The Relationship between Government Expenditure and Economic Growth in Sudan

(1973 ____ 2006)

Prepared by:

Hassan Hamza Esmail Ali
B.Sc. (Honours) in Economics
University of Gezira

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Supervised by:

Dr. Abuel Gasim Mohamed Abuel Nour

Department of Economics
Faculty of Economic and Social Studies

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DEDICATION

To my family, friends and my colleagues
with love and appreciation

[1]
I would like to express my thankfulness to my keen supervisor Dr. Abuel Gasim Mohamed Abuel Nour for his guidance, encouragement, help and supervision. Thanks are due to Dr. Mosllem Ahmed who helped me greatly. I also thank the staff members at the Department of Economics. Finally, I would like to express my gratitude to all those who helped me in completing this research.
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## ABBREVIATIONS

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<tr>
<td>ADF</td>
<td>African Development Fund</td>
</tr>
<tr>
<td>CBOS</td>
<td>Central Bank Of Sudan</td>
</tr>
<tr>
<td>CBS</td>
<td>Central Bureau Of Statistics</td>
</tr>
<tr>
<td>CPA</td>
<td>Comprehensive Peace Agreement</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
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<td>GFS</td>
<td>Government Finance Statistics</td>
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<td>GONU</td>
<td>Government Of National Unity</td>
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<td>HDI</td>
<td>Human Development Index</td>
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<tr>
<td>ICG</td>
<td>International Crisis Group</td>
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<tr>
<td>MOFNE</td>
<td>Ministry of Finance and National Economy</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation and Development</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nation Development Program</td>
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المستخلص

هناك عدة نظريات فسرت العلاقة بين الإنفاق الحكومي والنمو الاقتصادي، حيث تستنتاج بعض النظريات أن الإنفاق الحكومي يسبب النمو الاقتصادي، بينما يعتبر البعض أن النمو الاقتصادي هو أحد محددات الإنفاق الحكومي، هنالك وجهة نظر ثالثة ترى وجود تأثير متبادل بين الإنفاق الحكومي والنمو الاقتصادي.


أظهرت نتائج البحث علي أنه ليس هنالك تأثير متبادل بين الإنفاق الحكومي والنمو الاقتصادي في السودان بفرض خطية العلاقة، ولكن هنالك دليل لوجود علاقة غير خطية في الأجل الطويل.

أوصت الدراسة بضرورة زيادة الإنفاق الحكومي على البنيات الأساسية وذلك من أجل تحسين واستدامة النمو الاقتصادي. كما أوصت الدراسة بضرورة تحقيق السلام على مستوى القطر وإعادة تخصيص الموارد من القطاع العسكري لتنمية المناطق الأقل نمواً.
ABSTRACT

There are many theories conclude that government expenditures cause economic growth. However, the other considers that economic growth causes government expenditures. Another view considers the existence of a feedback relationship between government expenditures and economic growth.

This research is an attempt to test empirically the relationship between government expenditures and economic growth in Sudan during the period 1973–2006.

The Granger causality test, co-integration analysis are employed in this research to test the hypotheses.

The research results show that there is no causation between government expenditures and economic growth by assuming linear relation, but there is evidence for non-linear long-run relation.

The Study recommended that: the state must orient the government expenditure to infrastructure to promote human capital, achieving and sustaining peace in whole country, as well as, reallocating financial resources from military sector to develop the marginalized areas in order to achieve Broad-based growth.
CHAPTER ONE

Introduction

1.1 Preface

Since the Second World War, there has been an enduring growth of government expenditures no matter the nature of the political and economic system. In the meantime, GDP growth has also increased rapidly in some countries. For example, Sudan’s government expenditure had increased in average from (10.6%) of GDP during the period (1992-1998) to (13.5%) of GDP during the period (1999-2006) while economic growth rate increased from (6.8%) to (7.24%) for the same periods\(^1\).

The conventional neoclassical Solow-Swan growth model provides no guidance on how governments could influence the long-run growth rate. This model describes how the economies might approach a long-run path of steady-state growth in income per capita, but not what actually determines this steady-state growth rate itself. Since this exogenous growth rate is traditionally called the rate of technological change, it is obvious that technological progress is considered as the main driving force of per capita income growth. There are many factors that affect growth such as education, cultural factors, institutional support systems and efficient business organization.

By contrast, the new growth literature gives prominence to the external benefits associated with the accumulation of knowledge through education or innovation. Accordingly, governments can play a major role to

enhance and sustain economic growth through more spending on infrastructure, and investment on human capital and adoption of policies that would make that economy more stable. Government expenditure may directly or indirectly increase GDP growth through its interaction with the private sector. Lin (1994)\(^1\) has outlined some important ways in which government can increase growth, such as the provision of public goods and infrastructure, social services and targeted intervention (such as export subsidies).

The role and the size of government activities are inter-related to each other. Bigger government size, as reflected on its spending, implies greater roles to fulfill. In the late eighteenth and early nineteenth centuries, the provision of public goods and services was perceived as a primary role of the government. Nonetheless, Muller (2003)\(^2\) has cited other equally important roles of government such as being eliminator of externalities and redistributor of income and wealth.

Singh and Sahni (1984)\(^3\) argued that the relationship between government expenditure and GDP growth has been treated differently in two major areas of economic analysis. Public finance studies generally postulate that growth in government expenditure is caused by growth in GDP (Wagnerian approach). While most, macroeconomic models tend to


take the view that GDP growth is determined, in part, by growth in government expenditure (Keynesian approach). These different views of the causal relation between the two variables are due to differences in basic assumptions. Public finance studies, led by Wagner, consider government expenditure as a behavioral variable, similar to private consumption expenditure. By contrast, macroeconomic models, essentially led Keynes, treat public expenditure as an exogenous policy instrument designed to correct short-term cyclical fluctuations in aggregate expenditure.

The relationship between government expenditure and economic growth should be investigated in the short – run and in the long – run. The significance in distinguishing these two effects arises for two reasons: first, they can have opposite impact on the economy. Second, there is an outside lag inherent in fiscal policy between a policy action and its influence on the economy.¹

1.2 Research Problem:

The relationship between government expenditures and economic growth is controversial. Some theories conclude that the government expenditures may cause economic growth while other authors consider that economic growth may determent government expenditures, i.e economic growth causes government expenditure. Another view considers the existence of a feedback relationship between government expenditure and


www.eerc.kiev.ua/research/matheses/1998/Volkov_Alexander/body, downloadable
economic growth. However, these different theoretical views were supported by several empirical investigations about this relation.

Our problem in this research is to test empirically the relationship between government expenditure and economic growth in Sudan during the period 1973-2006. That is, to testing whether this relation obeys the Keynesian theory or Wagner’s law for the Sudanese economy over the period (1973-2006). Therefore, this research is organized around the following crucial questions:

- Does the growth of government expenditure promote economic growth in Sudan?
- Is there any long run relationship between government expenditures and economic growth?
- Is it significantly different from current expenditures to development expenditures?

1.3 Objectives of the Research:

The main objective of this research is to examine the relationship between total government expenditure and economic growth for Sudanese economy over the period (1973-2006), by testing whether this relation obeys the Keynesian theory or Wagner’s law. An attempt is made to examine the relationship between economic growths and disaggregate government expenditure (current and development spending). This is mainly to account for the claim that the components of government expenditure may have different effects on economic growth.

1.4 Research Hypotheses:

The hypotheses of this research are:
1. There are two ways causation between government expenditure and economic growth in Sudan.
2. Both, current and development expenditures cause economic growth in Sudan.

1.5 Research Methodology:

This research adopts an econometrics (quantitative) approach to empirically test whether there is a relationship between government expenditure and economic growth in Sudan as follows:

2- Augmented Dickey – fuller (ADF) test to test for non- stationary in order to avoid spurious regression.
3- Co- integration test: If data is not stationary in level and if it is integrated in the same level. We use Johansen test (1988) to test for co-integration analyses.

1.6 Research Organization:

This research is organized as follows: chapter one is introductory chapter, which outlines the problem and the objectives, hypotheses, methodology and the organization of the study. Chapter two reviews the relevant literatures that analyze the relationship between economic growth and government expenditure. The first part of this chapter highlights the main causes of government expenditure growth. While the second part focuses on the main determinants of economic growth. A review of the main findings of empirical literature conducted in this area will end this
chapter. Chapter three reviews the Sudan’s economic growth performance during the period of the study along with the sources and constrains of economic growth in Sudan. While the second part describes the main causes of government expenditure growth in Sudan. In Chapter four the model is specified and estimated, the results of the empirical work are presented, relevant recommendations end this thesis.
Chapter two
Literature Review

2.1 Introduction:

This chapter reviews the relevant literature; discusses the two theories that analyze the relationship between economic growth and government expenditures. An attempt will be made to discuss Wagner’s law and Keynesian paradigm with a special focus on the findings of empirical literature conducted in this area. The chapter is organized as follows: the first part highlights the role of government and the main factors that affect government expenditures, Second part describes the determinants of economic growth and the last part presents the empirical studies conducted in this area.

2.2 The role of government:

Some goods and services can technologically or legally possible to prevent people from using it (excludable) and cannot be used by sever user at the same time (rivalry), these goods and services produced under the competition market conditions especially perfect property rights which are an important requirement for market to be competitive.

According to competition market conditions, private sector can produce these kinds of goods and services without any intervention of government. But if any one of these conditions is violated market is fail to product goods and service efficiency (market failure). To correct this failure government most intervention by provision goods and services that technologically or legally impossible to prevent people from using such goods (non-excludability) and they cannot used by many people simultaneously (non- rivalry), this kind of goods and services are so called
public good. Therefore the role of government is to provision goods and services that private sector unable to provide such as infrastructure, defense.

