# THE IMPACT OF SECURITY EXPENDITURE ON ECONOMIC GROWTH: EVIDENCE FROM THE NIGERIAN ECONOMY.

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# CHAPTER ONE

## 1.0 GENERAL INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY:

The public sector, which involves government spending, revenue raising, and borrowing, has a crucial role to play in any mixed economy. Public expenditure is spending made by the government on collective needs and wants such as security spending, pension, provision of infrastructures among others. In the 17th and 18th century public expenditure was considered

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as wastage of money. Thinkers said government should stay with their traditional functions of spending on defence and maintaining law and order. Until the 19th century, public expenditure was limited as laissez faire philosophies believed that money left in private hands could bring better returns. In the 20th century John Maynard Keynes argued the role of public expenditure in determining levels of income and distribution in the economy. Since then government expenditures has shown an increasing trend (Wikipedia, 2014).

The recent insecurity, especially internal insecurity is not a problem that is unique to Nigeria; the US, UK and many countries, face the challenges of insecurity within their borders on a daily basis. The difference between them and Nigeria is how they manage the threats; how knowledgeable and prepared they are; how they deploy resources against the threats; how effective they are; how patriotic and united these people are against threats of insecurity.

In recent times, Nigeria suddenly metamorphosed into an abode of serial bombing, hostage taking, armed robbery, cold-blooded killings, kidnapping and ethno-religious

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conflicts traceable to militant groups and terrorists with conflicting ideological, political and religious agenda. Among these militant groups and terrorists are Niger-Delta Militants, campus cults, Bakassi Boys, armed robbers, O'odua People's Congress, youth thuggerists (*Kauraye*), kidnappers, and more recently Boko-Haram insurgents *et cetera*. The resultant loss of lives, rising budgetary spending for security and destruction of valuable government facilities portend devastating consequences for sustainable economic growth and development in the country (Adebakin and Rami, 2012).

The relationship between security expenditure and economic growth has continued to generate series of debates among policy makers, academicians, financial analysts, governments, researchers, economists as well as scholars. Government performs two functions, protection (security) and provision of certain public goods. Protection function consists of the creation of rule of law and enforcement of property rights, while provision of public goods includes: constructions of roads, water supply, building of schools and hospitals and others. This helps to minimize risks of criminality, enhance protection of life and

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property, and also protection of the nation from both internal and external aggression (Nurudeen and Abdullahi, 2008).

Therefore, the debate on the relationship between security expenditure and economic growth is still unsettled among economists. There are different views on the security-growth nexus. The first view is that the security expenditure is important in accelerating economic growth through its effect on aggregate demand, expansion of markets for suppliers, technology development and security benefits. The proponents of this view argue that, countries can benefit from spill-over effects of investment in research and development (R&D), in the military industries. However, the impact of R&D on growth is well established in the economic growth literature. Furthermore, security spending can deliver other public goods in terms of social infrastructure, such as airports, roads, and communication networks by producing goods with a "dual-use" nature. More notably, security expenditures can increase internal and external security by funding the production of an optimal level of military production. A more secure environment would attract domestic and foreign

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investments, thus improve the standard of living. Moreover, technology transfers from the inflow of foreign capital can speed up economic growth in the process (cited from the work Ali and Mustapha, 2014) [for example in the works of Halicioglu, 2004; Tiwari and Shahbaz, 2011; Anwar, Rafique and Joiya, 2012; and so on). While the other view argues that security expenditure can retard economic growth by way of crowding out investment (Khilji and Mahamood (1997); Edeme et al, (2013); Tekeogbu, (2008); and others. The work of Myo (2013) found that military expenditure has no clear impact on economic growth using sample of eighteen (18) Asian countries, hence the relationship is not clear]. Therefore, the inconsistency in the theoretical and empirical evidence on the relationship between security spending and economic growth are attributed to individual country specific effects and the techniques employed.

Most studies on the security-growth relationship utilized time series data. For example in the works of Tekeogbu (2008); Abraham, (2011); Gaiya, (2011); El-Husseiny, Al-Sayed and El-Sayed (2013); and so on. However, sample variations and differences in the model

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specifications and time periods usually lead to diversity on result and of interpretations. Furthermore, since different parts of the world do not share the same natural environments and socioeconomic structures, the impacts of security spending across countries cannot be easily generalized. These facts provide a justification for case studies on specific countries by using time-series data.

The economic analysis of public expenditure to a large extent is an attempt to apply the private sector rules for efficient resource allocation to the public sector. This applies not only to the theories of aggregate budget determination but also to the techniques developed by economists for the evaluation of specific public expenditure projects for example security expenditure. Over the past one and a half decades, a substantial volume of empirical research has been directed towards identifying the elements of public expenditure (at its aggregate and disaggregate levels) that bear significant association with economic growth. This empirical literature varies in data set, techniques of analysis, and often produces conflicting results. Over the past decades, although, there is general disagreement that public expenditure either

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recurrent or capital expenditure, notably on security expenditures can either be growth-enhancing or growth-retarding or both, (Niloy et al, 2003).

In today's world, it is well accepted that violence exerts a high cost on global development. In about sixty (60) countries over the last ten years, violence has significantly and directly reduced economic growth. It has hampered poverty reduction efforts and delayed progress towards the achievement of the Millennium Development Goals ((MDGs).

In Nigeria presently, security and social unrest are the greatest challenges to the peaceful coexistence of the country. People now live in fear and anxiety as many innocent citizens are being killed each day in the North-Eastern part of the country. The effect of unwholesome killings is the direct reduction in the effective population essential for meaningful development of the economy especially where number counts. The current wave of insecurity in most emerging economies like Nigeria has become very unprecedented (Fefa and Irefin, 2014).

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According to the Armed Conflict Location and Event Dataset (ACLED), Nigeria is the fourth most violent country measured by the number of violent events and the seventh most fatal over the course of the dataset coverage between (1997- 2013). This violence has different spread pattern; between 1997 and 2009, the levels of both violence and reported fatalities were relatively stable. But since 2010, both have climbed sharply, with increases holding in both absolute and proportional terms. The Nigerian state is plagued by many crises of marked volatility and extreme violence leading to high level of insecurity. Nigeria may have shown serious recovery in withstanding centrifugal forces throughout the territory, it is almost unparalleled in the scale, scope, reach and intensity of the threats it faces. This insecurity situation has far reaching effects on the Nigerian emerging economy (ACLED, 2013).

Okorie (2011) opines that, everyday about $1.4 trillion investment capital circulates around the world; this shows that capital in the global economy is volatile. A lot of indices

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are considered by investors before they decide to invest in one country or the other, one such index is security.

Insecurity is a risk factor which investors the world all over consider when investing. For investors, insecurity in any country is considered as a warning sign to take their investible funds to another country where there is adequate security. Foreign direct investments are required to stimulate the Nigeria emerging economy. However, the more the warning signals persist, the more fearful the investors become about investing in the Nigeria economy. In fact, panic withdrawal or disinvestment may result from insecurity in Nigeria (cited in Fefa and Irefin, 2014).

Analyzing the trend of Nigeria's total security expenditure in recent years shows that about ₦246b, ₦352b, ₦506b, ₦607b, ₦828b, ₦866b, ₦1.020trillion, 1.006trillion and ₦1.014trillion had been spent in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014 respectively (CBN, 2011 and Summary of Federal Government Budgets 2006-2014).

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Therefore, huge resources have been sunk in total security spending, in order to curtail the menace or devastating effects, yet the activities of insurgents are still rampant and prevailing in the country. However, despite the rising increases in total security spending, the activities of the insurgents have not declined or ceased.

## 1.2 STATEMENT OF THE PROBLEM:

Nigeria as a country has witnessed series of insecurity since its independence to date. The first major one was the civil war which took place between 1967 and 1970, investigations have shown that Nigeria's level of budgetary spending on defence and internal security rose during the period (CBN, 2011).

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The second major insecurity witnessed in the country is that of militants in the Niger Delta, Nigeria lost total revenue of about $1 billion daily as a result of the activities of the aggravated youth in the area (Douglas, 2012).

A lot of national resources have been sunk in order to curtail the issue, for example in 2008 the then government introduced an amnesty programme that was to end the insecurity in the oil region. The programme includes the following: firstly, to put the aggravated youth on monthly stipend; secondly, to send some of the youth in the region to schools for apprenticeship within and outside Nigeria; thirdly, the programme also include the establishment of the Ministry for Niger- Delta affairs with core mandate of providing basic amenities to all the states within the region; and finally, to give out the security of Nigeria oil exploration activities to the leaders of the militants (Kuku, 2012). The programme itself has engulfed huge financial resources.

However, as a result of the amnesty program, Nigeria had enjoyed a relative stability until in 2009 when some youth in North eastern region of the country came with an ideology

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that western education is prohibited (i.e. Boko-Haram). Since then, Nigeria has witnessed massive destruction and losses in terms of lives and property. It is estimated that about fifteen thousand (15,000) people so far lost their lives and property worth trillions of Naira, as a result of the insurgency (Oyobode, 2013).

This study intends to analyze some core issues on the relationship between security expenditure and economic growth. It is earlier established that the gap identified in the inconsistent results being reported by several studies, for example in the works of Abraham, (2011); Gaiya, (2011); Anwar, Rafique and Joiya, (2012); among others show that security expenditure has positive impact on economic growth. On the other hand, the works of Khilji and Mahamood, (1997); Tekeogbu, (2008); Adebakin and Rami, (2012); among others all found that security expenditure has negative impact on growth. While the work of Myo, (2013) found that military expenditure has no clear impact on economic growth using sample of eighteen (18) Asian countries. Thus, the existing literature showed that there is no general precise consensus on the relationship between security expenditure and economic growth;

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hence the results have been mixed. However, these previous works have served as a motivating factor for this study.

In recent times, Nigeria has joined the league of countries that are known to spend a good chunk of their budgetary allocation on security due to the activities of Niger-Delta and Boko-Haram militants. Analyzing the trend of Nigeria's total security expenditure in recent years showed that about ₦246b, ₦352b, ₦506b, ₦607b, ₦828b, ₦866b, ₦1.020trillion, 1.006trillion and ₦1.014trillion had been spent in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014 respectively. However, despite the rising increases in total security spending, it is rather doubtful whether it has translated to the growth of the economy as more threat from insurgent activities are still on.

Therefore, against these backdrops the following questions were raised:

## 1.3 RESEARCH QUESTIONS:

i) Is there any significant relationship between security expenditure and economic growth in Nigeria?

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ii) What is the structure and trend of security expenditure with reference to the period of Niger-Delta militancy and Boko-Haram insurgencies in Nigeria?

iii) What is the impact of security expenditure on economic growth in Nigeria?

## 1.4 OBJECTIVES OF THE STUDY:

The broad objective of the study is to investigate the relationship between security expenditure and economic growth in Nigeria. Other specific objectives that the research intends to accomplish include:

i) To analyses the structure and trend of security expenditure with reference to the period of Niger-Delta and Boko-Haram insurgences in Nigeria.

ii) To investigate the impact of security expenditure on economic growth in Nigeria.

## 1.5 HYPOTHESIS OF THE STUDY:

In view of the above objectives, the following hypotheses were tested for this research work as shown below:

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**Hypothesis 1:**

**$H_O$:** The security expenditure has no relationship with economic growth in Nigeria.

**$H_1$:** The security expenditure has relationship with economic growth in Nigeria.

**Hypothesis 2:**

**$H_O$:** The changing pattern for structure and trend of security expenditure with reference to the period of Niger-Delta militancy and Boko-Haram insurgences has no impact on economic growth in Nigeria.

**$H_1$: :** The changing pattern for structure and trend of security expenditure with reference to the period of Niger-Delta militancy and Boko-Haram insurgences has impact on economic growth in Nigeria.

**Hypothesis 2:**

**$H_O$:** The security expenditure has no impact on economic growth in Nigeria.

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**$H_1$:** The security expenditure has impact on economic growth in Nigeria.

## 1.6 JUSTIFICATION OF THE STUDY:

Results from the empirical literature have shown that there is no precise general consensus on the relationship between security expenditure and economic growth. Even though the results are peculiar to specific countries while others are contrary. The justification of this study is to further investigate the nature and extend of security expenditure in Nigeria with recent insurgency activities of Boko-Haram and its impact on economic growth. Therefore, there is need to conduct more researches in this area in order to ascertain the validity of what has been reported.

It is interesting to note that some studies have been conducted in same country using the same data sources. The inconsistency has provoked the interest of the researcher to explore the reasons for the results obtained from empirical researches on the relationship between the security expenditure and economic growth. For example in the works of Looney, (1991); Halicioglu, (2004); Pradhan, (2007);Alptekin, (2010); Tiwari and Shahbaz, (2011); among

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others, others are, Yildrim, Oscal and Keskin, (2011); Abraham, (2011); and Gaiya, (2011); Mohammadi, Maleki and Gashti, (2012); Anwar, Rafique and Joiya, (2012);and Ebiringa and Charles, (2012) shows that security expenditure has positive impact on economic growth. On the other hand, in the works of Kollias, (1989); Khilji and Mahamood, (1997); Dunne, (2000); Collier and Hoeffler, (2002); Antonakis and Apostolou, (2003); Enimola and Akobo, (2008). Others are Tekeogbu, (2008); Shahbaz, Afza and Shabbir, (2011); Shahbaz and Shabbir, (2011); Adebekin and Rami (2012); Edeme et al, (2013); Ovariawote and Eshenake, (2013); they all found that security expenditure has negative impact on growth. While in the work of Myo, (2013) found that military expenditure has no clear impact on economic growth using sample of 18 Asian countries, hence indicated indifference result.

