 | 0.1955 |
| D(TAXES,3) | -0.045166 | 0.063793 | -0.708012 | 0.4880 |
| C | 0.014650 | 0.031965 | 0.458306 | 0.6522 |
| R-squared | 0.264848 | Mean dependent var | | 0.018791 |
| Adjusted R-squared | 0.183164 | S.D. dependent var | | 0.161860 |
| S.E. of regression | 0.146287 | Akaike info criterion | | -0.874926 |
| Sum squared resid | 0.385199 | Schwarz criterion | | -0.725708 |
| Log likelihood | 12.18672 | F-statistic | | 3.242359 |
| Durbin-Watson stat | 0.00000 | Prob(F-statistic) | | |

**The equation is follows:**

**GDP=0.014650+0.181439GEXP- 0.045166TAXES**

Means that if **GEXP** was increased by 1%, **GDP** was increased by 18.14%

And if **TAXES** was decreased by 1%, **GDP** was decreased 4.5 %

And we can take the following conclusion:

**GDP** is stationary at I (1)

**GEXP** is also stationary at second difference I(2)

**TAXES** is also stationary at second difference I (2)

$\mathcal{E}_t$ is Stationary at I(0)

Means that there is a cointegration between GDP and GEXP, TAXES.

### 4.2.1. Test Stationary of Growth Domestic Products (GDP)

Calculation of Lag k

**Table 1: Table of Lags with intercept**

| K | AC | SBC |
|---|---|---|
| 0 | -1.284049 | -1.185311 |
| 1 | -1.166056 | -1.017277 |
| 2 | -1.994956 | -1.796000 |
| 3 | -1.909796 | -1.660863 |
| 4 | -1.887289 | -1.589045 |
| 5 | -1.713660 | -1.367405 |
| 6 | -1.718390 | -1.326289 |

**K=2**

**Test of stationary for government expenditure by using the E-views**

Calculation of Lag k with trend and intercept

**Table 7: Table of Lags with trend and intercept**

| K | AIC | SC |
|---|---|---|
| 0 | -0.130752 | -0.017356 |
| 1 | -1.968947 | -1.769801 |
| 2 | -1.398498 | -1.149802 |
| 3 | -1.789039 | -1.490319 |
| 4 | -2.598485 | -2.250533 |
| 5 | -3.168191 | -2.772471 |
| 6 | -2.992268 | -2.551155 |

**K=5**

**TEST FOR THE STATIONARY TAXES**

**Calculation of Lag k**

**Table 17: Table of Lags with NONE**

| K | AC | SC |
|---|---|---|
| 0 | 1.857659 | 1.907029 |
| 1 | 1.763096 | 1.862282 |
| 2 | 0.778802 | 0.928019 |
| 3 | -1.684050 | -1.484904 |
| 4 | -1.603781 | -1.355245 |
| 5 | -1.544638 | -1.247847 |
| 6 | -1.422422 | -1.079354 |

**K=3**