Public investment and expenditure on some good and services such as infrastructure can theoretically improve productivity in the private sector through a more efficient allocation of resources. This has positive effect on economic growth.

2.3 Main factors affecting government expenditure:

Many factors may affect the government expenditure such as political, social and economic factors. This section highlights factors that affecting government expenditure.

2.3.1 Non-economic factors:

Government expenditure basically affected by non-economic factors, especially in the developing countries. These factors could be reflected by:

- Political instability: expenditure increases when the country is politically unstable. For example, the military spending for war or spending for reforms after war.
- Political regime: there is positive relation between political system and government expenditure. When the political system is large (small), the government expenditure may increase (decrease) due to the structural of the executive authority.
- Natural ones such as drought and desertification. This factors increases government expenditure for example spending to control the effects of this natural disasters.

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1 Al Taher, Abdulla Al sheikh (1988) “Introduction to Economics of Public Finance” King Saud University, Al Riyadh – First editor, p 113-118
• Institutional system: this factor reflects the role and the duties of the
government, for example the role and the duties of the government
at the federal level differ from the local level.
• Population growth.

2.3.2 Economic factors:

These factors could be reflected by:

• Economic system: in the Capitalism system (free economy), the role
of government is limited; therefore the government expenditure may
be limited. But in the Socialism system government plays basic role,
thus the government expenditure may be unlimited.

• Economic variables: such as the deficit of budget, the price level, the
sources of finance, and economic growth\(^1\).

Economic growth is one of factors that affect the government
expenditure; here we concentrate on the Wagner’s law which is illustrating
the relationship between government expenditure and economic growth.

The growth of government spending has been a subject of extensive
theoretical and empirical investigation. One of the theoretical explanations
that have been advanced is Wagner's Law which has been used to analyze
the relationship between economic growth and government expenditure. It
suggested by German economist Adolph Wagner (1883). Wagner’s work is
based on empirical observations in a number of Western industrializing
countries. His main implication is that as GDP growth increased in the past,
government expenditure grew as well.

The basic Wagnerian assumption is that public expenditure growths
continuously associated with the continuing growth in GDP in developing

\(^1\) Ibid p 118-125
countries. Moreover, government expenditure increases at a faster rate than the growth of GDP, and this correlative relation is in one direction, i.e. from the growth of GDP to public expenditure. This was the main point of Wagnerian theorem.

Wagner saw three main reasons for the increase in the government’s role: Firstly, as nations develop they experience increased complexity of legal relationships and communications, as a result of the immense division of labor that accrues with industrialization. Because of this, Wagner envisaged an enlarged role for the state in the form of public, regulatory and protective activity. Further, increased urbanization and population density would lead to greater public expenditure on law and order, and economic regulation due to the associated risk of more conflict in densely populated urban communities. Because of the substitution of private for public activity, the administrative and protective functions of the state would expand. Thus, as nations become more advanced the number and/or magnitude of market failures would force the state to become more regulatory in nature, thereby expanding its role and this would inevitably involve higher public expenditures. Secondly, Wagner predicted the expansion of ‘cultural and welfare’ expenditures based on the presumption that as income rises, society would demand more education, entertainment, a more equitable distribution of wealth and income, and generally more public services. Public Services were seen as normal goods, that is, their income elasticity’s of demand exceeded unity. Wagner cited education and culture as areas in which collective producers were more efficient than private producers. Thirdly, Wagner’s final suggestion was that the dynamic nature of technology and increasing scale of investment required in many activities would bring the development of large
private monopolies whose domineering effects on the market would have to be neutralized by the state or alternatively the monopolies would have to be taken over by the state in the interest of economic efficiency. For some economic activities the required scale of capital was so large that the only way these capital projects could be financed was if the state participated in the activity.

Bird (1971) supports this notion by postulating that the ‘law’ operates under the following conditions: (i) Rising per capita incomes, (ii) Technological and institutional change of a particular sort, and (iii) At least implicitly, democratization (in the sense of wider political participation of the polity). Bird (1971) concurs with Wagner’s law stating that “the activities of government are an increasing function of the changing structure of the economy.” Whether the state decides to compete or to support private sector activity such as private monopolies, with the growth of this sector, it is plausible to assume that public sector activity will increase.

Some economists argue that it is not the level of income that determines a nation’s expenditure, but rather its prevailing conception of the role of the government. They note that developed countries currently spend relatively more on their public services than they had done a hundred years ago, not because they became richer and more prosperous but rather as a result of an evolving conception of the duties of the state.

3 Ibid, P 1-26
In the economic literature there are different interpretations of the Wagner’s Law which result into six formulations which are as follows:

A. \( G = f(y) \)  
B. \( G_C = f(y) \)  
C. \( G = f(y/N) \)  
   Goffman, (1968).
D. \( G/y = f(y_r/N) \)  
   Musgrave version (1969)
E. \( G/N = f(y/N) \)  
   Gupta (1967) and Michas (1975).
F. \( G/y = f(y) \)  
   Mann’s (1980) “modified Peacock-Wiseman”

Where: \( G, G_C, y, y_r \) and \( N \) stand for total government expenditure, (total) government consumption expenditure, gross domestic product, real gross domestic product and population respectively.

2.4 Determinants of economic growth:

Most ideas concerning economic growth starts from the aggregate production function where factors of production function determine national output. Two major theories discuss the determinants of economic growth.

2.4.1 Neoclassical growth theory:

According to neoclassical growth theories growth is due to the increase in Capital stock, labor supply and increases in productivity. In neoclassical growth models, the long-run rate of growth is exogenously determined - in other words, it is determined outside of the model. A common prediction of these models is that an economy will always converge towards a steady-state rate of growth, which depends only on the rate of technological progress and the rate of labor force growth.

Limitations of the model include its failure to take account of entrepreneurship (which may be catalyst behind economic growth) and
strength of institutions (which facilitate economic growth). In addition, it
does not explain how or why technological progress occurs. This failing has
led to the development of endogenous growth theory, which indigenizes
technological progress and/or knowledge accumulation. Also this theory
does not prescribe the channels through which government spending can
influence long-run economic growth\(^1\).

2.4.2 New growth theory:

In the mid-1980s it became increasingly clear that the standard
neoclassical growth models was theoretically unsatisfactory as tools to
explain the determinants of long–run growth.
The new growth theory is different from the neoclassical model in many
important ways. The exogenous growth models developed by Solow and
other neoclassical scholars largely did not try to explain what caused
technology to improve over time. Implying that technology “just happened”
led to an emphasis on capital accumulation and labor force improvement
as sources of growth.

Endogenous growth theory demonstrates that policy measures can have
an impact on the long-run growth rate of an economy. For example,
subsidies on research and development or education increase the growth
rate in some endogenous growth models by increasing the incentive to
innovate. Therefore new growth theorists suggest that there is both a
temporary effect from government intervention during the transition to

.2nd edition. p 23 -68
equilibrium, and a possible long-term effect from government spending on economic growth\(^1\).

Classical economists believe that market forces bring the economy to long-run equilibrium through adjustment in the labor market. They assume that the changes in government expenditure are unnecessary for correcting unemployment and output, while Keynesians allege that the assumed self-regulating mechanisms in the economy fail to lead the economy back to equilibrium mainly due to rigidities in the labor market. Thus, Keynesians prescribe expansionary fiscal policies to avoid long recessions.

The relationship between economic growth and public expenditure is perceived to be reversed within the Keynesian macroeconomic framework. A fiscal expansion is expected as a result of multiplier effect on output behind its assumption of price rigidity and the possibility of excess capacity. In the Keynesian demand –determined model, output and employment adjust to satisfy the prevailing volume of aggregate demand\(^2\). The equilibrium of the model is fixed at the level of production for which the product market clears. Symbolically, the output market clearing condition is:

\[
y = C + I + G + X - M \quad \text{(1)}
\]

Where:

- \(y\) = output

---


\[ C = \text{consumption} \]
\[ I = \text{investment} \]
\[ G = \text{government spending} \]
\[ X = \text{export} \]
\[ M = \text{import} \]

And the following behavioral relationships:
\[ C = c(y), \quad 0 < c'(y) < 1 \quad (2) \]
\[ M = m(y), \quad m'(y) > 0 \quad (3) \]

And the following exogenous variables
\[ I = I_0, \quad X = X_0 \quad (4) \]

According to the Keynesian’s view government expenditure is exogenous variable which mean that \[ G = G_0 \], substitute equations (2), (3) and (4) in equation (1), then we can write:
\[ Y = c(y) + I_0 + G_0 + X_0 - m'(y) \quad (5) \]

When we take total differentiation to equation (5)
We have:
\[ dY = c'(y)dy + dI_0 + dG_0 + dX_0 - m'(y)dy \quad (6) \]

Where: \( c'(y) \) = marginal propensity to consume.
\[ m'(y) \] = marginal propensity to imports
If we put \( dI_0 = dX_0 = 0 \) and, we rearranging equation (6) we get:
\( \{1 - c'(y) - m'(y)\} dy = dGo \)

This can be written as:

\[
\frac{dy}{dn} = \frac{1}{\{1 - c'(y) - m'(y)\}}
\]

(7)

The last equation represents the government multiplier, which implies that when government expenditure changes by (1% for examples) the output changes by more than (1%)\(^1\).

The Keynesian model is traditionally summarized by tow curves (IS- LM); the IS curve shows the combinations on output and the interest rate such that planned and actual expenditure on output are equal and the LM curve shows the combinations of output and the interest rate that lead to equilibrium in the money market for a given price level. The IS and LM curves provide a simple model of aggregate demand that can be used to analyze the effect of government expenditure on output. For example, suppose that government expenditure rise (decrease), this make IS curve shift to the right (left)\(^2\).