The justification is that the inconsistent results may be attributed to inappropriate methodology adopted by the authors which may have significantly affected the validity of the results.

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In addition to this, huge resources have been sunk in total security spending, in order to curtail the menace or devastating effects, yet the activities of insurgents are still rampant and prevailing in the country. However, despite the rising increases in total security spending, the activities of insurgents have not been declines or cease. Hence, there is need to reassess the impact of security expenditure on economic growth.

The results of the study would help the policy makers that are concerned with policy formulation on the composition of security expenditure to adopt a policy that will enhance and promote economic growth in the country. The study will also contribute to the body of knowledge by providing information on the relationship between the security expenditure and economic growth.

## 1.7 SCOPE AND LIMITATIONS OF THE STUDY:

The study will use time series data covering the period from 1961 to 2014 for Nigerian economy. The choice of this time period is justified by the facts that using longer sample will

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enhance the consistency, efficiency and the reliability of the model parameters. The choice of investigating the relationship between security expenditure and economic growth was as a result of the data availability which was merged together as obtained from the CBN Statistical Bulletin and Federal Government Budgets in Nigeria.

The major limitations of this study are that of data challenges, data are difficult to come by and the accuracy of available ones is rather doubtful, especially with the recent development of corrupt practices in government security spending (for example Dasukigate ).

## 1.8 ORGANISATION OF THE STUDY:

The study was organized into five chapters. Chapter One is the introduction which comprises the background of the study, statement of the problem, objectives of the study, hypothesis of the study, justification of the study, scope and limitations of the study as well as the organization of the study. Chapter Two comprises of the conceptual literature, theoretical literature, empirical literature as well as theoretical framework. Chapter Three captures the methodology of the research where by the model specification and estimation procedures will

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be clearly stated. Chapter Four includes presentation and analysis of data where various tests were conducted ranging from the unit root test for stationarity, co-integration, and error correction test among others were carried out. Chapter Five constitutes the summary of the research findings, conclusions and the recommendations made based on the findings. The acknowledgement of the works used for the research and appendices is part of this chapter.

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# CHAPTER TWO

# 2.0 LITERATURE REVIEW

## 2.1 INRODUCTION:

This section discusses relevant literature that has to do with conceptual, theoretical and empirical as well as the gap identified on the course of this study on the relationship between security expenditure on economic growth in Nigeria.

## 2.2 CONCEPTUAL LITERATURE REVIEW:

### 2.2.1 Economic growth:

Economic growth is one of the four macroeconomic objectives in any society and others are full-employment, price stability, and favourable balance of payment. Economic growth refers to the increase over time of an economic capacity to produce goods and services required (needed) to improve the well-being of the citizens. It is also defined as the steady process by which the productive capacity of an economy increasing over time to bring about rising levels of national income. In development process, economic growth becomes meaningful concept only if

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it leads to the increase in the well-being of the citizens' overtime. However this can only happen if the rate of population growth lags (slower) behind the economic growth (Jinghan, 2003).

Economic growth is defined as an 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. Of more importance is the growth of the ratio of GDP to population (GDP per capita), which is also called per capita income. An increase in per capita income is referred to as intensive growth. GDP growth caused only by increases in population or territory is called extensive growth (Wikipedia, 2014).

According to Economic Glossary, economic growth is the long-run expansion of the economy's ability to produce output This is one of five economic goals, specifically one of the three macro goals (stability and full employment are the other two) Economic growth is made possible by increasing the quantity or quality of the economy's resources such as labour, capital, land and entrepreneurship (Adebakin, 2012).

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According to Business Dictionary, economic growth is the increase in a country's productive capacity, as measured by comparing gross national product (G.N.P) in a year with the GNP in the previous year. Therefore, increase in capital stock, advances in technology and improvement in the quality and level of literacy are considered to be the principal causes of economic growth. In recent years, the idea of sustainable development has brought in additional factors such as environmentally sound processes that must be taken into account in growing an economy (Samuel, 2011).

Given the various definitions above generally, this study operationalized economic growth as an increase in GDP over time usually one year.

### 2.2.2 Security Expenditure:

The word security expenditure according to BBC dictionary of English Language refers to all expenditures for the precautions that are taken to protect a given location or place from danger. Security is also a legal protection against possible harm or loss (BBC Dictionary, 1992).

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The United Nations Development Programme (1994) posits that security expenditure refers to "expenditure for freedom from fear and freedom from want"…" expenditure for safety from chronic threats such as hunger, disease, and repression as well as protection from sudden and harmful disruptions in the patterns of daily life –whether in homes, in jobs or in communities."

Wehmeier and Ashby (2002) however defines security expenditure as an expenditure that ensures protection of a country, persons, properties of the community against future threats, danger, mishaps and all other forms of perils.

Babangida (2011) views security expenditure "as expenditure for the physical protection and defense of our citizens and our territorial integrity, of which it is a part, but also the promotion of the economic well being and prosperity of Nigerians in a safe and secure environment that promotes the attainment of our national interests and those of our foreign partners."

Furthermore, Otto and Ukpere (2012) asserts that "security expenditure means expenditure on protection from hidden and hurtful disruptions in the patterns of daily life in homes, offices or communities… security must be related to the presence of peace, safety, happiness and the

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protection of human and physical resources or the absence of crisis, threats to human injury among others."

However, security expenditure can be defined in terms of defense expenditure and internal security expenditure. Therefore, security expenditure refers to the quantity of society's resources that is allocated to the acquisition and management of military capability which are classified into recurrent and capital expenditures of the Armed Forces namely: Army, Navy and the Air Force. It involves the running expenses of the defence departments and other governmental agencies engaged in defence projects as well as the resources allocated to the protection of citizens and property within domestic territory such as police, civil defence, prisons and so on.

Based on the above definitions, this study mirrors security expenditure as expenditure that constitutes all current and capital expenditures on defence (i.e Army, Air force and Navy) and internal security (i.e Police Affairs, Police Formations and Command, Police Service

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Commission, Ministry of Interior, Office of National Security Adviser and Ministry of Niger-Delta ).

Therefore, in this research, security expenditure connotes the sum of defence and internal security spending made by government in a given fiscal year.

### 2.2.3 Defence Expenditure:

According to International Monetary Fund (I.M.F) "The IMF definition of defence expenditure covers all expenditures, whether by defence or other departments, for the maintenance of military forces, including the purchase of military supplies and equipment (including the stockpiling of finished items but not the industrial raw materials required for their production), military construction,

recruiting, training, equipping, moving, feeding, clothing and housing members of the armed forces, and providing remuneration, medical care and other services for them. Also included are capital expenditures for the provision of quarters to families of military personnel, outlays or military schools, and research and development (R&D) serving clearly and foremost the purpose

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of defence. Military force also include paramilitary organizations such as well gendarmerie, constabulary, security forces border and customs guards, and others trained, equipped and available for use as military personnel. Also falling under this category are expenditures for purposes of strengthening the public services to meet wartime emergencies training civil defence personnel, and acquiring materials and equipment for these purposes. Included also are expenditures for foreign military organizations and alliances. This category excludes expenditure for non military purposes, though incurred by a ministry or department of defence, and payments or services provided to war veterans and retired military personnel." (cited in the works of Abraham ( 2011), Gaiya (2011) among others).

However in the words of North Atlantic Treaty Organization (NATO), the definition includes: All current and capital expenditure on the armed forces, in the running of defence departments and other government agencies engaged in defence projects as well as space projects, the cost of paramilitary forces and police when judge to be trained and equipped for military operations, military R&D, tests and evaluation costs, and costs of retirement, pensions

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of service personnel, including pensions of civilian employees. Military aid is included in the expenditure of the donor countries. Excluded are items on civil defence, interest on war debts and veterans payments.

The Stockholm International Peace Research Institute (SIPRI) defines military (defence) expenditure to include where possible, all current and capital expenditure on:

i. the armed force, including peacekeeping forces.
ii. defence ministries and other agencies engaged in defence projects
iii. paramilitary forces when judged to be trained, equipped and available for military operations
iv. military space activities.

United Nations (1994) has framed the definition with three categories of military expenditures: (A) operating costs; (B) procurement and construction; and (C) research and development.

**A. Operating costs**

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(1) Personnel

a) conscripts; b) other military; c) civilian

(2) Operations and maintenance

a) current-use material; b) maintenance and repairs; c) purchased services; d) rent.

**B. Procurement and construction**

(1) Procurement

a) aircraft and engines; b) missiles, including conventional warheads; c) nuclear war heads and bombs; d) ships and boats; e) armored vehicles; f) artillery; g) other ordinance and ground force arms; h) ammunition; i) electronics and communications; j)non-armored vehicles.

(2) Construction

a) air bases; b) missile sites; c) naval bases; d) electronics and communications; e)personnel; f) medical; g) training; h) warehouses and depots; i) command, administration;j) fortifications; k) shelters.

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**C. Research and development**

(1) Basic and applied

(2) Development, testing and evaluation (cited from the work of Abraham, 2011).

Therefore, from the above conceptual discuss it is clear that defence expenditure comprises only those spending made by or for the military activities (i.e Army, Air force and Navy).

### 2.2.4 Internal Security Expenditure:

Internal security (IS) is the act of keeping peace within the borders of a sovereign state or other self-governing territories. This is done generally by upholding the national law and defending against internal security threats. Responsibility for internal security may range from police to paramilitary forces, and in exceptional circumstances, the military itself (Wikipedia, 2014).

Internal Security Expenditure refers to the total amount of expenditure on protection of the domestic territory and citizens by security agencies (Oriavwote and Eshenake, 2013).

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According Dictionary of Military and associated internal security expenditure is expenditure for maintaining state of law and order prevailing within a nation (US Department of Defence, 2005). On the other hand, it is an expenditure on non-defence (i.e paramilitaries), in order to protect lives and property of the people in the country.

Therefore, this work mirrors internal security expenditure as that which constitutes all current and capital expenditures on (Police Affairs, Police Formations and Command, Police Service Commission, Ministry of Interior, Office of National Security Adviser and Ministry of Niger-Delta).

## 2.3 THEORTICAL LITERITURE REVIEW:

In this section we review the theoretical literature that relates security spending and economic growth. The relevant theories discussed in this research are broadly categorized into theories of economic growth and public expenditures: Classical Growth Theory, Keynesian Growth Theory, Harrod-Domar Growth Theory, Neoclassical Growth Theory, Wagner's Law of Increasing State Activities Theory of Public Expenditure, Peacock and Wiseman Theory of

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Public Expenditure, The Classical Approach to Theory of Public Expenditures, The Keynesian Approach to Theory of Public Expenditures.

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### 2.3.1 Theories of Economic Growth:

### i. The Classical Growth Theory:

The modern conception of economic growth theories began with the critique of Mercantilism, especially by the physiocrats and with the Scottish enlightenment thinkers such as David Hume and Adam Smith and the foundation of the discipline of modern political economy. The theory of the physiocrats was that productive capacity, itself, allowed for economic growth and that improving and increasing capital to enhance that capacity was "the wealth of nations". The theory further stressed the importance of agriculture and saw urban industry as "sterile", Adam Smith extended the notion that manufacturing was central to the entire process of the economy. According to the classical theory which hinge on capital accumulation as the major determinant of economic growth, put differently, the theory assigns the responsibility of growth enhancement to the rate of investment. The level of investment in turn leads to higher profit such that the higher the level of profits, the higher the level of investment and hence economic growth (Wikipedia, 2014).

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The classical economist, Adam Smith (1776), David Ricardo (1817) and John Stuart Mill provided various forms of definition for production. They included manufacturing as one of the elements in the creation of wealth and introduced the concept of vendibility – production for the market rather than in accordance with the dictates of a national economy. Nevertheless they reserved the term production for the description of fourty (40) such activities as resulted from the agricultural and the extractive processes and from the manufacture of useful material object. David Ricardo argued that trade was of benefit to a country; because if one could buy a good more cheaply from abroad, it means that there was more profitable work to be done. This theory of "comparative advantage" was the central basis for arguments in favour of free trade as an essential component of economic growth.

The classical growth theory is the theory on economic growth that argues that economic growth will end because of an increasing population and limited resources. Classical Growth Theory economists believed that temporary increases in real GDP per person would cause a population explosion that would consequently decrease real GDP (Investopedia, 2014).

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Economists behind this theory developed an idea of a "subsistence level" to model the theory. They believed that if real GDP rose above this subsistence level of income that it would cause the population to increase and bring real GDP back down to the subsistence level. It was sort of like an equilibrium level that real GDP would always revert to in this theory. Alternatively, if the real GDP fell below this subsistence level, parts of the population would die off and real income would rise back to the subsistence level (Wikipedia, 2014).