2.5 Government Expenditure and Growth; previous studies

A number of studies have focused on the relationship between government expenditure and economic growth, cross-country and individual country studies on the relationship between government

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\(^2\) Ibid , p 23-68
expenditure and economic growth based on data of annual and quarterly frequencies have yielded mixed results.

Landau, (1983)\textsuperscript{1} examines the relationship between the share of government expenditure in GDP and the rate of growth of real per capita GDP for the high, Middle and bottom income countries and for third world over the period (1961 – 1976). He used four explanatory variables: the share of government expenditure in GDP, total investment in education and two climate zone dummies, Mediterranean and Tropical Rain Forest and energy consumption. The result for full sample, he found that, there is negative relation between share of government and per capita GDP, the investment in education is related positively to per capita GDP, the regional dummies were positively related to the growth of per capita GDP and the energy consumption is insignificant and was dropped. For the high income countries he found that the share of government expenditure had negative impact on per capita GDP, and investment in education and the dummies variable (Mediterranean and Tropical) has positive impact on per capita GDP. The middle countries have the same result as in high income countries. For the bottom countries the investment in education had the positive impact. However, the negative relationship between the share of government in GDP and per capita GDP does not hold inside this group. For the third world the results show that the share of government had negative impact and investment in education had positive impact, while the dummy for Mediterranean climate was totally insignificant and was dropped from regression.

Henrekson et.al, (1998)\(^1\) investigate the relationship between GDP growth, tax share and public expenditure. They focused first on OECD countries and then on an extended sample of rich countries over the period (1970-1994). They used total government spending and total taxes. The results for OECD countries show that the Public expenditure has a significant negative coefficient, while the coefficient for taxes is negative, but not significant. The results for rich Countries show that strong relation between tax and government spending and growth.

Sinha, (1998)\(^2\) studies the relationship between GDP and government expenditure in Malaysia for data (1950-92). He found the existence of long run relationship between GDP and government expenditure. Also he applied Granger causality tests between the growth rates of two sets of the variables. Here, he does not found any evidence that the growth of government expenditure contributes to the growth of GDP.

Kweka et.al, (2000)\(^3\) investigate the impact of public expenditures on economic growth using time series data on Tanzania for the period (1965-1996). They used disaggregated government expenditure {physical investment, consumption spending and human capital investment}. Their results show that productive expenditure (physical investment) have a

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negative impact on growth, consumption expenditure relates positively to
growth, and in particular associated with increased private consumption
and expenditure on human capital investment was insignificant. The
results confirm the view that public investment in Tanzania has not been
productive.

**Albatel, (2002)**

investigated the relationship between aggregate
income and public expenditure for Saudi Arabia by using aggregated and
disaggregated public expenditure data for the period 1964-1998. He used
co-integration and the error correction models. He found that government
expenditure is positively related to the GDP growth (i.e. there is existence
of Wagner’s Law in the case of Saudi Arabia).

**Al -Khazali et.al, (2003)**

examine the long run relationship between
government expenditure and economic growth Using data from the
Jordanian economy, by using causality test and co-integration technique,
they found that there is a uni directional relationship between the economic
growth and the growth in the government expenditures.

**Abu-Qarn et.al (2003) **

used data for three countries individually
(Egypt (1975 - 1998), Israel (1967 – 1998) and Syria (1973 -1998)) and

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2 Al-Khazali.o and AbuAl-Foul.B,(2003) “The long run Relationship between Government Expenditure and
Economic growth : Case of Jordan”. Journal of Economic Education Research, Volume (4),NO (3)

567 -583.
they used multivariate co-integration and variance decomposition techniques to investigate causal relation between government expenditure and economic growth. They found bi-directional causality from government spending to economic growth with a negative long-run relationship between the two variables. However, when they tested for causality within a trivariate system – the share of government civilian expenditures in GDP, military burden and economic growth – they found that the military burden negatively affects economic growth for all the countries, and that civilian government expenditures cause positive economic growth in Israel and Egypt.

Hakan et.al, (2003)\(^1\) examine the relationship between public expenditure and GDP for the Turkish case over the period of 1965-2000. By using co-integration test and Granger causality test, they found that no causality in both directions; neither Wagner’s Law nor Keynes hypothesis is valid for the Turkish case.

Sinha (2007)\(^2\) investigates the relationship between government expenditure and both total and per capita GDP for the Thailand using for (1950-2003). By using Granger causality test and co-integration analysis results show that there is no causality flowing from either direction between GDP or government expenditure. Autoregressive Distributed Lag (ARDL) tests of co-integration show very weak evidence of a long-run relationship

\(^1\) Hakan, C & Muhlis .B ,(2004) "Causality between Public Expenditure and Economic Growth: The Turkish Case " Journal of Economic and Social Research 6 (1),( 2004), P 53-72

between GDP and government expenditure. Thus, he does not found much evidence that the Wagner’s Law holds for Thailand.
Chapter three

Government Expenditure and Economic Growth in Sudan

3.1 Introduction:

Sudan is ninth largest country in the world in terms of area (2.5 million square kilometers). It shares extensive borders with nine countries. Because of its vast area, the country embraces many climatic and ecological zones. Diversity is also reflected in its people; and as a result the country is multi-cultural, multi-ethnic, multilingual and multi-religious.

This chapter will present the general features of the Sudanese economy in term of economic growth, resources and constraints. Also it will present the features of government expenditures.

3.2 The Structure of Sudan Economy:

Sudan has plenty of natural resources; its main resource at the present time is petroleum. Others resources are iron ore, copper, chromium ore, zinc, tungsten, mica, silver, gold. Sudan’s population is about (36.3) mn in 2006.

The main sectors which play a major role in Sudan’s economy are Agriculture (39.9% of GDP), Services (32.2% of GDP) and Industrial (28.9% of GDP) in 2006. In 1999, Sudan started exporting crude oil and in the last quarter of 1999 recorded its first trade surplus, Increased oil production, revived light industry, and expanded exports contributed in

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1 Economy Survey, op. cit., p 33-40
2 Ibid, P 33-40

[31]
GDP at 16, 5% in 2006. Table (3-1) shows the contribution of main sectors to overall GDP 2000-2006.

Table (3-1): Shares of economic sectors in Sudan’s GDP (%).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>38.5</td>
<td>38.7</td>
<td>39.3</td>
<td>38.8</td>
<td>36.7</td>
<td>47.4</td>
<td>42.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>20.7</td>
<td>20.1</td>
<td>16.9</td>
<td>17.5</td>
<td>16.5</td>
<td>16.4</td>
<td>25.9</td>
</tr>
<tr>
<td>Services</td>
<td>40.8</td>
<td>41.2</td>
<td>43.8</td>
<td>43.7</td>
<td>46.8</td>
<td>36.2</td>
<td>31.5</td>
</tr>
<tr>
<td>Overall GDP</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: MFNE, Economic Survey

The data on the shares of economic sectors in Sudan’s GDP presented in table (3-1) indicates that there is increase in contribution of the agricultural sector for the periods (1973-1985) but it declined in the period (1986-1995), this decline may be due to the natural disasters such as drought over 1984-5 and flood in 1988, however it increased in periods (1996-2000), and decreased in the periods (2001-2006). And there was increase in the service sector from the period (1973-1975) up to the period (1991/1995) after that it declined, and there is declined in the share of manufacturing sector, but it increased in the period (2000/2006) which can be interpreted due to the oil production.

3.3 Economic growth in Sudan:

Since the early 1970s, Sudan had experienced fluctuated economic growth rates. However, since the 1990s, economic growth had increased rapidly. Figure (1) depicts the real GDP growth rate during the period 1973-2006:
The graph shows that over the peace prevailed period (1973-82); however, the government policies were not growth oriented, during this period IMF was intervenes (1978-1985), the growth rates was (4.8%) in average. The sub-period 1983-91 showed a lower average real GDP growth of (1.5%), The main cause for this poor performance has been the outbreak of the civil war in 1983, the poor economic policies and the natural disasters such as drought over 1984-5 and flood in 1988, (Suliman, 2005). During the period 1992-2006, the government pursued a macroeconomic stabilization programme, also within this period oil is produced, the growth rate was (7%) in average.

Figure (1): Sudan’s economic growth (1973-2006)

Source: MOFNE, Economic Survey

---

3.3.1 The sources of economic growth in Sudan:-

Sudan's economy is booming due to the increases in oil production, high oil prices, and large inflows of foreign investment. GDP growth rate registered more than 8% and 9% per year in 2005 and 2006 respectively. This section will highlight some factors that cause economic growth in Sudan.

3.3.1.1 Oil Protection:

The oil sector has become an important productive sector, and has begun to have an increasing influence on economic activity. Oil production began in 1997, since 1999 oil became one component of the country’s exports and the largest source of foreign currencies and government’s main source of revenue, for example the share of Oil Revenue in Total Revenue reached (40.4, 44.8, 56.9) in(2001, 2002, 2003) respectively; therefore it can conceded as source of economic growth.

3.3.1.2 The Foreign Direct Investment:

Foreign direct investment is viewed as a major stimulus to economic growth in developing countries, due to its perceived ability to deal with major obstacles such shortages of financial resources, technology, and skills. There is considerable literature on the impact of foreign direct investment on economic growth, and some empirical studies argued that foreign direct investment has made positive contribution to the economic growth of developing countries. The contribution of foreign direct investment to economic growth has been debated quite extensively in the literature. Recent literature points to the role of FDI as a channel of international technology transfer. There is growing evidence that FID
enhances technological change through technological diffusion, because multinational firms are concentrated in industries with a high ratio of Research and Development relative to sales, technical and professional laborers. After policies of economic liberalization Sudan witnessed higher flows of FDI especially in Oil sector.