Criticisms of classical growth theory are that technology, the most important factor in economic growth, is held constant and those economies of scale are ignored. Contrary to what the classical economists has envisioned, capital had become an important factor in agriculture and is now increasingly substituting land. This is prevented a fall in the rate of profits. Even in the industrial sector, growth caused by increasing returns has prevented profit rates from falling. Hence, investment activity has not slowed down. The classical economists were right to observe the technical progress was greatly depended on savings and investment, but the relationship they share is not rigid with one they have assumed in their model. Also the classical economists knew

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the role of entrepreneurs in the process of production, yet they never assigned any important position to them in their system (Wikepedia, 2014).

**ii. Keynesian Growth Theory:**

Keynesian economics (also called Keynesianism and Keynesian theory) is a macroeconomic theory based on the ideas of 20th-century British economist John Maynard Keynes. Keynesian economics argued that private sector decisions sometimes lead to inefficient macroeconomic outcomes and therefore advocates active policy responses by the public sector, including monetary policy actions by the central bank and fiscal policy actions by the government to stabilize output over the business cycle. The theories forming the basis of Keynesian economics were first presented in the *General Theory of Employment, Interest and Money* published in1936 (Dolan and Lindsey, 1990).

The publication of Keynes' book, *The General Theory of Employment, Interest, and Money*, in 1936, not only opened a new chapter in the theory of income, output and employment, it also revived the economists' interest in the study of economic growth. Keynes had focused

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attention on the deficiency of the aggregate effective demand as the principal factor responsible for economic stagnation and unemployment. The solution to the problem of economic stagnation lay in the expansion of aggregate effective demand through a massive increase in government outlay on public works (Vaish, 2008).

However, some of the criticism of this theory is that, the theory neglected the role of supply effect of investment; hence the role of investment has been recognized only from the demand side. The fact is that one period's net investment by augmenting the economy's productive capacity in that period increases the next time period's potential output making it necessary for the aggregate demand to increase in the next time period if the expanded productive capacity is to be fully utilised. It, therefore, follows that if net investment is taking place in the economy in each time period, then the aggregate demand has to keep on increasing in each subsequent time period to ensure full utilization of the economy's expanding productive capacity (Vaish, 2008) .

**iii. The Harrod-Domar Growth Theory:**

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The Harrod-Domar Growth theory derives its name from the analyses of growth process advanced by two economists, Sir Roy Harrod of Britain and EvseyDomar of U.S.A. A key objective of the Harrod-Domar Model (H-D Model) is to outcome the limitation inherent in the short run nature of the simple Keynesian model. This model takes cognizance of only one of the dual roles of investment in the economy, its role as a component of aggregate demand. However, this theory stressed the basic principle for the dual role of investment. On the one hand, it constitutes the demand for output and on the other hand it increases the total productive capacity of the economy. Investment, therefore, has both the demand and supply effects. For example, the construction of a new railway line generates the demand for steel, teak-wood sleepers, steel rails, nuts and bolts, steel girders and so on. The H-D analysis proceeds by assuming that an economy is in an equilibrium stage given an initial level of investment which equates savings. However, the dual nature of investment ensures that investment overtime becomes an addition to the capital stock. The increase in capital stock in turn increases the economy's potential output (Vaish, 2008).

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However, the model has been criticized because both Harrod and Domar assume a fixed capital-output ratio (i.e a rigid relationship between the capital stock and output).

**iv. The Neo-classical Growth Theory:**

The neo-classical growth model, attributable essentially to the works of Robert Solow attempts to correct a major defect of the H-D growth theory, that defect being the rigidity of the model imparted to its by the underlying Leontief type production function. This type of production is characterized by fixed labour-capital proportions. This fixity eliminates the possibility of increasing output by increasing the supply of one factor alone. In other words, the scope of facts substitution is zero implying the impossibility of factor substitution. It is this defect inherent in the H-D model that the neoclassical growth model proceeded to redress. In doing this, the assumption of a Leontief type production function was dropped and replaced by a more realistic production function characterized by well behaved negatively sloping isoquants (Vaish, 2008).

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According to the neo-classical growth theory, capital is a unique abstract factor of production which can be adjusted at anytime to absorb any size of labour force into employment. Since labour and capital can be combined in the varying proportion, the theory assumes an indefinitely large number of production processes, each process being characterised by a different labour-capital ratio. It, therefore, follows that in place of the fixed output-capital ratio assumed by Harrod and Domar, the neo-classical growth theorists assume that the output-capital ratio can be continuously varied (Vaish, 2008).

**v. Evaluating the Various Growth Theories:**

The growth theories reviewed in this work are discussed aboved (Classical, Keynesian, Harrod–Domar, and Neo-classical). Most of the theories are by product of their counterpart school of thoughts. For example the classical growth theory assigns the role of savings and investment as tools that would trigger economic growth in the long-run.

According to Keynes, savings will not help rather spending and had focused attention on the deficiency of the aggregate effective demand as the principal factor responsible for economic

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stagnation and unemployment. To him, if the aggregate demand is effective, there would be an economic boom, subsequently full employment of resources, hence economic growth in the short run.

In the words of Harrod and Domar who developed an idea as a result of the limitation inherent in the short run nature of simple Keynesian model that the investment take only cognizance of one dual role of investment (i.e its role as a component of aggregate demand). However, Harrod and Domar incorporated the dual roles of the investment. Firstly, it constitutes the demand for output (i.e demand role) and secondly it increases the productive capacity of the economy (i.e supply role).

According to Neo-classical growth theory, the theory was developed in response to Harrod-Domar growth theory in order to correct defect of the theory that assumed labour-capital proportion fixity (i.e characterized by leontieff production function).To them, capital is a unique abstract factor of production that adjusts anytime to absorb any size of labour force into

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employment. Both labour and capital are combined in varying proportion in order to stimulate production capacity, hence economic growth.

### 2.3.2 Theories of Public Expenditures:

### i. The Wagner's Law of Increasing State Activities Theory of Public Expenditures:

Wagner's law, also known as the law of increasing state spending, is a principal named after the German economist Adolph Wagner (1835-1917), who developed a "law of increasing state activities" after empirical analysis on Western Europe at the end of the 19$^{th}$ century. He argued that government growth is a function of increased industrialization and economic development. Wagner stated that during the industrialization process, as the real income per capita of a nation increases, the share of public expenditures in total expenditures increases. The law cited that "The advent of modern industrial society will result in increasing political pressure for social progress and increased allowance for social consideration by industry."

He first observed it for his own county and then for other countries. For any country the public expenditure rises constantly. It shows an upward shopping trend. The law predicts that the

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development of an industrial economy with be accompanied by an increased share of public expenditure in gross national product.

Wagner (1883) designed three focal bases for the increased in state expenditure. Firstly, during industrialization process, public sector activity will replace private sector activity. State functions like administrative and protective (security) functions will increase. Secondly, governments needed to provide cultural and welfare services like education, public health, old age pension or retirement insurance, food subsidy, natural disaster aid, environmental protection programs and other welfare functions. Thirdly, increased industrialization will bring out technological change and large firms that tend to monopolize. Governments will have to offset these effects by providing social and merit goods through budgetary means.

He further, pointed out that public spending is an endogenous factor, which is determined by the growth of national income. Hence, it is national income that causes public expenditure. The Wagner's law tends to be a long-run phenomenon: the longer the time-series, the better the economic interpretations and statistical inferences.

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The principal criticisms of Wagner's law have concerned his view of history and the relationship between the state and its citizens. Peacock and Wiseman also queried whether Wagner's ideas could be applied to all societies at all times and suggested that the time pattern of actual public expenditure growth did not fill well with Wagner's law.

**ii. The Peacock and Wiseman Theory of Public Expenditure:**

According to Peacock and Wiseman (1961), elicited salient shaft of light about the nature of increase in public expenditure based on their study for public expenditure in England. Peacock and Wiseman suggested that the growth in public expenditure does not occur in the same way that Wagner theorized. Peacock and Wiseman choose the political propositions instead of the organic state where it is deemed that like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services.

There may be divergence of ideas about desirable public spending and limits of taxation but these can be narrowed by large-scale disturbances, such as major wars. According Peacock and Wiseman, these disturbances will cause displacement effect, shifting public expenditure to

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new levels. Government will fall short of revenue and there will be an upward revision of taxation. Initially, citizens will engender displeasure but later on, will accept the verdict in times of crisis. There will be a new level of "tax tolerance". Individuals will now accept new taxation levels, previously thought to be intolerable. Furthermore, the public expect the state to heal up the economy and adjust to the new social ideas, or otherwise, there will be an inspection effect.

Peacock and Wiseman viewed the period of displacement as reducing barriers that protect local autonomy and increasing the concentration power over public expenditure to the Central government. During the process of public expenditure centralization, the role of state activities tend to grew larger and large. This can be referred to the concentration process of increasing public sector activities.

Nowadays, the growth in public expenditure has become a compulsion and thus, the disturbance situations matter little.

**iii. The Classical Approach to Theory of Public Expenditures:**

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The classical economists believed that the government intervention brings more harm than good to the economy and that the private sector should carry out most of the activities. In his *Welfare of Nations, Adam Smith (1776)* advocated much on the "Laissez-faire" economy where the profit motive was to be the main cause of economic developments. According to classical dichotomy, an increase in the total amount of money leads to a proportionate increase in all money prices, with no change in the allocation of resources or the level of real GDP, which is known as money neutrality.

The classical economists assumed that the economy was perfect, it is always at full employment level, wage rate and rate of interest is self-adjusting and as a matter of fact, the savings should always equal to investment. Since they believed that the economy was always at its full employment level, their objective was certainly not growth (Dolan and Lindsey, 1990).

However, the major criticism here is that, the assumption of perfection of the economy was unrealistic.

**iv. The Keynesian Approach to Theory of Public Expenditures:**

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The Keynesian, on the other hand favoured government intervention to correct market failures. In 1936, John Maynard Keynes' (1883-1946) "*General Theory of Employment, Interest and Money*", criticized the classical economists to put too much emphasis on the long-run.

According Keynes, "we are all dead in the long-run", Keynes believed that depression needed government intervention as a short term cure. Increasing savings will not help, but spending. Government will increase public spending, giving individuals purchasing power and producers will produce more, creating more employment. This is the multiplier effect that shows causality from public expenditure to national income.

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

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**v. An Evaluation of the Public Expenditure Theories:**

The public expenditure theories reviewed in this work are (i.e, Wagner's law of increasing state activities, Peacock and Wiseman theory of public expenditure, the Classical approach to the theory of Public expenditure and Keynesian approach to the public expenditure.

The Wagner's law stated that as the national income increases, so does to the public spending. Hence, the causation runs from national income to public expenditure.

While Peacock and Wiseman suggested that growth in public expenditure does not occur in the same way Wagner theorized, rather choose the political proposition instead of organic state where it is deemed that like to spend money, people do not like increasing taxation and the population voting for ever-increasing social services.

According to classical approach to the theory of public expenditure believed that government intervention bring more harm than good to economy and that forces of demand and supply are best market mechanism that produces efficient and effective economy, hence economic growth and development in the long-run.

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Also, Keynes argued and favoured government intervention in order to correct market failures in the economy. Government spending stimulates economy by way of stabilizing effective aggregate demand. Security expenditure can make environment secure as well as attracting domestic and foreign investors to invest so that can trigger economic growth.

## 2.4 EMPIRICAL LITERITURE REVIEW:

### 2.4.1 Relationship between Security Expenditure and Economic Growth

According to Khilji and Mahamood (1997), who explored the impact of defence expenditures on economic growth and major economic variables in the Pakistan economy using Ordinary Least Square (OLS), Granger Causality, and Full Information Maximum Likelihood Method (FIML). The results found that the defence burden to be negatively related to GDP growth.

In Anwar, Rafique and Joiya (2012) work who empirically investigated the relationship between defense spending and economic growth in Pakistan using Error Correction Model (ECM), Johansen Co-integration and Granger Causality Test, the results indicated that defence

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spending do not hurt economic growth and there exists a relationship between defense spending and economic growth whereas economic growth granger causes defense spending.

Edeme et al (2013) analyze the interaction between defence spending, debt service obligation and economic growth in developing countries, with special reference to Nigeria using Ordinary Least square (OLS), Johansen Maximum Likelihood, Vector Autoregressive Model (VAR) and Vector Error Correction Model (VECM). The findings revealed that a bitter irony or paradox: "states that enjoy relative peace seem to reap more economic benefits from defense spending, while those suffering from conflict and poverty pay higher economic costs for their defense". Thus, the results showed a negative relationship between military spending and economic growth.

Enimola and Akobo (2008) determine the relationship between the level of economic growth and defence expenditure using Vector Error Correction Model (VECM), Granger causality. The results indicated a negative relationship between level of economic growth and

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defence expenditure while Granger causality test showed that there is unidirectional causality running from economic growth to defense spending.

Oriavwote, Victor and Eshenake (2013) examine the impact of security expenditure on the level of economic growth in Nigeria, using Error Correction Model (ECM). The result shows that the expenditure on defence has a negative impact on the level of economic growth.