3.3.2 The Constraints of economic growth in Sudan:

Many factors limit economic growth in Sudan such as social behavior, cultural factors, political instability and inadequate infrastructure. This section will focus on the weakness of infrastructures and political instability as constraints to economic growth in Sudan.

3.3.2.1 The weak of Infrastructure:

Infrastructure is the capital stocks that provides public goods and services and enhance private activities. It produces various effects, on production activities, quality of life for the households and it accelerates economic growth. The vast size of the country and its fragile ecological systems require transport facilities, communications, and others infrastructures facilities. Although infrastructure has been one of the main development problems in Sudan for a long time, provision services has deteriorated as a result of the long civil war, budgetary cuts, and limited access to foreign finance\(^1\). Budget constraints imposed since the early 1990s, while necessary for stabilization of the economy, caused considerable reductions in the operations and maintenance budgets for all

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government agencies responsible for providing basic public infrastructure. Roads, Bridges, Railways, river transport, and sea ports are all in need of rehabilitation. Other central public infrastructure such as large irrigation systems and power plants also need rehabilitation and additional investment.

3.3.2.2 Political instability:

Both political and economic stability play basic role to promote economic growth and attract more FDI. In contract instability play passive role and will constraint the economic growth. Many studies identified various sources of growth such as human and, physical capital accumulation, technology improvement, foreign trade, investment and attitudes of people. Although all these factors have positively contributed to economic growth, they directly and indirectly depend on political stability. Most of the prior studies on economic growth have found that stable political systems accelerate economic growth.

Sudan is one of countries that are characterized by political instability, it witnessed the longest civil war in Africa, the first War was in South of Sudan (1983-2005) and the Second War is in Darfur region (2003 up to present time). This war has negative impact on the economy as whole .the average of real GDP for the period (1973-1982) was (83.46) while for the period (1983-2006) was (0.021) which shows that the average for the peacetime (1973-1982) is greater than the average for the wartime.

[36]
3.4 The government expenditure in Sudan:

The functional classification of expenditure in the federal budget has been discontinued and aggregate allocations of spending are grouped in four chapters as follows\(^1\):

Chapter one includes aggregate expenditure category consists of wages and salaries for all federal employees. Also included are central government contributions to the pension fund and central government contributions to the social insurance fund. Chapter two is composed of goods and services purchased for governmental units. In addition, it includes social subsidies, which are mainly directed to subsidizing electricity, free medication in emergencies, free medicines for kidney dialysis and heart disease, and support to needy students in higher education. Also included are centralized obligations, which include internal debt, external debt, travel abroad, subscription in international organization, custom duties for government units, pipeline fees, training, replacement of equipment and emergency reserves. Chapter three consists of current and development transfers to states, as well as agriculture tax compensation for states through the Federal Rule Chamber (FRC). These transfers are called central grant-in-aid to the States. At the time the states prepare their budgets (including revenue and expenditure estimates), the federal government finances their deficits through these transfers. They are strictly unconditional transfers, and the states are not required by law to report details of their spending to the federal Ministry of Finance and National Economy. Chapter four consists of national development expenditure, transfers of development funds to states, capital contributions in

\(^1\) MFNE, Economic Survey, 2005 p 109 -120
government projects financed by foreign loans and financing of agriculture. Allocations in this chapter for development are directed to maintain and sustain the functioning of existing projects. In the year (2006), the budget is reclassified in three chapters as follows\(^1\):

Chapter one consists of federal authorities spending, it is composed three items. The first item includes all wages and salaries for federal employees. Also included are central government contributions to the pension fund and central government contributions to the social insurance fund. The second item is composed of goods and services purchased for governmental units. In addition, it includes social subsidies. Also included are centralized obligations, and the third item consist of national development expenditure, capital contributions in government projects financed by foreign loans and financing of agriculture. Chapter two consists of transfers to southern Sudan states. Chapter three consists of transfers to northern Sudan states.

The data on government expenditures presented in table (3-2) indicates that there is decline of total expenditure as ratio of the GDP starting from period (1981-1985), this may has been influenced by the implementation of stabilization and adjustment programmers (1978) which focused on reducing government Spending, also the government adopted economic liberalization policies in the year (1992), under which many financial obligations has been transferred to the States. However this share increased in the periods (2001-2006) after oil production.

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\(^1\) MFNE, Economic Survey, 2006 p 67
Table (3-2):- Shares of total government expenditures in Sudan’s GDP (%) (1973-2006) .

<table>
<thead>
<tr>
<th>period</th>
<th>The share of total government spending in GDP (%)</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-1975</td>
<td>26.06</td>
<td>8.69</td>
</tr>
<tr>
<td>1976-1980</td>
<td>27.52</td>
<td>5.50</td>
</tr>
<tr>
<td>1981-1985</td>
<td>18.09</td>
<td>3.62</td>
</tr>
<tr>
<td>1986-1990</td>
<td>16.91</td>
<td>3.38</td>
</tr>
<tr>
<td>1991-1995</td>
<td>15.79</td>
<td>3.16</td>
</tr>
<tr>
<td>1996-00</td>
<td>9.45</td>
<td>1.89</td>
</tr>
<tr>
<td>2001-06</td>
<td>29.56</td>
<td>4.93</td>
</tr>
</tbody>
</table>

Source: MOFNE, Economic Survey (calculated by researcher).

### 3.4.1 The current expenditure in Sudan

The current expenditure consists of wages, salaries, and social subsidies, centralized items, steering expenditure and contribution to States’ support Fund.

From table (3-3) it is notes that the share of current expenditure in the total expenditure increased from (79.52) in the period 1973/1975 to (81.18) in the period 1981/1985, this increasing may be due to outbreak of the civil war in 1983, and spending on the natural disasters in 1984-5. But this the share decreased to (60.74) in the period (1986/1990), and increased to (90.15) in the period 1996/2000, and decreased to (75.79) in the years (2001/2006). Also table shows that most of the government expenditures are directed to meet the current expenditure demands (76% in 2006). The remainder is directed to development expenditure which makes just about
24% of the government expenditure. The government needs to spend more on development expenditure to enhance long term growth in economy.

Table (3-3): Shares of current expenditure in total government expenditure (%), (1973-2006)

<table>
<thead>
<tr>
<th>period</th>
<th>The share of current expenditure in total government expenditure</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-1975</td>
<td>79.52</td>
<td>26.51</td>
</tr>
<tr>
<td>1976-1980</td>
<td>75.75</td>
<td>15.15</td>
</tr>
<tr>
<td>1981-1985</td>
<td>81.18</td>
<td>16.24</td>
</tr>
<tr>
<td>1986-1990</td>
<td>60.74</td>
<td>12.15</td>
</tr>
<tr>
<td>1991-1995</td>
<td>92.68</td>
<td>18.54</td>
</tr>
<tr>
<td>1996-00</td>
<td>90.15</td>
<td>18.03</td>
</tr>
<tr>
<td>2001-06</td>
<td>75.79</td>
<td>12.63</td>
</tr>
</tbody>
</table>

Source: MOFNE, Economic Survey (calculated by researcher).

3.4.2: The development expenditure in Sudan:

The development expenditure consists of development expenditure, contribution to capital and State development. It is consists the expenditures on infrastructures such as education, health, communications Roads, Bridges, Railways which affect positively on economic growth.

Recently Sudan witnessed several large projects such as Merowe Dam project, Rosiers Dam project and many Roads and Bridges, all these projects accelerates the economic growth. Transport and energy make up almost another third of recent expenditures that may promote economic growth.
From table (3-4) it is noted that the share of development in total expenditure had increased from (20.48) in the period 1973/1975 to (55, 94) in the period 1986/1990, this increasing may be due to adoption of the slogan “eat and wear what we produce” in 1990, but after that decreased overtime.

Table (3-4): Shares of development expenditure in total government expenditure (%)

<table>
<thead>
<tr>
<th>period</th>
<th>The share of development expenditure in total government expenditure</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-1975</td>
<td>20.48</td>
<td>6.83</td>
</tr>
<tr>
<td>1981-1985</td>
<td>18.82</td>
<td>3.76</td>
</tr>
<tr>
<td>1986-1990</td>
<td>39.26</td>
<td>7.85</td>
</tr>
<tr>
<td>1991-1995</td>
<td>7.32</td>
<td>1.46</td>
</tr>
<tr>
<td>1996-00</td>
<td>9.85</td>
<td>1.97</td>
</tr>
<tr>
<td>2001-06</td>
<td>24.21</td>
<td>4.04</td>
</tr>
</tbody>
</table>

Source: MOFNE, Economic Survey (calculated by researcher).

3.5 Determinants of government expenditure in Sudan:

Two factors may affect government expenditure in Sudan: political regime and civil war.

3.5.1 Political regime:

In 1992 Sudan adopted the federal system, thereby creating three main levels of governance: the federal government, the states, and local authorities. The structure of the federal system in Sudan currently consists of 26 states (16 in the northern part and 10 in the south), and some 500
local communities\(^1\). The 1998 constitution spells out the division of responsibilities among the three tiers of government\(^2\).

- For the localities: preschool and primary education, supply and management of primary health care, and environmental sanitation (garbage collection and sewerage management).
- For the State governments: responsibilities include providing secondary education and purchase and distribution of school textbooks to all pupils; health care at hospitals and dental care units; construction, operation and maintenance of small water schemes; and agricultural development.
- For the federal government: in addition to traditional functions at the national level such as defense, foreign relations, monetary and fiscal policies, responsibilities include transport and communication, energy and mining; higher education, monitoring education quality and providing transfers to the poorer States.

Under the government’s decentralization strategy (1992), the delivery of key services such as education, health, sanitation, local roads, and agriculture were delegated to the States and local authorities, which had neither the revenues nor the administrative capacity for these tasks.

### 3.5.2 Civil war:

Sudan has been witnessed civil war since Independence up to 1972, but in 1983, it flared up to now (2008). It affected on government expenditure and its allocation. There are direct and indirect costs of war:

\(^1\) WB, op.cit, p 63-64

\(^2\) UNDP, 2006 “Macroeconomic Policies for Poverty Reduction: The Case of Sudan”. p 38 - 51
the direct cost includes the war casualties, sufferings and displacement of the population in war affected areas. A recent report summarized the human cost of the second civil war in Sudan, According to the International Crisis Group two million people have died as a result of the fighting in the period of War. Half a million refugees have spilled into neighboring countries, and roughly four million people have been displaced and driven from their homes within Sudan\(^1\).

The economic cost of the war covers the immediate and substantial decline of output, destruction of physical, human and “social” capital. The loss of productive capital, especially human and social capital, takes more time to reverse than the loss of output.

Table (3-5) presents the real total government expenditure for the peacetime and wartime:

\[
\text{Table (3-5): real government expenditure for peacetime and Wartime (1973-2006)}
\]

<table>
<thead>
<tr>
<th>period</th>
<th>real government expenditure</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peacetime (1973-1982)</td>
<td>221.28</td>
<td>22.13</td>
</tr>
<tr>
<td>Wartime (1983-2006)</td>
<td>512.16</td>
<td>21.34</td>
</tr>
</tbody>
</table>

Source: MOFNE, Economic Survey (calculated by res

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Chapter Four
Econometric Framework and Empirical Results

4.1 Introduction:
This chapter presents the econometric framework which contains the causality test, unit root test and cointegration test. It discusses the empirical results by presenting the summary statistics of the data, time profile of the economic growth and government expenditure in Sudan for the period under study and, then discusses the results of causality, stationarity of data and cointegration analysis.

4.2 Econometric Framework:
In order to empirically test whether there is a relationship between government expenditure and economic growth in Sudan, the research adopts the econometrics (quantitative) approach in particularly use Granger causality, unit root and cointegration tests.

4.2.1 Granger Causality Test (1969):
According to the Granger causality test (1969), we can say a variable (Y) is Granger cause variable (X) if (Y) predict variable (X), or knowledge of (Y) help to predict (X) while the knowledge of (X) do not help to predict (Y) (i.e. there is no feedback), but if (Y) predict (X) and (X) predict (Y) then there is feedback. The Granger causality test assume that the information relevant to the prediction of the respective variables, (Y) and (X), is contained solely in the time series data on these variables. The test involves estimating the following pair of regressions:
\[ Y_t = \text{const.} + \sum_{i=1}^{k} \mu_i X_{t-i} + \sum_{j=1}^{p} \beta_j Y_{t-j} + \epsilon_t \quad \rightarrow \quad (1-1) \]

\[ X_t = \text{const.} + \sum_{i=1}^{k} \mu_i X_{t-i} + \sum_{j=1}^{p} \beta_j Y_{t-j} + \epsilon_t \quad \rightarrow \quad (1-2) \]

It is assumed that the disturbance \((\epsilon_t)\) and \((\xi_t)\) are uncorrelated.

Equation (1-1) postulates that the current \((Y)\) is related to past values of itself as well as that of \((X)\), and equation (1-2) postulates a similar behavior for \((X)\), we can distinguish four cases:\

1. Unidirectional causality from \((X)\) to \((Y)\) is indicated if the estimated coefficients on the lagged \((X)\) in (1-1) are statically different from zero as a group (i.e. \(\sum \mu_i \neq 0\)) and the set of estimated coefficients on the lagged \((Y)\) in (1-2) is not statistically different from zero (i.e \(\sum \beta_j = 0\)).

2. Conversely, unidirectional causality from \((Y)\) to \((X)\) exists if the set of lagged \((X)\) coefficients in (1-1) is not statically different from zero (i.e \(\sum \mu_i = 0\)) and the set of the lagged \((Y)\) coefficients in (1-2) is statistically different from zero (i.e \(\sum \beta_j \neq 0\)).

3. Feedback, or bilateral causality, is suggested when the set of \((X)\) and \((Y)\) coefficients are statistically significant different from zero in both regressions.

4. Finally, independence is suggested when the sets of \((X)\) and \((Y)\) coefficients are not statistically significant in both the regressions.

More generally, since the future cannot predict the past, if variable \((X)\) \{Granger causes\} variable \((Y)\), then changes in \((X)\) should precede change.
in (Y). Therefore, in a regression of (Y) on other variable (including its own past values) if we include past or lagged values of (X) and it significantly improves the prediction of (Y), then we can say that (X) Granger causes (Y). A similar definition applies if (Y) Granger causes (X).

4.2.2 Unit Root Test:

If an (OLS) regression is estimated with non-stationary data, then the regression might be spurious. To overcome this problem the data has to be tested for a unit roots. We test for non-stationary by using the Augmented Dickey – Fuller (ADF) test in testing the null hypothesis that a series does contain a unit root (i.e. it is non – stationary) against the alternative of stationary\(^1\).

The Dickey – Fuller (1979) (DF) test is performed by running an OLS for one of the following equations:

\[
\Delta Y_t = \phi \Delta Y_{t-1} + \mu_t \quad \rightarrow \quad (2-1)
\]

\[
\Delta Y_t = \alpha + \phi \Delta Y_{t-1} + \mu_t \quad \rightarrow \quad (2-2)
\]

\[
\Delta Y_t = \alpha + \beta T + \phi \Delta Y_{t-1} + \mu_t \quad \rightarrow \quad (2-3)
\]

Where: (T) is the time trend.

In each case the null hypothesis is that (\(\Phi = 0\)) that is, there is unit root. If a significant negative value is found for (\(\Phi\)), the null is rejected and the series is stationary. The test statistic given by:

\[
\frac{\frac{\hat{\phi}}{s.e(\hat{\phi})}}
\]

Where (s.e) is the standard error of (Φ), this statistic here is referred to as (DF) statistic; it is compared with MacKinnon critical values, if it exceeded the critical values the null is rejected\(^1\).

The difference between (2-1) and other two regressions lie in the inclusion of the constant (intercept) and the trend term.

If the term (μt) is serially correlated, the (DF) test is biased. However, Augmented Dickey-Fuller can be used in the test; it required estimating the following model:

\[
\Delta Y_t = \alpha + \beta T + \phi Y_{t-1} + \sum_{i=1}^{m} \mu_i \Delta Y_{t-1} + \epsilon_t \quad (2-4)
\]

Where (m) is the number of lagged difference terms to include which is often determined empirically, the idea being to include enough terms so that the error term in (2-4) is serially independent. The null hypothesis is still that \((\Phi = 0)\), that is, a unit root exists in series \((y)\) \{i.e. \(y\) is non-stationary\}. When the (DF) test is applied to models like (2-4), it is called Augmented Dickey–Fuller (ADF) test, the (ADF) test statistic has the same asymptotic distribution as the (DF) statistic, so the same critical values can be used\(^2\). The number of lagged differences included (the degree of augmentation) in the model in (2-4) depends on the order of AR process followed by the errors in model\(^3\).

---

\(^1\) Gujarati, op. cit, p. 815


\(^3\) Gujarati, op. cit, p . 817
4.2.3 Co-integration Test:

The existence of unit root in the time series data at level require testing for co-integration among the variables of the study. Generally, a set of variable is said to be co-integrated if a linear combination of the individual series, which are I(d), is stationary. In order to test whether two series $X_{1t}$ and $X_{2t}$ are co-integrated, Engle and Granger suggest: running OLS regression, saving the residuals and then running the ADF test on the residual to determine if it is stationary, the time series are said to be co-integrated if the residual is itself stationary. An alternative to Engle–Granger methodology of testing for co-integration is Johansen procedure. It focuses on the rank of matrix $P_0$, which determines the number of distinct co-integrating vectors. In this methodology, two likelihood ratio tests are described. The first one is based on the maximal eigenvalue and is designed to test the hypothesis $H$: Rank $(P) = (r-1)$. The second likelihood ratio test is based on the trace of the stochastic matrix and is designed to test the hypothesis is that there is no co-integration vector (i.e $H_0$: $r=0$) and the alternative is that there is co-integrating vector (i.e $H_1$: $r>0$).

4.3 Models Specification:

Government expenditures can influence the dynamics of Gross Domestic Product (GDP) through its consequences for the effectiveness of resource allocation and accumulation of productive resources.

The current spending affects economic growth indirectly through increasing aggregate demand for goods and services while development spending affect economic growth directly through spending on education,

health, building Road or through build the public project. Therefore the relation between government expenditure and economic growth can be illustrated by the following models:

4.3.1 The first model: According to the national income identity or gross domestic product (GDP), aggregate government expenditure affects GDP directly as follows:

\[ Y_t = C_t + I_t + g_t + (X_t - M_t) \]  \hspace{1cm} (1)

Where \( Y_t \) is GDP, \( C_t \) is consumption, \( I_t \) is investment, \( g_t \) is government expenditure, \( X_t \) is export and \( M_t \) is import. Since we concentrate on government expenditure we can ignore \( (C, I, X, M) \). To avoid the problem of misspecification we can express current \( Y_t \) as function of previous \( Y_t \). Therefore equation (1) can be written as follows:

\[ G_t = \text{const.} + \sum_{i=1}^{k} \mu_i SHT_{t-i} + \sum_{j=1}^{p} \beta_j G_{t-j} + e_t \]  \hspace{1cm} (2)

Where \( G_t \) is growth rate, \( SHT_t \) is the share of total government expenditure in GDP.