Dunne, J Paul (2000) provide the relationship between the military spending and economic growth in developing countries using theoretical approaches. The results suggest that disarmament need not to be costly and does indeed provide an opportunity for improved economic performance. Keynesian framework suggest that military expenditure as at best no effect on growth, but is likely to have a negative impact. Certainly there is no evidence of a positive effect.

In the word of Kollias (1989) examines the link between military expenditure and economic growth using 2 Stage Least Squares (2SLS). The results indicated that military

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expenditure has adversely affected growth in the period under study, mainly through the crowding out of investment.

Tiwari and Shahbaz (2011) re-investigate the effect of defence spending on economic growth using Ordinary Least Square (OLS), Vector Error Correction Model (VECM) and Granger Causality. The results confirmed that there is long run relationship between the variables and indicated a positive effect of defence spending on economic growth, while economic growth is inversely related to interest rate. Granger causality test showed bidirectional causal relationship between defence spending and economic growth.

Adebakin and Rami (2012) examines the link between national security and sustainable economic development in Nigeria using Generalized Method of Moment (GMM) and Dynamic Panel Data Method. The research findings indicated that Nigeria's expenditure on national security is rising faster than spending on education, agriculture, health and construction. Therefore, this unpleasant finding has negative effect on sustainable economic development in Nigeria.

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El-Husseiny, Al-Sayed and El –Sayed(2013) analyses the relationship between military/civilian component of public expenditure and economic growth in the Egyptian economy using Gun and butter approach and Error Correction Model (ECM). The results showed that civilian expenditure to GDP is positively and significantly correlated to economic growth in the long run. Military to GDP ratio is insignificantly correlated to the economic growth rates in the long run. The ECM estimates showed that both shares of military and civilian expand to GDP are negatively correlated to the economic growth in the short run.

Antonakis and Apostolou (2003) investigate the growth-defence relationship in the case of Greece over the period of study using Ordinary least Square (OLS), Error Correction Model (ECM), Co-integration, and Granger Causality Test. The findings revealed that military expenditure retards the output growth rates in Greece, contrary to the inconclusive findings of previous studies.

Collier and Hoeffler (2002) investigate what determines military expenditures using descriptive statistics. The study found that the level of military expenditure chosen by a

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government is strongly influenced by the levels chosen by neighbouring governments. This creates multiplier effects for the other influences on military spending notably war and the threat of war. Hence, the study concluded that military expenditure in the context of poverty is highly seen as wasteful.

In the work of Tekeogbu (2008) the thesis set out to find the relationship between defense spending and economic growth for Turkey using Ordinary Least Square (OLS). The result showed that there is negative linkage between defense spending and economic growth in Turkey.

Halicioglu (2004) finds out the relationships between the level of economic growth and defense expenditures in Turkey using Multivariate Co integration Procedures. The results showed that there is a positive long run relationship between aggregate defense spending and aggregate output in Turkey. The impact of military expenditure on the real output level is positive.

Yildrim, Oscal and Keskin (2011) investigate the relationship between military expenditure and economic growth for 133 countries taking spatial aspects into account using

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Ordinary Least Square (OLS), Spatial Error, Spatial Lag and Generalized Two Stage Least Square (GS 2SLS). The results showed that military expenditure has a positive effect on economic growth.

Alptekin and Levine (2010) find the combined overall effect of military expenditure on economic growth using Meta Fixed, Random Fixed and Regression Analysis. The results showed that the net effect between military expenditure and Economic growth is positive and the magnitude is small.

Khalid and Mustapha (2014) re-examines the effect of military spending and economic growth in India using Co integration Approach and Granger Causality Test. The findings revealed that there is positive relationship between military spending and economic growth in the short run.

Ebiringa, Oforegbunam and Charles (2012) evaluate the impact of government expenditure in some priority sectors on economic growth using Cochrane –Orcult, Error Correction Model (ECM). The results showed that expenditure on telecommunication, defence

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and security, education and health sectors have made positive impact on Nigeria's economic growth. But transport and agricultural expenditure have impacted negatively in the economic growth in Nigeria.

Mohammadi, Maleki and Gashti (2012) examine the effect of governmental expenditure composition on economic development of ECO countries using Generalized Method of Moment (GMM) and Dynamic Panel Data Method. The findings showed that the effect of defense expenditure is significant and statistically positive on the economic development of ECO counties.

Pradhan (2007) examines the relationships between defense spending and investment using Investment Function. The result indicated that there is a significant negative effect of defense spending on investment, hence impede economic growth.

In Myo (2013) investigates the relationship between military expenditures and economic growth in 18 Asian countries during the period of 1985-2000 using Ordinary Least Square (OLS). The result indicated that there is no clear cut impact of defence spending on economic

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growth rate but has a negative impact on savings- income ratio in Asian countries. Hence, indicated that the result is indifference.

Shahbaz, Afza and Shabbir (2011) re-visits the impact of defence spending on economic growth using Augmented Keynesian Model in long and short runs in case of Pakistan using Vector Error Correction Model (VECM). The results indicated that the defence spending retard the pace of economic growth. Thus, indicated a negative effect of military spending on economic growth for Pakistanis economy.

Shahbaz and Shabbir (2011) re-visit the impact of defence spending on economic growth using Rolling Window Approach (RWA), Descriptive Statistics and Correlation Matrix. The results indicated a long run relationship between military spending and economic growth using RWA and also indicated negative and significant correlation between military spending and economic growth in case of Pakistan.

Looney (1991) examines the interdependence between arms races and economic allocation in a developing world context using Ordinary Least Square (OLS) and Granger

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Causality Test. The results indicated that there is positive relationship, even though there is little evidence that this relationship exists any longer.

Abu-Bader and Abu- Qarn (2003) examine the causal relationship between government expenditure and economic growth for Egypt, Israel and Syria for the past three decades using Multivariate co integration and variance decomposition techniques. The findings indicate bi-directional causality from government spending to economic growth with negative long term relationship between the two variables. However, study found that the military burden negatively affect economic growth for all the countries and that civilian government expenditure causes positive economic growth in Israel and Egypt.

Abraham (2011) analyses the impact of defence expenditure on economic growth and some macroeconomic variables as well as to test the validity of simulation series using two (2) stages least square technique and simulation approach. The result revealed a positive effect between defence expenditure and economic growth in Nigeria.

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Gaiya (2011) also analyses the impact of defence expenditure on economic growth in Nigeria using Ordinary Least Square Techniques (OLS), ARIMA. The result found that defence expenditure does not retard economic growth in Nigeria, hence indicated a positive effect.

Fefa and Irefin (2014) examine the cost of insecurity on the Nigerian emerging economy using Vector Error Correction Model (VECM). The result revealed that insecurity would exert negative influence on GDP.

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### 2.4.2 Core Issues in the Empirical Literature and Implication of Literature Reviewed within the Context of this Study Revealed that[1]

Many empirical works have tried to analyze the impact of security expenditure on economic growth, but the findings is inconclusive as different works presents different results. For example, in the works of Looney, (1991); Halicioglu, (2004); Pradhan, (2007);Alptekin, (2010); Tiwari and Shahbaz, (2011); among others, others are, Yildrim, Oscal and Keskin, (2011); Abraham, (2011); and Gaiya, (2011); Mohammadi, Maleki and Gashti, (2012); Anwar, Rafique and Joiya, (2012);and Ebiringa and Charles, (2012) shows that security expenditure has positive impact on economic growth. On the other hand, in the works of Kollias, (1989); Khilji and Mahamood, (1997); Dunne, (2000); Collier and Hoeffler, (2002); Antonakis and Apostolou, (2003); Enimola and Akobo, (2008). Others are Tekeogbu, (2008); Shahbaz, Afza and Shabbir, (2011); Shahbaz and Shabbir, (2011); Adebekin and Rami (2012); Edeme et al, (2013); Ovariawote and Eshenake, (2013); they all found that security expenditure has negative impact

[1] For the detailed summary on the direction of the empirical literature review see appendix 1

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on growth. While in the work of Myo, (2013) found that military expenditure has no clear impact on economic growth using sample of 18 Asian countries, hence indicated indifference result.

The related studies in Nigeria confirmed that there is no general consensus on the reported results, even though many of the empirical research works adopted a similar methodology for example Enimola and Akobo (2008) determine the relationship between the level of economic growth and defence expenditure; Oriavwote, Victor and Eshenake (2013) examines the impact of security expenditure on the level of economic growth in Nigeria; Edeme et al (2013) analyze the interaction between defence spending, debt service obligation and economic growth in Developing countries, with special reference to Nigeria and Fefa and Irefin (2014) examine the cost of insecurity on the Nigerian emerging economy uses ECM and found that the results are negatively related. While in the work of Ebiringa, Oforegbunam and Charles (2012) evaluate the impact of government expenditure in some priority sectors on economic growth, despite using the same methodology (i.e. ECM) still found that there exists a positive relationship in the study.

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Contrary, Abraham (2011) analyses the impact of defence expenditure on economic growth and some macroeconomic variables as well as to test the validity of simulation series and Gaiya (2011), also analyses the impact of defence expenditure on economic growth in Nigeria, even though they employed different methodology, yet their results reported to be similar, hence positively related.

The related studies across the world in the international community re-confirmed that there is no general consensus on the empirical literature for example in the works of Khilji and Mahamood (1997) explore the impact of defence expenditures on economic growth and major economic variables in the Pakistan economy and Tekeogbu (2008) thesis set out to find the relationship between defense spending and economic growth for Turkey both studies employed OLS techniques, hence found that there exist a negative relationship. While in the work of Alptekin and Levine (2010) find the combined overall effect of military expenditure on economic growth showed a contrary positive result, even though they employed similar OLS techniques.

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Similarly, in the works of Antonakis and Apostolou (2003) investigate the growth-defence relationship in the case of Greece over the period of study and El-Husseiny, Al-Sayed and El –Sayed (2013) analyses the relationship between military/civilian component of public expenditure and economic growth in the Egyptian economy both employed ECM and found that there exists a negative relationship. While according to Anwar, Rafique and Joiya (2012) empirically investigates the relationship between defense spending and economic growth in Pakistan and Tiwari and Shahbaz (2011) re-investigate the effect of defence spending on economic growth, despite using similar methodology (ECM) still reported contrary results based on their studies.

Other related studies for example Kollias (1989) examines the link between military expenditure and economic growth and Yildrim, Oscal and Keskin (2011) investigate the relationship between military expenditure and economic growth for 133 countries taking spatial aspects into account, despite using 2SLS as the same methodology the different results were

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found. Hence, the former indicated negative relationship while the later indicated positive relationship.

Conversely, the following studies Dunne, (2000) provide the relationship between the military spending and economic growth in developing countries using theoretical approaches. Collier and Hoeffler (2002) investigate what determines military expenditures using descriptive statistics and Pradhan (2007) examines the relationships between defense spending and investment using Investment Function employed mixed methodology and found that the results are negatively related. While in the works of Mohammadi, Maleki and Gashti (2012) examine the effect of governmental expenditure composition on economic development of ECO and Halicioglu (2004) finds out the relationships between the level of economic growth and defense expenditures in Turkey, despite using different methodology their results indicated positive.

However, in the work of Myo (2013) investigates the relationship between military expenditures and economic growth in 18 Asian countries during the period of 1985-2000, even though employed OLS technique the result indicated that there is no clear cut impact between

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military expenditure and economic growth, despite the fact that from empirical evidence some studies with similar methodology showed positive while others negative relationships.

In addition to that, many of them have used Vector Error Correction Model (VECM), Ordinary Least Square (OLS) with complementary tools like the Granger causality test among others.

### 2.4.3 Gap Identified in this Study:

From the conceptual, theoretical and empirical literature review the following gaps are identified

i. Most of the studies concentrated on the impact of public expenditure on economic growth using the framework of aggregate data.

ii. In terms of conceptualization, there is no clear cut on what constitute security expenditure.

iii. The stance in terms of the empirical literature remain inconclusive as some works revealed positive relationship between security expenditure and economic growth, and others found the existence of negative and indifference results as well.

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iv. There exists little empirical evidence on the specific impact of security expenditure on economic growth as most of the studies concentrated on the impact of defense expenditure on economic growth.

v. Some works adopted methodology with degree of biasness, hence ignoring the procedures for applying standard time series analysis (for example in the work of Abraham, (2011) and Gaiya, (2011).

vi. The existing works in the Department (for example Abraham, (2011) and Gaiya, (2011) did not capture the effect of Boko-Haram insurgency the scopes of their studies stopped at 2008. This extending the scope to present state of security in Nigeria is very significant in this study.

Based on the above gaps identified the research is expected to fill them.

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# CHAPTER THREE

# 3.0 RESEARCH METHODOLOGY

## 3.1 INTRODUCTION:

This chapter discusses conceptual framework, theoretical framework, empirical framework, model specification(s), estimation techniques, sources of data, as well as a priori expectation(s).

## 3.2 CONCEPTUAL FRAMEWORK:

In economic growth, this study attempted to focus on; given the various definitions above generally economic growth can be defined as an increase in GDP over time usually one year.