According to Wagner’s Law (1883), when GDP grows, government expenditure tends to grow. This argument can be written as:

\[ SHT_t = \text{const.} + \sum_{i=1}^{k} \mu_i SHT_{t-i} + \sum_{j=1}^{p} \beta_j G_{t-j} + \varepsilon_t \]  \hspace{1cm} (3)

Where: \( (\mu, \beta) \) are parameters and \( (e, \varepsilon) \) are random errors.
4.3.2 The second model: government expenditure may possibly be divided into current and development to test for its different effects on growth as follow:

\[ G_t = \text{const.} + \sum_{i=1}^{k} \mu_i \text{SHCU}_{t-i} + \sum_{j=1}^{k} \lambda_i \text{SHD}_{t-i} + \sum_{j=1}^{p} \beta_j G_{t-j} + \varepsilon_t \]  \hspace{1cm} (4)

\[ \text{SHCU}_t = \text{const.} + \sum_{i=1}^{k} \mu_i \text{SHCU}_{t-i} + \sum_{j=1}^{k} \lambda_i \text{SHD}_{t-i} + \sum_{j=1}^{p} \beta_j G_{t-j} + \varepsilon_t \]  \hspace{1cm} (5)

\[ \text{SHD}_t = \text{const.} + \sum_{i=1}^{k} \mu_i \text{SHCU}_{t-i} + \sum_{j=1}^{k} \lambda_i \text{SHD}_{t-i} + \sum_{j=1}^{p} \beta_j G_{t-j} + \varepsilon_t \]  \hspace{1cm} (6)

Where: (SHCU<sub>t</sub>) is current expenditure, (SHD<sub>t</sub>) is development expenditure and (\(\lambda\)) is parameter.

4.4 The data and the variables:

To investigate the relationship between government expenditure and GDP growth, we use yearly observations from (1973) to (2006) for the Sudanese economy.

Economic growth (G) is measured by real GDP growth, government expenditure (SHT) is measured as ratio of total nominal government expenditures to nominal GDP in logarithm form, current expenditure (SHCU) is measured as ratio of nominal spending on current expenditure to
nominal GDP in logarithm form and development expenditure (SHD) is measured as ratio of nominal development expenditure to nominal GDP.

4.5 Empirical results:

This section discuss the Summary statistics of the data, time profile of the variables and discuss the results of stationarity of data, Granger causality test and co-integration analysis.

4.5.1 Summary Statistics of the Data:

This section present the summary statistic of the time series data of the variable included in the model to be estimated. Table (4-6) shows the Statistics of the data

Table (4-6): summary statistics (1973-2006)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>4.92</td>
<td>4.22</td>
<td>12.3</td>
<td>-5.8</td>
</tr>
<tr>
<td>Share of Total expenditure in GDP</td>
<td>0.17</td>
<td>0.08</td>
<td>0.31</td>
<td>0.02</td>
</tr>
<tr>
<td>Share of Current expenditure in GDP</td>
<td>0.14</td>
<td>0.06</td>
<td>0.22</td>
<td>0.02</td>
</tr>
<tr>
<td>Share of development expenditure in GDP</td>
<td>0.04</td>
<td>0.03</td>
<td>0.12</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Source: MOFNE, economic survey (calculated by researcher).

Table (4-6) indicates that the average rate of real GDP growth is (4.92) with standard deviation (4.22), the average of the share of total government expenditure in GDP is (0.17) with standard deviation (0.08), the average of the share of current expenditure in GDP is (0.14) with standard deviation (0.06) and the average of the share of capital expenditure in GDP is (0.04), with standard deviation (0.03). we can note that the average of the share of development expenditure in GDP is very small compared with the average
of the share of capital expenditure in GDP which indicate that most of expenditure in Sudan go to the current expenditure.

4.5.2 Time profile of economic growth and government expenditure:

This part presents the time profile of economic growth and the share of total government expenditure in GDP (SHT), and disaggregates government expenditure {the share of Current (SHCU) and development (SHD) expenditures in GDP}.

Figure (2): the time profile of Sudan’s Economic Growth and government expenditure (1973-2006)

Source: MOFNE, Economic Survey.
From figure (2), it noted that the economic growth and the share of total government expenditure in GDP, generally, they moved together from 1973 up to the early 1980s, but during the period (1984-1994) they had opposite direction, while they had the same direction during the period (1995-2005).

The economic growth and current expenditure fluctuated and moved in the opposite direction from 1973 up to the period (1995), but during the period (1996-2005) they had the same direction.

The economic growth and development expenditure had the same direction during the period (1974-1984), but during the period (1985-1992) they fluctuated and had opposite direction, and during the period (1993-2004) they were stable and move in the same direction.

The above discussion on the time profile of economic growth and government expenditure can be summarized in the Correlation matrix in table (4-7).

Table (4-7): Correlation Matrix.

<table>
<thead>
<tr>
<th></th>
<th>G</th>
<th>SHD</th>
<th>SHCU</th>
<th>SHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>1.000</td>
<td>0.012</td>
<td>-0.063</td>
<td>-0.042</td>
</tr>
<tr>
<td>SHD</td>
<td>1.000</td>
<td>0.511</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>SHCU</td>
<td>1.000</td>
<td>1.000</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>SHT</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>

Source: MOFNE, Economic Survey (calculated by researcher).

Table (4-7) presents the correlations between the variables; there are low correlations between growth, the share of total government expenditure in
GDP and each of the shares of current and development expenditure in GDP. However, there are high correlations between the share of current expenditure in GDP and the share of development expenditure in GDP with the share of total government expenditure.

4.5.3 Testing Non-stationarity and co-integration of variables:

To avoid spurious regression, it is essential to test for unit root in the series included in the model. Testing for the existence of unit roots in level and first difference of each variable over the period 1973-2006, the Dickey–Fuller results are reported in table (4-8).

Table (4-8): Unit root tests.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model without trend or intercept</th>
<th>Model with only intercept</th>
<th>Model with intercept and trend</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>1.637803</td>
<td>3.330228*</td>
<td>3.40224</td>
</tr>
<tr>
<td>SHT</td>
<td>0.255663</td>
<td>2.302039</td>
<td>4.001769*</td>
</tr>
<tr>
<td>SHCU</td>
<td>0.47501</td>
<td>2.826264</td>
<td>4.964013*</td>
</tr>
<tr>
<td>SHD</td>
<td>0.038283</td>
<td>2.271600</td>
<td>2.948707</td>
</tr>
<tr>
<td><strong>First difference</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>6.463546**</td>
<td>6.377632**</td>
<td>6.263858**</td>
</tr>
<tr>
<td>SHT</td>
<td>6.894245**</td>
<td>6.872763**</td>
<td>6.676296**</td>
</tr>
<tr>
<td>SHCU</td>
<td>7.831602**</td>
<td>7.823819**</td>
<td>7.615613**</td>
</tr>
<tr>
<td>SHD</td>
<td>6.973241**</td>
<td>6.877900**</td>
<td>6.717299**</td>
</tr>
</tbody>
</table>

**Note:** ADF: Dickey – Fuller test statistic. The degree of augmentation is (0); it is determined by selecting the model with the lowest AIC. Asterisks (*) and (**) indicates rejection of the null hypothesis that unit root exists at 5% and 1% significance level respectively.

The results presented in table (4-8) indicates that the all variables are non-stationary in levels at 1%level while they appear to be stationary in the
first differences at 1% significance level, economic growth rates however, appear to be stationary in the level at 5% level with intercept only. And the share of total and current government expenditure in GDP, appear to be stationary in the level at 5% level with intercept and trend.

The existence of unit root in the time series data at level require testing for co-integration among the variables of the study. Co-integration test is performed using Johansen test (1988). According to it, if there existence a stationary linear combination of non-stationary random variables, the variables combined are said to be co-integrated. Results of co-integration tests are summarized in table (4-9) below.

Table (4-9): Johansen co-integration result

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.283568</td>
<td>18.66244</td>
<td>25.32</td>
<td>30.45</td>
<td>None</td>
</tr>
<tr>
<td>0.220988</td>
<td>7.991325</td>
<td>12.25</td>
<td>16.26</td>
<td>At most 1</td>
</tr>
</tbody>
</table>

Note: 1- The null hypothesis is: there is no cointegration between variables ($r = 0$)
2- **(*)** denotes rejection of the hypothesis at 5 % (1%) significance level.
3- L.R. rejects any cointegration at 5% significance level

From table (4-9) it noted that the null hypothesis is accepted at 5% since the likelihood Ratio is smaller than critical value, this indicates that there is no cointegration between variables

**4.5.4 (VAR) Estimation and Causality test:**

Granger causality test requires estimating the (VAR) model by using (OLS). To estimate the relationship between the share of government expenditure in GDP and economic growth, the research applied the methodology presented above.
4.5.4.1 The economic growth and aggregate government expenditure:

In this section economic growth is regressed on the share of total government expenditure in GDP, results are reported as follows:-

\[ \Delta G = -0.17 - 0.27 \Delta G (-1) - 0.36 \Delta G (-2) + 5.45 \Delta SHT (-1) + 5.89 \Delta SHT (-2) \]

\[ (-0.23743) \quad (-1.59657) \quad (-2.15114) \quad * \quad (1.01471) \quad (1.09376) \]

R-squared = 0.21    Adj. R-squared = 0.09    F-statistic = (1.738372)    Log likelihood = -83.33

\[ \Delta SHT = 0.03 + 0.000003 \Delta G (-1) - 0.004 \Delta G (-2) - 0.76 \Delta SHT (-1) - 0.21 \Delta SHT (-2) \]

\[ (0.83027) \quad (0.00036) \quad (-0.38631) \quad * \quad (2.39240) \quad (-0.66464) \]

R-squared = 0.21    Adj. R-squared = 0.09    F-statistic = 1.721260    Log likelihood = 4.43

Log Likelihood = -78.83832    AIC = 5.731505

In the first equation of the above VAR model, the economic growth (DG) is regressed on its first and second lags and the first two lags of the Share of government expenditure in GDP (SHT). The coefficients of the variables included in the VAR are shown in the equations with their corresponding t-values. All individual coefficients in the model are not significantly different from zero since their t-values are lower than the critical values which are (1.70 at 5% and 2.47 at 1%). except in the case of coefficients of the second lag of growth in the first equation (t-value is -2.15) and the first lag government expenditure in the Second equation (t-value is 2.39), (F – statistic) in the two equations are in significant at (1%). Log likelihood indicates that all coefficients are stable at (1%).
Since the intercept was insignificant, model can regressed without intercept, results are reported as follows:

\[
DG = -0.27DG(-1) - 0.36DG(-2) + 5.41DSHT(-1) + 5.83DSHT(-2)
\]

\[
(-1.61370) \quad (-2.17755)^* \quad (1.02589) \quad (1.10434)
\]

\[
R^2 = 0.21 \quad \text{Adj. } R^2 = 0.12 \quad F = 2.382297 \quad \text{Log likelihood } = -83.36183
\]

\[
DSHT = -0.0005DG(-1) - 0.0045DG(-2) - 0.75DSHT(-1) - 0.20DSHT(-2)
\]

\[
(-0.04941) \quad (-0.45486) \quad (-2.38140)^* \quad (-0.63453)
\]

\[
R^2 = 0.19 \quad \text{Adj. } R^2 = 0.10 \quad F = 2.089272 \quad \text{Log likelihood } = 4.026869
\]

From the above results of the VAR models, the causality between government expenditure and economic growth is tested using Granger test. The null hypothesis that government expenditure does not cause economic growth and that economic growth does not cause government expenditure. Results of causality are summarized in table (4-10) below.

Table (4-10) : aggregate government expenditure and Granger causality results:

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSHT does not Granger Cause DG</td>
<td>31</td>
<td>0.69719</td>
<td>0.50705</td>
</tr>
<tr>
<td>DG does not Granger Cause DSHT</td>
<td></td>
<td>0.07639</td>
<td>0.92666</td>
</tr>
</tbody>
</table>

Table (4-10) indicates the acceptance of the null that government expenditure does not Granger cause economic growth and that growth does not Granger cause government expenditure. That to say there is not a
feedback relationship between government expenditures and economic growth in Sudan.

4.5.4.2 The economic growth and disaggregate government expenditure:

The components of total government expenditure may have difference results. Therefore, in this section total government expenditure disaggregates into current and development expenditures and they regressed on economic growth, results are reported as follows:

<table>
<thead>
<tr>
<th></th>
<th>DG</th>
<th>DSHD</th>
<th>DSHCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG(-1)</td>
<td>-0.007730</td>
<td>0.020278</td>
<td>0.028826</td>
</tr>
<tr>
<td></td>
<td>(-0.03581)</td>
<td>(0.85292)</td>
<td>(1.74258)*</td>
</tr>
<tr>
<td>DG(-2)</td>
<td>-0.216269</td>
<td>0.003750</td>
<td>-0.001841</td>
</tr>
<tr>
<td></td>
<td>(-1.00956)</td>
<td>(0.15894)</td>
<td>(-0.11215)</td>
</tr>
<tr>
<td>DG(-3)</td>
<td>0.323544</td>
<td>-0.006594</td>
<td>0.017561</td>
</tr>
<tr>
<td></td>
<td>(1.53024)</td>
<td>(-0.28316)</td>
<td>(1.08376)</td>
</tr>
<tr>
<td>DG(-4)</td>
<td>-0.449220</td>
<td>0.007115</td>
<td>0.016281</td>
</tr>
<tr>
<td></td>
<td>(-2.31636)</td>
<td>(0.33306)</td>
<td>(1.09549)</td>
</tr>
<tr>
<td>DG(-5)</td>
<td>0.719775</td>
<td>0.029395</td>
<td>0.027408</td>
</tr>
<tr>
<td></td>
<td>(2.95070)*</td>
<td>(1.09404)</td>
<td>(1.46614)</td>
</tr>
<tr>
<td>DSHD(-1)</td>
<td>1.260905</td>
<td>0.369051</td>
<td>0.580595</td>
</tr>
<tr>
<td></td>
<td>(0.36008)</td>
<td>(0.95681)</td>
<td>(2.16347)*</td>
</tr>
<tr>
<td>DSHD(-2)</td>
<td>14.84767</td>
<td>0.211175</td>
<td>0.319738</td>
</tr>
<tr>
<td></td>
<td>(3.94099)*</td>
<td>(0.50888)</td>
<td>(1.10741)</td>
</tr>
<tr>
<td>DSHD(-3)</td>
<td>-0.520470</td>
<td>-0.507455</td>
<td>-0.075594</td>
</tr>
<tr>
<td></td>
<td>(-0.16352)</td>
<td>(-1.44740)</td>
<td>(-0.30990)</td>
</tr>
<tr>
<td>DSHD(-4)</td>
<td>1.625126</td>
<td>0.292498</td>
<td>0.399950</td>
</tr>
<tr>
<td></td>
<td>(0.55667)</td>
<td>(0.90962)</td>
<td>(1.78764)*</td>
</tr>
</tbody>
</table>

[58]
In the first equation of the above VAR model, the economic growth (DG) is regressed on its first and fifth lags and the first fifth lags of the Share of current government expenditure in GDP (SHCU) and the first fifth lags of the Share of development government expenditure in GDP (SHD). In the second equation the share of development government expenditure in GDP is regressed on its first fifth lags and the first fifth lags of growth and
the first fifth of the Share of current government expenditure in GDP (SHCU). In the third equation the share of Current government expenditure in GDP is regressed on its first fifth lags and the first fifth lags of growth and the first fifth of the Share of development government expenditure in GDP (SHD). The lag length is determined by selecting the model with lowerest AIC, we started at 5 lags and reduced the number of lags gradually. * (**) indicates Significant at 5% and 1%.

Since the intercept is insignificant we estimate the (VAR) model without intercept, results is reported as follows:

<table>
<thead>
<tr>
<th></th>
<th>DG</th>
<th>DSHD</th>
<th>DSHCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG(-1)</td>
<td>-0.015020</td>
<td>0.018995</td>
<td>0.027549</td>
</tr>
<tr>
<td></td>
<td>(-0.07153)</td>
<td>(0.80419)</td>
<td>(1.61982)</td>
</tr>
<tr>
<td>DG(-2)</td>
<td>-0.225164</td>
<td>0.002185</td>
<td>-0.003399</td>
</tr>
<tr>
<td></td>
<td>(-1.08144)</td>
<td>(0.09329)</td>
<td>(-0.20152)</td>
</tr>
<tr>
<td>DG(-3)</td>
<td>0.321634</td>
<td>-0.006931</td>
<td>0.017226</td>
</tr>
<tr>
<td></td>
<td>(1.56139)</td>
<td>(-0.29908)</td>
<td>(1.03241)</td>
</tr>
<tr>
<td>DG(-4)</td>
<td>-0.457427</td>
<td>0.005670</td>
<td>0.014844</td>
</tr>
<tr>
<td></td>
<td>(-2.42704*)</td>
<td>(0.26744)</td>
<td>(0.97238)</td>
</tr>
<tr>
<td>DG(-5)</td>
<td>0.701391</td>
<td>0.026160</td>
<td>0.024189</td>
</tr>
<tr>
<td></td>
<td>(2.97570)**</td>
<td>(0.98659)</td>
<td>(1.26697)</td>
</tr>
<tr>
<td>DSHD(-1)</td>
<td>1.168896</td>
<td>0.352860</td>
<td>0.564485</td>
</tr>
<tr>
<td></td>
<td>(0.34292)</td>
<td>(0.92022)</td>
<td>(2.04451)*</td>
</tr>
<tr>
<td>DSHD(-2)</td>
<td>14.54029</td>
<td>0.157085</td>
<td>0.265918</td>
</tr>
<tr>
<td></td>
<td>(3.99992)**</td>
<td>(0.38413)</td>
<td>(0.90312)</td>
</tr>
<tr>
<td>DSHD(-3)</td>
<td>-0.661942</td>
<td>-0.532350</td>
<td>-0.100365</td>
</tr>
<tr>
<td></td>
<td>(-0.21405)</td>
<td>(-1.53023)</td>
<td>(-0.40067)</td>
</tr>
<tr>
<td>DSHD(-4)</td>
<td>1.440141</td>
<td>0.259946</td>
<td>0.367560</td>
</tr>
<tr>
<td></td>
<td>(0.50926)</td>
<td>(0.81712)</td>
<td>(1.60466)</td>
</tr>
<tr>
<td>DSHD(-5)</td>
<td>5.427404</td>
<td>-0.737279</td>
<td>-0.262040</td>
</tr>
<tr>
<td></td>
<td>(1.35575)</td>
<td>(-1.63714)</td>
<td>(-0.80811)</td>
</tr>
</tbody>
</table>
The lag length is determined by selecting the model with lowest AIC, we started at 5 lags and reduced the number of lags gradually. * (***) indicates Significant at 5% (1%). From the above results of the VAR models, the causality between disaggregate government expenditure and economic growth is tested using Granger test, the null hypothesis that current and development expenditure does not cause economic growth and that economic growth does not cause current and development expenditure. Results of causality are summarized in table (4-11).
Table (4-11) indicates the acceptance of the null that current and development expenditures does not Granger cause economic growth and that growth does not Granger cause current and development expenditure. That is to say current and development expenditures does not cause economic growth and economic growth does not cause current and development expenditures in Sudan.