In this study, the security expenditure is used as expenditure that constitutes all current and capital expenditures on defence and internal security.

Therefore, this work used security expenditure to mean the sum of defence and internal security spending made by government in a given fiscal year.

The justification for this adoption of security expenditure in its holistic approach is that, which comprises of defence expenditure that constitutes Army, Air-force and Navy, while the

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internal security constitutes Police Affairs, Police Formations and Command and Police Service Commission (these are police packages). Ministry of interior constitutes the affairs of Custom Service, Civil Defence, Fire Service and Immigration Service, then office of the National Security Adviser (this has to do with the Directorate and State Security, Intelligent Agency and the office of the National Security Adviser in particular). The Ministry of Niger-Delta: this constitute Niger-Delta Development Commission 'NDDC' and Ministry of Niger-Delta in particular (this has to do with safeguarding the pipelines and security of Niger-Delta region).

All these units constitute an integral part of security expenditure in its holistic approach.

## 3.3 THEORETICAL FRAMEWORK:

This research adopts Wagner Theory of Increasing State Activities and Keynesian Theory which support the view that an increase in public spending will lead to an increase in economic growth.

Adolph Wagner, the German economist made an in depth study relating to rise in government expenditure in the late 19$^{th}$ century. Based on his study, he propounded a law called

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"The Law of Increasing State Activity". Wagner's law states that "as the economy develops over time, the activities and functions of government increase".

According to Wagner (1883), "comprehensive comparisons of different times show that among progressive peoples (societies) with which alone we are concerned; an increase regularly takes place in the activity of both the central government and local governments constantly undertake new functions, while they perform both old and new functions more efficiently and more completely. In this way economic needs of the people to an increasing extent and in more satisfactory fashion, are satisfied by the central and total governments". Wagner's statement indicates the following points:

i. In progressive societies, the activities of the central and local governments increase on regular basis.
ii. The increase in government activities is both extensive and intensive.
iii. The governments undertake new functions in the interest of the society.
iv. The old and new functions are performed more efficiently and completely than before.

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v. The purpose of the government activities is to meet the economic needs of the people.
vi. The expansion and intensification of government function and activities lead to increase in public expenditure.
vii. Though Wagner studied the economic growth of Germany, it applies to other countries too both developed and developing.

## 3.4 EMPIRICAL FRAMEWORK:

The study adopts with modification the work of Tekeoglu, E. (2008) whose work was Defense Expenditure and Economic Growth in Turkey. The work examines the impact of military expenditures on economic growth in Turkey. Tekeoglu's growth model used was given as:

$$GGDPC = \alpha + \alpha_1 PFI + \alpha_2 EBGS + \alpha_3 MILEX + \alpha_4 DUM + \varepsilon \quad \text{---------- (3.1)}$$

Where;

GGDPC = Growth rate of gross domestic product per capita,

PFI = Public total fixed investment as a share of gross domestic product

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EBGS = External balance on goods and services as a share of gross domestic product

MILEX = Military expenditures as a share of gross domestic product (defense burden ratio)

DUM = Dummy variable(s) to capture whether the government is military or civilian (i.e structural change)

The modification done in this study is the removal of growth rate of gross domestic product per capita (GGDPC), public total fixed investment as a share of gross domestic product (PFI), external balance on goods and services as a share of gross domestic product (EBGS) and military expenditures as a share of gross domestic product (defense burden ratio) (MILEX), dummy variable as proxy to structural change (DUM) and then inclusion of total defence expenditure (TDE), total internal security expenditure (TISE), total security expenditure (TSE), inflation (INF) and exchange rate (EXG).

## 3.5 MODEL SPECIFICATION(S):

The model specification is given below in its functional forms, in order to suit the peculiarities that involves in this study.

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$$GDP = F(TSE, INF, EXG) \text{ ----------} (3.2)$$

$$GDP = F(TDE, TISE, INF, EXG) \text{ ----------} (3.3)$$

Equation 3.2 expresses that gross domestic product (GDP) which is proxy to economic growth as a function of total security expenditure (TSE) with inflation and exchange rate as the control variables, this equation enabled us to see the relationship between total security expenditure and economic growth. Equation 3.3 disaggregated the total security expenditure into total defence expenditure (TDE) and internal security expenditure (TIE), this equation enabled us to see the partial relationship among components of total security expenditure and economic growth. Why this? Because when we estimate the total security expenditure (TSE) and its components i.e total defence expenditure (TDE) and total internal security expenditure (TISE) in a single equation, this can generate a problem of multicollinearity. We further add control variables of inflation (INF) and exchange rate (EXG) in the equation to account for other factors

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that cause gross domestic product (GDP) as proxy to economic growth other than defence and internal security expenditure. This was justified by the fact that Nigeria majorly depended on importation and the movements of prices have direct bearing on economic growth.

The stochastic representation of equations 3.2 and 3.3 is given as:

$GDP = \alpha_1 + \beta_1 TSE + \beta_2 INF + \beta_3 EXG + U_t$ ..... (3.4)

$GDP = \alpha_1 + \beta_1 TDE + \beta_2 TISE + \beta_3 INF + \beta_4 EXG + U_t$ ..... (3.5)

$\beta_1 > 0$, $\beta_2$ and $\beta_3 < 0$ for equation 3.4

$\beta_1$ , $\beta_2 > 0$, $\beta_3$ and $\beta_4 < 0$ for equation 3.5

Where

TSE = Total Security Expenditure,

TDE= Total Defence Expenditure

TISE= Total Internal Security Expenditure

INF = Inflation

EXG = Exchange Rate; and

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U = Error Term

$\beta_1, \beta_2, \beta_3$ , $\beta_4$ and $\beta_5$ = Are coefficient of the estimated parameters

## 3.6 ESTIMATION TECHNIQUES:

### 3.6.1 Diagnostic Tests of the Models:

Once a Model has been estimated, it is important to see whether the residuals obey the model's assumption that is to check for the absence of serial correlation, heteroscadesticity and the normality of the residuals. In order to check for the accuracy of our model, we conduct some ex-ante diagnostic checks. The essence is to make sure our model satisfies the entire econometric requirement for model building.

### 3.6.2 Unit Root Test:

The literature on testing the presence of unit root on macroeconomic variables has evolved over time. The early work has been the work of D A. Dickey and W.A fuller that developed a test of stationarity known as Dickey-Fuller test. The method involves the specification of random walk model with and without a drift parameter and a model with drift and deterministic trend.

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The null hypothesis of unit root is tested against the alternative hypothesis of stationarity. The major criticism on this method is that the error terms in the three equations are serially correlated. To overcome this problem Dickey and Fuller augmented the three equations into one and introduce a difference lagged value of the dependent variable to take care of the problem of serial correlation[2]. In another study Phillips and Perron develop a non parametric statistical test in order to take care of the problem of serial correlation. A general criticism was raised against the above methods in their ability to detect the presence of unit root in a series and the that produce the ability to a false unit root hypothesis, he therefore proposed a method that allowed for the exogenous determination of the presence of unit root with structural break in the augmented Dickey specification of null hypothesis of unit root against the alternative hypothesis of stationarity. To address the problems, more power tests were introduced (Elliott et-al (1996)[3],

[2] The test is known as Augmented Dickey Fuller
[3] The test was developed Elliott and perron in 1996 known as DF-GLS

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Elliott (1996)[4], Kwaitkowjki, Phillips, Schmidt-Shin (1992)[5], and Elliote (1996).[6] the above method are widely used in checking the presence of unit root. However, Perron (1989) showed that the failure to allow for the existing break lead to bias Fuller test. Following this development Zivot and Andrew (1992) question the exogenous break date proposed by Perron (1989) and they developed a method that allowed for the endogenous determination of single break point. Lumsdaine and Papell (1997) extended Zivot and Andrew (1992) model for the detection of two break date.

### 3.6.3 Test of Unit Root without Structural Break:

In this section we intent to adopt procedure for testing the existence of unit root without checking for the presence of structural breaks. Before the work of Perron (1989), this has been the popular procedure for testing the existence of unit root in a given series. In this study, KPSS

[4] The test was developed by Elliott (1996) known as ERS- $P_T$

[5] The test was developed from the independent works of Kwaitkowjki, Phillips, and Schmidt-Shin known as KPSS

[6] This statistic was developed by Elliott known as NP-$MZ_t$

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was used as developed by Kwaitkowjki, Phillips, Schmidt-Shin (1992) and DF-GLS developed by Elliott et-al (1996). The former allow for the test of null hypothesis of stationarity against the alternative hypothesis of unit root and the later allow for the test of null hypothesis of unit root against the alternative hypothesis of stationarity. As noted by Ndako (2010) that several works by Perron (1989, 1998), Zivot and Andrews (1992), Gregory (1994), and Volgelsang and Perron (1998) have shown that both augmented Dickey Fuller (ADF) and Philip-Perron (PP) exhibit high size distortion, that is, a probability of accepting a false null and also incorrect probability of rejecting a true null. The justification for adopting this procedure is to check the debate on whether statement of hypothesis has implication for detecting unit root in a given series.

### 3.6.4 Lomnicki-Jargue-Bera Test:

The Jarque-Bera normality tests for univariate and multivariate series are implemented and applied to the residuals of a VAR(p) as well as separate tests for multivariate skewness and kurtosis (see Bera and Jarque [1980], [1981], Jarque and Bera [1987], and Lutkepohl [2006]). The univariate versions of the Jarque-Bera test are applied to the residuals of each equation. A

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multivariate version of this test can be computed by using the residuals that are standardized by a Choleski decomposition of the variance-covariance matrix for the centered residuals. Please note that in this case the test result is dependent upon the ordering of the variables. The test statistics for the multivariate case are defined as

$$JB_{mv} = S_3^2 + S_4^2 \text{ ---------- (3.6)}$$

Where $S_3^2 and S_4^2$ are computed according to

$$S_3^2 = \frac{Tb_1^{'}b}{6} \text{ and } S_4^2 = T(\frac{(b_2 - 3_k)(b_2 - 3_k)}{24}$$

And **b**1and **b**2 are the third and fourth non-central moment vectors of the standardized residuals $\bar{U}\, st = \bar{P}(U_t - \bar{U}_t) and\, \bar{P}$ is a lower triangular matrix with positive diagonal such that $\bar{P}\bar{P}^{'} = \sum_u^{-}$. i.e., the Choleski decomposition of the residual covariance matrix. The test statistic

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JBmv is distributed as $X^2(2K)$ and the multivariate skewness, $S_3^2$, and kurtosis test, $S_4^2$, are distributed as $X^2(K)$.

### 3.6.5 Tool for Data Analysis:

After careful assessment of the time series properties of the variables under study. The best technique to apply in assessing the impact of security spending on economic growth was to apply the Vector Error Correction Model (VECM). This was justified by the fact that we knew ex- anti diagnostic of individual and combination of our series, we found our variables to be integrated and presence of co integration. However, these enable us to model both the short run which is VAR component and long run which is co integration component.

The considered basic VECM specification is thus;

$$W_t = \phi_1 + \Gamma_1 \Delta w_{t-1} + \Gamma_2 \Delta w_{t-2} + \Gamma_k \Delta w_{t-n} + \Pi w_{t-1} + V \text{ ----------(3.7)}$$

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Where $W_t$ is an NxM vector of endogenous variables, $W_{t-1}$ ……$W_{t-n}$ is the vector of explanatory variables up to lag N, $\Gamma$ is the vector of short run coefficients. $\Pi$ matrix represent the long run information of the model and is decomposed into $\alpha$ and $\beta$ matrix, V is the 1XN vector of error terms. To analyze the impact of shocks in the system impulse response functions was used; this refers to the reaction of any dynamic system in response to some external change. In both the cases, the impulse response describes the reaction of the system as a function of time (or possibly as a function of some other independent variable that parameterizes the behavior of the system). The IRF gives the jth period response when the system is shocked by a one standard deviation shock. The importance of the impulse response is because it was fully characterized a system. If you know the impulse response of a system, you can figure out the response (output) of the system for any kind of input without even testing. In signal processing, the impulse response, or impulse response function (IRF), of a dynamic system is its output when presented with a brief input signal, called an impulse. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change. In both cases, the impulse

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response describes the reaction of the system as a function of time (or possibly as a function of some other independent variable that parameterizes the dynamic behavior of the system).

In all these cases, the dynamic system and its impulse response may be actual physical objects, or may be mathematical systems of equations describing such objects. Since the impulse function contains all frequencies, the impulse response defines the response of a linear time-invariant system for all frequencies.