Economic theory offers different methods and instruments for evaluating the role of the government in the economic growth. One of these instruments is the Armey curve\(^1\). The Armey curve is based on the fundamental law of diminishing factor returns. The idea of this law is that the increase in government spending leads to higher GDP, faster at the beginning, slower after that, and reaching the maximum output (or maximum growth rate) at a certain level of government spending. After this point, a further increase in government spending leads to a decrease in the output (or slowing down of the growth rate). This means the relation between government expenditure and economic growth is non-linear, therefore we test for co-integration between economic growth and

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSHD does not Granger Cause DG</td>
<td>28</td>
<td>1.44900</td>
<td>0.25759</td>
</tr>
<tr>
<td>DG does not Granger Cause DSHD</td>
<td></td>
<td>0.64217</td>
<td>0.67092</td>
</tr>
<tr>
<td>DSHCU does not Granger Cause DG</td>
<td>28</td>
<td>0.48331</td>
<td>0.78395</td>
</tr>
<tr>
<td>DG does not Granger Cause DSHCU</td>
<td></td>
<td>0.33824</td>
<td>0.88268</td>
</tr>
<tr>
<td>DSHCU does not Granger Cause DSHD</td>
<td>28</td>
<td>1.96980</td>
<td>0.13518</td>
</tr>
<tr>
<td>DSHD does not Granger Cause DSHCU</td>
<td></td>
<td>0.95521</td>
<td>0.47174</td>
</tr>
</tbody>
</table>

government expenditure by assuming non-linear relation. Results of cointegration tests are summarized in table (4-12).

Table (4-12): Johansen co-integration result (Quadratic deterministic trend in the data)

<table>
<thead>
<tr>
<th>Eigenvalue</th>
<th>Likelihood Ratio</th>
<th>5 Percent Critical Value</th>
<th>1 Percent Critical Value</th>
<th>Hypothesized No. of CE(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.283143</td>
<td>18.35048</td>
<td>18.17</td>
<td>23.46</td>
<td>None *</td>
</tr>
<tr>
<td>0.213823</td>
<td>7.698348</td>
<td>3.74</td>
<td>6.40</td>
<td>At most 1 **</td>
</tr>
</tbody>
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Notes: 1- We test under assumption that there is Quadratic deterministic trend in the data.
2- The null hypothesis is: there is no cointegration between variables (r =0)
3- *(**) denotes rejection of the hypothesis at 5% (1%) significance level.
4- L.R. test indicates (2) cointegration equation(s) at 5% significance level.

From table (4-12) it noted that the null hypothesis is rejected at 5% since the likelihood Ratio is greater than critical value, this indicates that there is cointegration between variables, which means there is non-linear long-run relationship between economic growth and government expenditure in Sudan, The policy implication points out that the increase in government spending leads to higher GDP, faster at the beginning, slower after that, and reaching the maximum Economic growth rate at a certain level of government spending. After this point, a further increase in government spending leads to a decrease in the Economic growth rate.

4.5.5(VECM) estimation:

The presence of unit roots in time series the possibility of spurious correlation rise. Since the unit root test results showed that all variables are non stationary at levels at (1%), the series should be differenced to exhibit stationarity and the (VECM) is then suitable in modeling these variables. Results are reported as follows:-
\[ \Delta G = 0.084 - 0.04\Delta G_{(-1)} - 0.18\Delta G_{(-2)} + 9.22\Delta SHT_{(-1)} + 8.14\Delta SHT_{(-2)} - 0.42Z_{(-1)} \]

\[
\begin{array}{cccc}
(0.12842) & (-0.23511) & (-1.02339) & (1.74082) \\
(1.58791) & (-2.20588) & & \\
\end{array}
\]

R-squared = 0.34  Adj. R-squared = 0.21  F-statistic = 2.570662  Log likelihood = -80.57

\[ \Delta SHT = -0.037 + 0.006\Delta G_{(-1)} + 0.001\Delta G_{(-2)} - 0.66\Delta SHT_{(-1)} - 0.15\Delta SHT_{(-2)} - 0.011Z_{(-1)} \]

\[
\begin{array}{cccc}
(-0.88095) & (0.51405) & (0.09499) & (-1.95539) \\
(-0.46205) & (-0.94402) & & \\
\end{array}
\]

R-squared = 0.24  Adj. R-squared = 0.08  F-statistic = 1.549480  Log likelihood = 4.975380

Log Likelihood = -75.59254  Akaike Information Criteria = 5.780164

The above equations show the short-run dynamic coefficients for the relationship between government expenditure and economic growth. The results indicate that the error correction term in the growth equation was significantly different from zero, while the rest of the variables are insignificant; except the first lag of the government expenditure, This result suggests short-run relationship between government expenditure and economic growth, and the adjustment toward the long-run equilibrium in growth equation was about (-0.42). The lag length is determined by selecting the model with lowestest AIC, we started at 5 lags and reduced the number of lags gradually. The long-run coefficients can be reported as:

\[ G = 8.85 + 0.22\text{Trend} + 9.79\text{ SHT} \]

\[ t = (7.44516) \]

This equation showed the existence of long-run relation between economic growth and aggregated government expenditure in Sudan during the period of Study, The long-run government coefficient is about (9.79), and it is significant at (1%).

[64]
4. 6: Results of model application

As can be seen from table (4-8), all variables are non-stationary in level at (1%), thus we test for cointegration by assuming that there is quadratic deterministic trend in the data. The result shows that cointegration exist. This means there is non-linear long-run relationship between economic growth and government expenditure during the period of study.

The test for causality shows that there is no causation between economic growth and government expenditure by assuming linear relation (see table 4-10). When we test causality between disaggregate government expenditure (current and development) and economic growth, results show that both current and development expenditure does not cause economic growth and economic growth does not cause current and development expenditure by assuming linear relation (see table 4-11).
Results, Conclusion and Recommendations

1- Results:

The research results show that:

1. All variables are non-stationary in level at (1%).
2. There is no causation between economic growth and government expenditure by assuming linear relation.
3. Both current and development expenditure does not cause economic growth and economic growth does not cause current and development expenditure by assuming linear relation.
4. Results of cointegration showed that cointegration exist between economic growth and government expenditure under assumption that there is quadratic deterministic trend in the data. This means that there is non-linear long-run relationship between government expenditure and economic growth.
5. The short-run dynamic coefficient of government expenditure is significant at (5%) and the adjustment toward the long-run equilibrium in growth equation was about (-0.42), and it is significant.

2 - Concluding Remarks:

The main objective of this research is to investigate the relationship between economic growth and government expenditure in Sudan during the period (1973-2006). To achieve this aim research used aggregate government expenditure and disaggregates (current and development) government expenditure.
The research adopts econometrics methodology, namely used cointegration analysis, Granger causality test to test the hypotheses.

Results of Augmented –Dickey Fuller (ADF) test of non-stationary showed that all variables were non-stationary in level at 1%, thus test for cointegration is needed by using Johansen test, and results showed that cointegration exist between economic growth and government expenditure under assumption that there is quadratic deterministic trend in the data. This means that there is non-linear long – run relationship between government expenditure and economic growth and causality test can be carried out using first difference of variables.

When we used aggregate government expenditure to test for causality: result shows that there is no causation between economic growth and government expenditure by assuming linear relation. We further test for causality between economic growth and disaggregate (current and development) government expenditure results showed that economic growth dose not cause both current and development government expenditure, and both current and development does not cause economic growth in Sudan by assuming linear relation.

We can conclude that; based on data for the period (1973-2006) for economic growth and government expenditure in Sudan, the relationship between government expenditure and economic growth dose not obeys the Keynesian theory or Wagner’s law, but there is evidence for non-linear long run relation. Such results are reached to by researchers who concluded that there is no causal relation between government expenditure and economic growth, such as Sinha, (1998) , Kweka et.al, (2000) , Hakan et.al, (2003) , Sinha (2007) and Dipendra, (2007).

[67]
3- Recommendations:

The empirical investigation of the relationship between economic growth and government expenditure in Sudan during the period (1973-2006) showed that government expenditure has not played basic role to promote economic growth in Sudan. Thus, the policy implication points out:

1- Orienting the government expenditure to education and health to promote human capital, this leads to enhance the economic growth.
2- More spending to infrastructures which leads to increase in productivity in the private sector and increases the economic growth.
3- Achieve and sustain peace in whole country, and reallocate of financial resources from military sector to develop the marginalized areas in order to achieve Broad-based growth.
4- The ongoing reforms for adoption of the (GFS) budget classification should be continued, and a consolidated GNU budget including coverage of the spending in the Northern and South states.
5- Improving accountability and efficiency in public spending sector by adoption the program of build capacity for more effective resource allocation and use
References

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III. Reports :


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• UNDP , 2006 “Macroeconomic Policies for Poverty Reduction : The Case of Sudan”


• Ministry of finance and national economy, (economic survey, 2005 and 2006).

IV. Website :

• Suliman, Kabbashi Medani (2005) “The Impact of Trade Liberalization on Revenue Mobilization and Stability in Sudan” (Online) available at:

المراجع العربية:


[73]
## Appendix

**SDD Millions**

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Source: MFNE

Notes: The data of GDP and government expenditure transformed from Sudanese pounds to Sudanese Dinars for the period before 1992 and after 2005.