### 3.6.6 Causality Tests:

Now, in order to investigate the direction of causality between total security expenditure its components and economic growth (GDP) the research made used of VECM Granger causality test. The following systems of equations are considered

$$\Delta GDPt = \sum_{i=1}^{l} \beta_{i2} \Delta TSE_{t\text{-}i} + \sum_{i=1}^{m} \alpha_{i2} \Delta GDP_{t\text{-}i} + \varepsilon_t \text{----------(3.8)}$$

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$$\Delta TSEt = \sum_{i=1}^{p} \beta_{i1} \Delta TSE_{t-i} + \sum_{i=1}^{q} \alpha_{i1} \Delta GDP_{t-i} + \varepsilon_t \text{----------(3.9)}$$

Where $\Delta$ is the first-difference operator; $\beta_{ij}$'s and $\alpha_{ij}$'s are parameters; and $\lambda_i$'s are constant terms, while TSE is the total security expenditure. In Equation 3.8, the null-hypothesis (which is as $H_0$: $\alpha_{11} = \alpha_{21} = \ldots\ldots = \alpha q_1 = 0$) tested against the alternative hypothesis (which is as $H_1$: $\alpha_{ij}$'s are jointly significant). If $H_0$ was rejected, it would be conclude that economic growth granger causes total security expenditure. Similarly, in Equation 3.9, the null-hypothesis (which is as $H_0$: $\beta_{12} = \beta_{22} = \ldots\ldots = \beta_{12} = 0$) is tested against the alternative one (which is as $H_1$: $\beta_{ij}$'s are jointly significant). If we reject $H_0$, then we would conclude that total security expenditure granger cause economic growth.

## 3.7 SOURCES OF DATA:

The data used in this study comprises yearly observations from 1961 to 2014 for Nigeria. The main source of data for the study will be generated entirely from secondary sources. Data will be

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sourced from the central bank of Nigeria statistical bulletins, journals, magazines, published and unpublished materials as well as relevant items from the internet.

## 3.8 A PRIORI EXPECTATIONS:

At the end of the study, it was expected that the defence and internal security and security expenditures are positively related to GDP, this is because as country secured as by increasing security spending, this lead to business friendly environment, hence attract both domestic and foreign investors to invest into the country that can trigger economic growth. While inflation and exchange rate are negatively related to GDP, this is also because as inflation and exchange rate increases harm the economy.

However, this is supporting Wagner's Law of Increasing State Activities and Keynesian Theory as adopted in this study.

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# CHAPTER FOUR

## 4.0 DATA PRESENTATION AND ANALYSIS OF RESULTS

### 4.1 INTRODUCTION:

In order to achieve the main objective of this research which is to examine the impact of total security expenditure on economic growth, we used six macroeconomic variables, that is, gross domestic product (GDP) as proxy to economic growth, total defense expenditure (TDE), total internal security expenditure (TISE) and total security expenditure (TSE) as direct variables and inflation (INF) and exchange (EXG) rates as control variables. Here, the assumption is that the control variables are also significant in influencing economic growth in Nigerian economy. In this chapter, we pursue comprehensive time series analysis for the variables where we check for the integration and co-integrated properties of the series, the short run and long run causal relationship between the variables we found to have either of such relationship and finally based on the stochastic properties of the series we estimated vector error correction as our impact model.

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## 4.2 THE TREND AND PATTERN OF SECURITY EXPENDITURE IN NIGERIA:

The persistent rise in aggregate security expenditure must have been motivated by the need to sustain peace, security of lives and property, peaceful electoral process. For example, in the year 1981 the Maitatsine crisis in Maiduguri and Kano, military coup d'état in 1983, electoral process of 1999, 2003 and 2007, religious crisis in Kaduna between 2000 and 2002, incessant destruction of oil pipelines and kidnapping and the agitation for control of oil resources between 2002 and 2008 as well as other forms of threats that permeate the nation between 1970 and 2008 must have increased consistently the need for security spending in Nigeria. Besides, the steady increase in federally collected oil revenue has continued to account for the increase in aggregate security expenditure in Nigeria.

Threat to national security is the singular factor that is responsible for the astronomical increase in the nation's expenditure on security. The Federal government has continued to appropriate huge funds for security (i.e defence and internal security) in the national budget; a trend that has denied capital projects in the education, health, agriculture, construction sectors etc

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that need government attention. For example in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014 fiscal years, the total security expenditures in the approved budgets were ₦246b, ₦352b, ₦506b, ₦607b, ₦828b, ₦866b, ₦1.020trillion, 1.006 trillion and ₦1.014trillion respectively (CBN, 2011 and Summary of Federal Government Budgets, 2006-2014).

In this table 4.1 below, study and discuss the growth profile and composition of Nigerian government security spending between 1961 and 2014. This entails a statistical review of aggregate security expenditures that constitutes both internal security expenditure and defence expenditure in terms of both recurrent and capital expenditures of security sector in Nigeria. The table reveals the composition of security expenditure in Nigeria between 1961 and 2014. Nigeria is a developing nation and conflict has assumed different dimension accounting for the volume of security expenditure. Aggregate security expenditure within this period has demonstrated a consistent increase but with some few years of fall in security expenditure due largely to fall in federally collected revenue. Aggregate security expenditure had a total of ₦9.47 millions in 1961 and was totally allocated to defence expenditure, this represents a total of 100%.

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However, there are persistent increases in security expenditure in Nigeria with slight fluctuation under the period of study; hence, the figure stood at ₦9.47 million in 1961 and rose to ₦352489.8 billion in 2007 with the emergences of Niger-Delta militancy and Boko-Haram insurgencies periods there are level shift of security expenditure to ₦506375.3billion and ₦607474.5 in 2008 and 2009 respectively. Hence the figure continued to increase over the years under study, yet the Niger-Delta militancy and Boko-Haram insurgencies activities had not been ceased, which is worrisome to economists and even non-economists.

**TABLE 4.1: TREND ANALYSIS OF TOTAL SECURITY EXPENDITURE IN NIGERIA**

| **YEARS (YRS)** | **Total Defence Expenditure (TDE)** **(₦ millions)** | **Total Internal Security Expenditure (TISE)** **(₦ millions)** | **Total Security Expenditure (TSE)** **(₦ millions)** |
|---|---|---|---|
| 1961 | 9.47 | - | 9.47 |
| 1962 | 18.7 | - | 18.7 |
| 1963 | 16.98 | - | 16.98 |

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| | | | |
|---|---|---|---|
| 1964 | 28.65 | - | 28.65 |
| 1965 | 27.73 | - | 27.73 |
| 1966 | 26.54 | - | 26.54 |
| 1967 | 60.67 | - | 60.67 |
| 1968 | 111.82 | - | 111.82 |
| 1969 | - | - | - |

**Table 4.1 cont'd**

| | | | |
|---|---|---|---|
| 1970 | 382 | - | 382 |
| 1971 | 401.6 | - | 401.6 |
| 1972 | 607.4 | - | 607.4 |
| 1973 | 588.4 | - | 588.4 |
| 1974 | 823.7 | - | 823.7 |
| 1975 | 820 | - | 820 |
| 1976 | 890.4 | - | 890.4 |
| 1977 | 915.4 | 168.9 | 1084.3 |

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| | | | |
|---|---|---|---|
| 1978 | 635.9 | 130.2 | 766.1 |
| 1979 | 768.6 | - | 768.6 |
| 1980 | 780 | 269.3 | 1049.3 |
| 1981 | 821.3 | 500.3 | 1321.6 |
| 1982 | 745 | 400.4 | 1145.4 |
| 1983 | 736.2 | 410.4 | 1146.6 |
| 1984 | 607.6 | 376.9 | 984.5 |
| 1985 | 687.2 | 398.3 | 1085.5 |
| 1986 | 951.4 | 396.8 | 1348.2 |
| 1987 | 736.2 | 390.4 | 1126.6 |
| 1988 | 1101.3 | 545 | 1646.3 |
| 1989 | 1081.4 | 617.7 | 1699.1 |
| 1990 | 1606.9 | 1129.9 | 2736.8 |
| 1991 | 2245.3 | 1518.3 | 3763.6 |
| 1992 | 2706.6 | 1743.1 | 4449.7 |

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| | | | |
|---|---|---|---|
| 1993 | 4171.0 | 2832.5 | 7003.5 |
| 1994 | 5491.9 | 4722.2 | 10214.1 |
| 1995 | 7775.6 | 2031.1 | 9806.7 |
| 1996 | 14095.6 | 11780.5 | 25876.1 |
| 1997 | 15428.0 | 9038.6 | 24466.6 |
| 1998 | 21278.6 | 12281.2 | 33559.8 |
| 1999 | 32947.7 | 20433.0 | 53380.7 |
| 2000 | 40074.3 | 19195.0 | 59269.3 |
| 2001 | 63471.6 | 43668.9 | 107140.5 |

**Table 4.1 cont'd**

| | | | |
|---|---|---|---|
| 2002 | 108147.4 | 92152.2 | 200299.6 |
| 2003 | 61723.3 | 76924.8 | 138648.1 |
| 2004 | 76057.3 | 95143.3 | 171200.6 |
| 2005 | 111869.0 | 114601.9 | 226470.9 |
| 2006 | 101451.9 | 145120.0 | 246571.9 |

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| | | | |
|---|---|---|---|
| 2007 | 145926.9 | 206562.9 | 352489.8 |
| 2008 | 191575.2 | 314800.1 | 506375.3 |
| 2009 | 223021.9 | 384452.6 | 607474.5 |
| 2010 | 264206.6 | 564052.1 | 828258.7 |
| 2011 | 248037.1 | 618577.0 | 866614.1 |
| 2012 | 359735.5 | 660995.0 | 1020730.5 |
| 2013 | 348908.1 | 657844.1 | 1006752.2 |
| 2014 | 340332.3 | 674295.5 | 1014627.8 |

**Sources: C**omputed from Central Bank of Nigeria Statistical Bulletin, 2011 and Summary of Federal Government Budgets, 2006-2014.

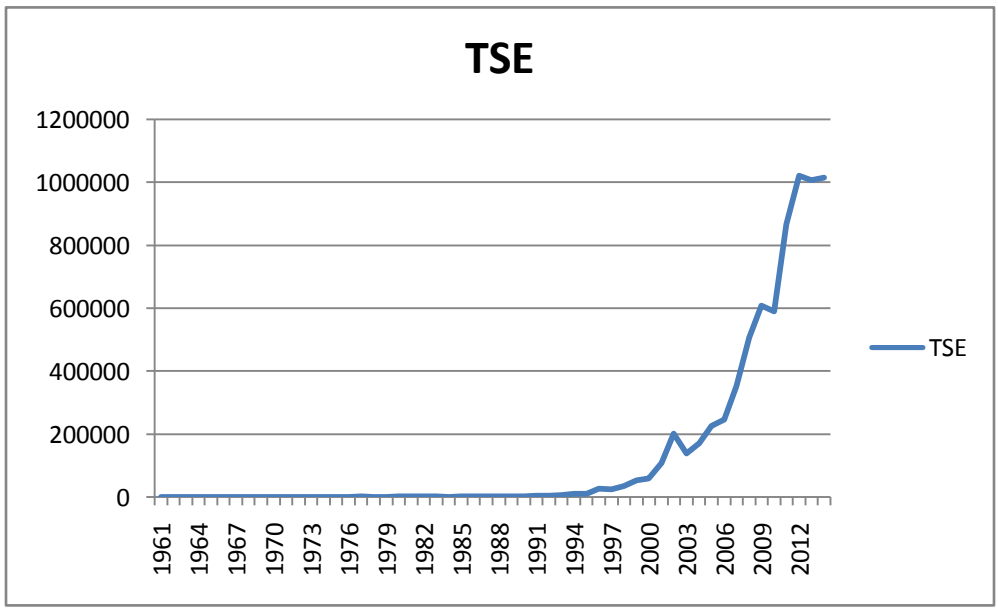
**Figure 4.1: Total Security Expenditure in Nigeria:**

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From the above figure 4.1, the total security expenditure (TSE) which comprises the total of both defence expenditure and internal security expenditure shows that there is upward

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movement with slight fluctuations over the years. The persistent increases in total security expenditure could also be attributed to both internal and external threats facing the Nigerian economy throughout the period under study.

According to graphical analysis, the total security expenditures have not been statistically significant since 1961 until 1999 with the emergence of democratic system of government, even though the then government had injected its resources into the budgets for security purposes.

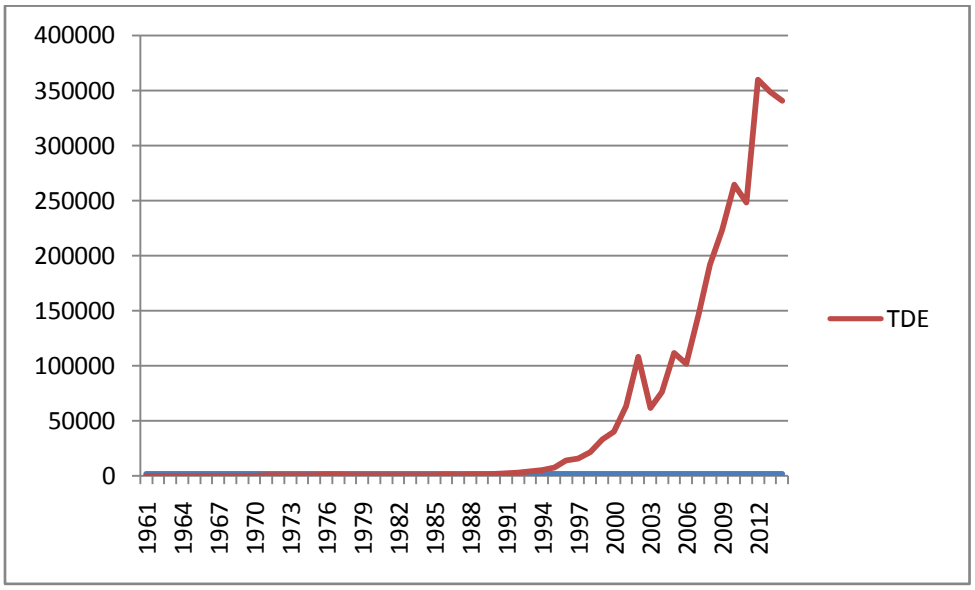
Threat to national security is the singular factor that is responsible for the astronomical increase in the nation's expenditure on security. The Federal government has continued to appropriate huge funds for security (i.e. defence and internal security) in the national budget; a trend that has denied capital projects in the education, health, agriculture, construction sectors etc that needed attention. For example in 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014 fiscal years, the total security expenditures in the approved budgets were ₦246b, ₦352b, ₦506b, ₦607b, ₦828b, ₦866b, ₦1.020trillion, 1.006trillion and ₦1.014trillion respectively (CBN, 2011 and Federal Government Budgets, 2006-2014).

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**Figure 4.2: Total Defence Expenditure in Nigeria:**




From the above figure 4.2, the total defence expenditure (TDE) since 1961 was not statistically significant until 1994 when the value stood at ₦5491.9 millions and steadily rises

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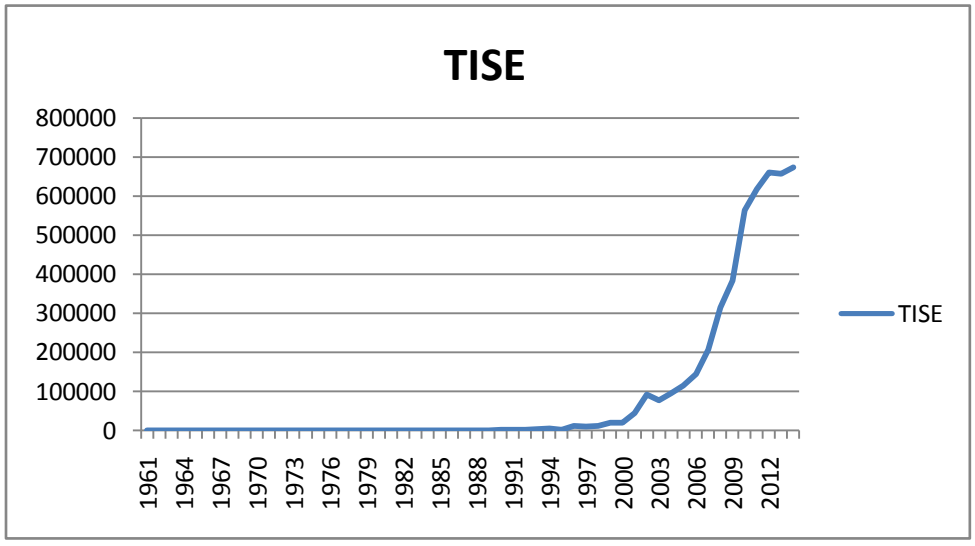
until 2002 when it reached ₦108147.4billion and sharp decline in 2003 which the value stood at ₦61723.3billion, after this point the defence expenditure in Nigeria began to rise over the years until 2009 when the value rose to ₦223021.8612 billion and decline to ₦26420.65 billion in 2010, and jumped when the defence expenditure reaches its peak in 2012 to a value of ₦359735.486 billion and slightly decrease to ₦340332.3 billion in 2014.

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**Figure 4.3: Total Internal Security Expenditure**




The nature and pattern of internal security is partly associated with the nature and pattern of defence expenditure; as total defence expenditure (TDE) rises, so also the total internal security expenditure (TISE). For example from the above figure 4.3, the total internal security

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expenditure (TISE), since 1961 has also not statistically significant until 1999 with the emergence of democratic system of government when the value stood at ₦20,433.00 billion and the continues to increase with slight fluctuations until 2014 when it reached a value of ₦674295.471 billion, this is as a result of the persistent increase in internal insecurity challenges over the entire period under study.

From the foregoing, threat to Nigeria's internal security is real, as the international community has declared Nigeria a failing state in several circles as well as in policy papers. For instance, the Fund for Peace (FFP) in its 2012 report ranked Nigeria as one of the top 10 failed states in Africa and 14th in the world because of growing wave of insecurity and endemic violence (Tella, 2012).

The evidence from figure 4.3 reveals that for more than four (4) decades, the total defence expenditures where greater than internal security expenditure since 1961-2003. This is as a result of the fact that internal insecurity is not more pronounced during the period than now

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that there has been the participation of Nigeria in peace keepings in different countries like Liberia, Somalia etc.

However, in recent time the data from figure 4.3 reveals that internal security expenditure constitutes a large chunk of budgetary allocation for security expenditure which is greater than defence expenditure. For example, since 2004, the internal security stood at ₦95143.3b while defence expenditure stood at ₦76057.3b, in subsequent years, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014, the internal security expenditure and defence expenditure were ₦114,601.9b, ₦1451,20.0b, ₦206,560.9b, ₦314,800.1b, ₦384,452.6b, ₦564,052.1b, ₦618,677.0b, ₦660,995.0b, ₦657,844.1b, ₦674,295.5b and ₦111,869.0b, ₦101,451.9b, ₦145,926.9b, ₦191,575.2b, ₦223,021.9b, ₦264,206.6b, ₦248,037.1b, ₦359,735.5b, ₦348,908.1b, ₦340,332.3b respectively.

Furthermore, this is as a result of the fact that Nigeria was facing security challenges especially internal insecurity such as ethno-religious crisis, kidnapping, armed-robbery, Niger Delta Militant activities and most recently Boko-Haram insurgencies etc.

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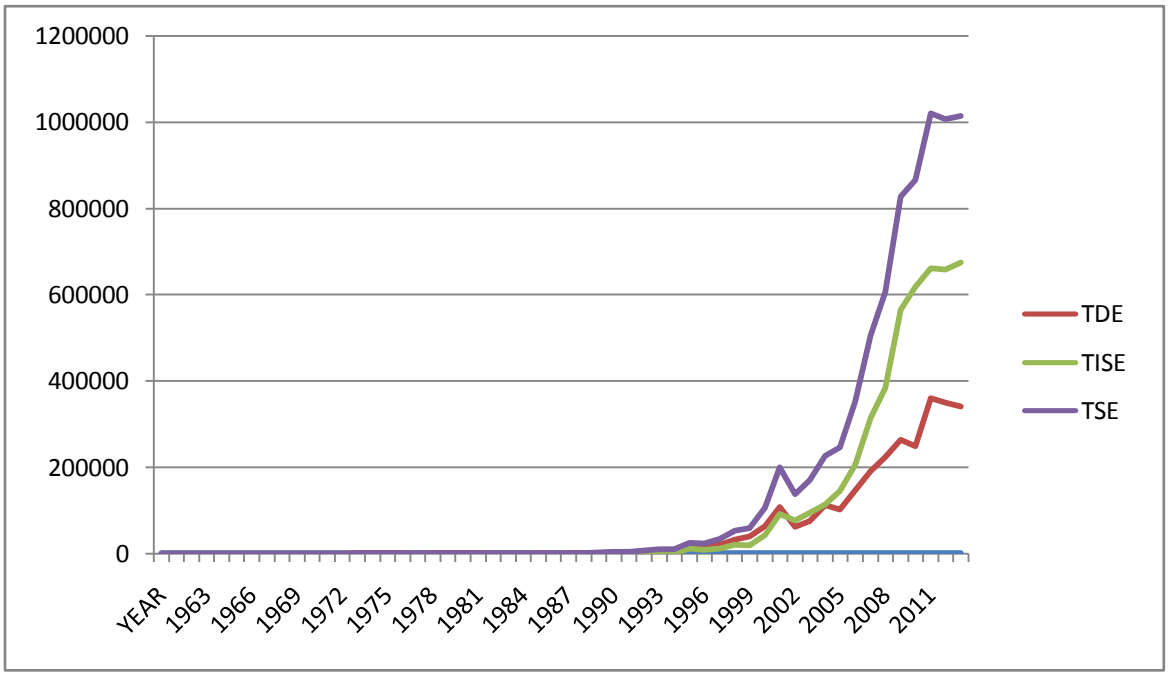
**Figure 4.4: Relationship between Total Defence, Internal Security & Security Expenditures in Nigeria:**

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Figure 4.4 shows that Nigeria's total security expenditures trended upwards over the entire period with slight fluctuations from 1961 to 2014 period under study, and also with total internal security expenditures rising faster than total defence expenditures as a result of the series of insecurity challenges facing the country especially internal threats such as Niger-Delta militants and Boko-Haram insurgency in recent time. Data was sourced from the CBN Statistical Bulletin (2011), and summary of Federal Government Budget between 2006 and 2014.

The Second National Development plan (1970-1974) played a leading role in government business just as it considered public enterprise as crucial to growth and self – reliance due to capital scarcity, structural defects in the private sector and perceived the danger of foreign dominance of the private sector. The third National Development plan (1975- 1980) advocated some shift in resources allocation in favor of rural areas, which were said to have benefited little from the economic growth of 1970's. Thus small farmers and the rural population were expected to benefit from public expenditure.

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However, against the background of the austere fiscal outlook of the government, under the Third National Plan (1981- 1985) during pre-SAP period, the role of fiscal policy was viewed mainly as the generation of revenue through increased tax effort and the control of public spending. The structural adjustment programmed (SAP) introduced in July 1986 recognized that the financial resources for public expenditure for the rest of the 1980s and beyond were likely to be less than was previously envisaged. And given the uncertainty in the oil market and substantial debt repayment, there was need to curtail government expenditure, especially those involving foreign exchange. Despite all these policies in order to curtail the government expenditures, the total security expenditures have been receiving a special attention and evidence shows that security spending is rising throughout the period under study since the independence of Nigeria.

The civil war which took place between 1967 and 1970, investigations has shown that Nigeria's level of budgetary spending on total security expenditures rose during the period and stood at ₦60.67, ₦111.82 in 1967 and 1968 and there was no provision of security expenditures

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in 1970 due to the civil war, even though the total security expenditures were not more pronounced at that time. Hence, the total security expenditures continued to rise after the civil war throughout the decades with slight changes (CBN, 2011).

The figure 4.4 above reveals that, since the country returned to democratic system of government on May 29, 1999, there was sudden and serious changes in terms of size and composition of security expenditure which stood from ₦53380.7millions, ₦246billions and rose to ₦1.014trillion in 1999, 2006 and 2014 respectively.

**Table 4.2: Summary of Descriptive Statistics Result.**

| | EXG | GDP | INF | TDE | TISE | TSE |
|---|---|---|---|---|---|---|
| **Mean** | 57.04249 | 12.54452 | 20.38697 | 2.187109 | 8.858491 | 9.771229 |
| **Median** | 21.88610 | 12.54756 | 13.72020 | 2.192630 | 8.460030 | 9.231524 |
| **Maximum** | 157.4994 | 13.69773 | 72.83550 | 2.548908 | 13.40150 | 13.83603 |
| **Minimum** | 0.546358 | 10.28235 | 5.382224 | 1.857784 | 4.869072 | 6.641313 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| **Std. Dev.** | 61.22352 | 0.832039 | 17.68692 | 0.251224 | 2.785372 | 2.500004 |
| **Skewness** | 0.479198 | - 1.326386 | 1.598867 | 0.008365 | 0.240058 | 0.226315 |
| **Kurtosis** | 1.418433 | 4.981163 | 4.355377 | 1.373711 | 1.607545 | 1.523296 |
| **Jarque-Bera** | 4.987320 | 15.98656 | 17.59122 | 3.857432 | 3.163768 | 3.478894 |
| **Probability** | 0.082607 | 0.000338 | 0.000151 | 0.145335 | 0.205587 | 0.175618 |
| **Sum** | 1996.487 | 439.0583 | 713.5439 | 76.54880 | 310.0472 | 341.9930 |
| **Sum Sq. Dev.** | 127442.9 | 23.53780 | 10636.12 | 2.145861 | 263.7820 | 212.5006 |
| **Observations** | 35 | 35 | 35 | 35 | 35 | 35 |

**Sources:** Author Calculation

Table 4.2 presents the summary of the descriptive statistics result. The table summarizes the mean, median, and standard deviation of each series; the maximum and minimum values, as well as the skewness, kurtosis and Jacque-Bera test of every series. The mean, median and standard deviation values for TSE stood at 9.77, 9.23 and 2.50 respectively. The minimum and

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maximum values for the series are ₦6.64 billion and ₦13.84 billion. The coefficients of skewness and kurtosis measure the peak and fat tails of the series. The value of the kurtosis for TSE is 1.52, which means that the series is platykutic. The coefficient of skewness is 0.22 which indicates that the variable is positively skewed. However the Jarque-Bera value for the series appears 3.4, meaning that the series is normal distribution. The TISE series has mean and median values of 8.85 and 8.46 respectively. The minimum value for the TISE series is ₦4.86 billion and the maximum value of the series is ₦13.40 billion while its standard deviation is 2.78. Similarly the coefficient of skewness is 0.3 which shows that the TISE series is positively skewed, however, the coefficient of kurtosis is 1.60 which indicates a platykurtic nature of the series and it is normally distributed. The mean and median values for TDE series are 2.19 and 2.19 respectively. The series has a minimum value of ₦1.86 billion and a maximum value of ₦2.55 billion while its standard deviation is 0.25. The skewness and kurtosis as well as the Jargue-Bera test values are 0.01, 1.37 and 3.86 respectively which shows that the series is platykurtic, positively skewed and normally distributed. The mean value for INF series is ₦20.39, and its

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median value was 13.72 while its standard deviation is 17.68. The minimum and maximum values for INF series are ₦5.38billion and ₦72.83 billion respectively. The coefficients of skewness and kurtosis are 1.60 and 4.36 respectively while its Jarque-Bera test value is 17.59 this means that the series is positively skewed, leptokurtic and not normally distributed. The GDP series has a mean value of 12.54 and a median value of 12.55. The minimum and maximum values of the series are ₦10.28 billion and ₦13.70 billion respectively, and the standard deviation is 0.83. The coefficient of skewness is -1.33 which means that the series is negatively skewed. Similarly the coefficients of kurtosis and Jarque-Bera test values are 4.98 and 15.99 which indicates that the series is leptokurtic and not normally distributed. For the EXG series, the mean, median and standard deviation values are 57.04, 21.89, and 61.22 respectively. The minimum value for the series is ₦0.55 to a dollar, while the maximum value for EXG was N157.50 to a dollar. The coefficients of skewness, kurtosis and Jarque-Bera test values are 0.48, 1.42 and 4.99 respectively, this shows that the series is positively skewed, platykurtic and not normally distributed.

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Generally speaking, the statistics from the above table 4.2 shows that the variables are not normally distributed.

In order to check for the stationary of the variables, first plot the individual series in a line graph, the essence is to prove the assumption on the deterministic component of unit root specification. The result for the trend analysis shows that in all the variables except inflation series, we assume that there is the presence of a constant and linear trend in the specification; this can be seen in the graphs of the series as presented in appendix 2.

The literature on the stationary test has evolved, the initial effort has been the individual works of Dickey and Fuller to assess the stochastic properties of macroeconomic variables using three set of models. That is the random walk model with drift and without a drift parameter and a random walk model that combine both the drift and deterministic trend. The problem associated with their method especially the issue of serially correlated errors of the three models led to the augmentation of the three equations to come up with Augmented Dickey-Fuller (ADF) test. However, the test suffer on the parametric assumption it made for correction the serial

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correlation problem, this led to the introduction of the adjusted non-parametric test by Phillips and Perron known as PP test. For the sake of this study, we used the two tests to check for the integrated properties of the series.

## 4.3 STOCHASTIC AND CO INTEGRATION PROPERTIES OF THE SERIES:

**Table 4.3: Stationarity Test**

| | Level | | First Difference | | Order of integration |
|---|---|---|---|---|---|
| | ADF | PP | ADF | PP | |
| GDP | -1.186035 | -1.208736 | -6.498550* | -6.484352* | I(1) |
| TDE | -2.887168 | 1.836112 | -2.957760 | -9.482285* | I(1) |
| TSE | -1.489614 | -1.435133 | -10.38684* | -10.28090* | I(1) |
| TISE | 0.333713 | 0.344506 | -9.182303* | -8.862144* | I(1) |
| EXG | 0.816772 | 0.781298 | -6.482213* | -6.493936* | I(1) |
| INF | -3.376429*** | -3.219775*** | -7.293907 | 16.25861* | I(0) |

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-4.14, -3.50 and -3.17 represents the critical values at 1%, 5% and 10% respectively. * ** and *** represent the level of significance at 1%, 5% and 10%
**Sources:** Author Calculation

Table 4.3 presents the result for stationarity test. We used Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, to test the null hypothesis of unit root against an alternative hypothesis of stationary. The essence is to see whether the mean and variance of the series are zero and the covariance is constant across different samples. We also made use of ADF and PP to see whether the parametric and non-parametric ways of resolving the problem of serial correlation in the stated equations can lead to differences in the conclusion for the series. To make decision regarding the hypotheses we compare the test statistic given in table 4.3 with the critical values at 1%, 5% and 10% respectively. The level result for ADF and PP shows that all the variables have unit root at 1% and 5% level of significance only inflation remains stationary at 10%. On the other hand, the first difference of the series shows that all variables are stationary.

The order of integration was found which shows that all the variables are integrated of order one I(1), this was then followed with a check of presence of co integrating vectors among

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the variables. The co integration result provides if there exist a long run equilibrium among the variables.

The economic interpretation of co integration is that it measures the level of diversification in the economy, this means that the more co integrating vectors a system has, the more an economy is diversified. The literature on the test of co-integration has evolved, the first attempt was the Engle and Granger (1985) two (2) step base residual test, under this method, the assumption is to regress the series and extract the residual, then a formal test of unit root was conducted on the residual, if the residual were found to be stationary then the combination of the series was said to be co-integrated. However, there are some disadvantages associated with the test, for example, if there are more than two variables, the expectation is to have more than one co-integrating equation, but since the Engle and Granger test is a residual base test, it can only shows the presence of single co-integrating equation. Secondly, unless there is a guide from economic theory, it becomes difficult to specify which variable is dependent and which one is explanatory variable as missed specification of the relationship will alter the entire result and

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finally, because it is a two-step procedure, once there is a mistake in the first stage, it will be extended to the second stage. Based on the identified problems, Johansen came up with a multivariate framework for testing the presence of co-integration. Under this test, the assumption is that all the variables should be integrated at the same order and the sample size should also be large enough to avoid distortion. Based on the stochastic properties of the series, Johansen (1992) test of co integration is used to check the presence of long run relationship between the variables.

**Table 4.4: Pantula Method for Choosing Co integration Equation**

| $H_0$ | Intercept (no trend) in the CE- and test VAR | | Intercept (no trend) in the CE- and VAR | | Intercept (no trend) in the CE-no trend in VAR | |
|---|---|---|---|---|---|---|
| HCE | Trace stat | Max. Eig val. | Trace stat | Max. Eig. val. | Trace stat | Max Eig. Val. |
| CE<=0 | 125.4185 | 43.82730 | 166.2219 | 45.65542 | 154.8560 | 45.30631 |
| CE<=1 | 81.59118 | 31.94225 | 120.5665 | 43.68480 | 109.5497 | 40.14144 |
| CE<=2 | 49.64893 | 27.14365 | 76.88165 | 31.26728 | 69.40825 | 30.99846 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| CE<=3 | 22.50528 | 12.96884 | 45.61437 | 26.13662 | 38.40980 | 24.25881 |
| CE<=4 | 9.536438 | 9.044348 | 19.47775 | 12.82905 | 14.15099 | 11.00119 |

For the critical values of Johensen(1991) see appendix 6.

**Sources:** Author Calculation

Table 4.4 presents the result for the co integration analysis, to check the best assumption that fit the data generating properties (DGP) of the series, we employed the Pantula principle which states that you run all the five assumptions and select from them the one that present the highest co integrating vectors. But we considered three assumptions because they only make economic sense. We run the first model to include intercept (no trend) in the co integrating equation and also no intercept in the VAR specification, the second model assumed an intercept (no trend) in the co integrating equation and test VAR while the last model assumed the presence of intercept and trend in the co integrating equation and no intercept in the test VAR, based on the relationship between the number of variables in the system and rank of the matrix, we developed four null and alternative hypotheses, for each assumption, we compared both the

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trace statistic and maximum eigen values with the critical values[7] to make decision on the presence of co integrating vectors. The first assumption indicated that the presence of 3 co integrating vectors using both the trace and maximum eigen value statistics, the second equation showed that the presence of 3 co integrating equations and the last model indicates the presence of 4 co-integrating vectors. We took the last assumption since it gives us maximum number of long run relationships.

**Table 4.5: Long run Co integration Equation**

| GDP | TDE | TSE | TISE | EXG | INF |
|---|---|---|---|---|---|
| 1 | 1.683466<br>(0.67828) | 0.289207<br>(0.20749) | -0.268054<br>(0.13174) | -0.002907<br>(0.00069) | -0.003423<br>(0.00075) |

**Sources:** Author Calculation

Now since we have found the presence of long run relationship, the next is to present the long run co integrating equations attached to the vectors, the result is presents in table 4.5 above,

[7] For the critical values see appendix 6

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since GDP is the dependent variable, we normalized on it and see how in the long run the variables impact on it. Among the five explanatory variables, total internal security expenditure (TISE), exchange rate (EXG), and inflation rate (INF) have a positive impact on economic growth (GDP), meaning when there is increase in either of TISE, EXG and INF as economic growth (GDP) will increase and vice versa. On the other hand, total defence expenditure (TDE) and total security expenditure (TSE) have negative relationship on economic growth (GDP), meaning when any of the variables increases economic growth (GDP) will decrease and vice versa. In terms of the magnitude of the impact, the result shows that the impacts of all the variables are less than unity except on the total defense expenditure coefficient. Based on the standard errors presented in parentheses in page 50, it shows that all the variables are statistically significant in the long run which explain the movement of economic growth in Nigeria.

The co-integrating equations and the long run equations are presents, next was to present the coefficient for the speed of adjustment which represented the dynamics that correct the short

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run disequilibrium in the system. The theoretical assumption is that the coefficient has to be negative, less than one and also statistically significant.

**Table 4.6: Coefficient of the Speed of Adjustment[8]**

| Equations | ECT/ Loading Factor | T-statistics(Prob) | Lag length |
|---|---|---|---|
| GDP | -0.843452 | -7.204990 (0.000) | 1 |
| TISE | -0.553068 | -2.887557 (0.007) | 1 |
| INF | -0.446353 | -2.527574 (0.017) | 1 |
| TDE | -0.071048 | -0.907320 (0.372) | 1 |
| EXG | -0.397544 | -2.740112 (0.011) | 1 |
| TSE | -0.166989 | -1.363361 (0.184) | 1 |

[8] This is generated by restricting the vector error correction model using Wald test restriction scheme.

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**Sources:** Author Calculation

The result for the short run dynamics in table 4.6 shows that the entire coefficients conformed to the theoretical expectation of being negative and less than one. However, the error correction terms of the four equations that is gross domestic product (GDP) as proxy to economic growth, total internal security expenditure (TISE), inflation rate (INF), and exchange rate (EXG) were statistical significant. The aforementioned four variables satisfied the theoretical assumption and therefore they were considered for checking a long run causal relationship through Wald Test.

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## 4.4 CAUSALITY TEST:

### 4.4.1 Short-run Causality Test

In this section, we checked how in the short run the causal relationships that were existed between various components of security expenditures on economic growth in Nigeria. To achieve this, we made used of Granger Causality test and the result was presented below:

**Table 4.7: Short-run Causality Test.**

| Null Hypothesis | Obs | F-statistics | Prob. |
|---|---|---|---|
| D(TDE) does not Granger Cause D(GDP) | 45 | 0.15267 | 0.8589 |
| D(GDP) does not Granger Cause D(TDE) | | 1.26780 | 0.2925 |
| D(TSE) does not Granger Cause D(GDP) | 45 | 0.02097 | 0.9793 |
| D(GDP) does not Granger Cause D(TSE) | | 2.23872 | 0.1198 |

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| | | | |
|---|---|---|---|
| D(TISE) does not Granger Cause D(GDP) | 30 | 0.06277 | 0.9393 |
| D(GDP) does not Granger Cause D(TISE) | | 1.28973 | 0.2930 |
| D(TSE) does not Granger Cause D(TDE) | 47 | 2.36051 | 0.1068 |
| D(TDE) does not Granger Cause D(TSE) | | 1.06022 | 0.3555 |
| D(TISE) does not Granger Cause D(TDE) | 32 | 0.92647 | 0.4082 |
| D(TDE) does not Granger Cause D(TISE) | | 3.20112 | 0.0566 |
| D(TISE) does not Granger Cause D(TSE) | 32 | 3.36362 | 0.0496 |
| D(TSE) does not Granger Cause D(TISE) | | 5.16720 | 0.0126 |

**Sources:** Author Calculation

Since we established the presence of long run equilibrium then we need to check what cause the short run and long run relationships between the variables in the model. To check the short run causal relationships, we applied Granger causality test. The theoretical condition for

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using this test is that the variables should be stationary, if the condition exists, at level, then the Granger method can be used to check for the presence of long run causality, otherwise we differentiate the variables and then apply the Granger test for the short run causality. Since all our variables were integrated of order I (1) one then we used Granger Causality to check for the presence of short run causal relationships between the variables.

Table 4.7 presents the result of the short run Granger causality test; here we are testing the null hypothesis that in the short run variable A does not cause variables B against the alternative of either the existence of unidirectional relationship or bidirectional causality. The F-statistics and the probability values are reported in table 4.7 above. The result shows that the presence of uni-directional causality that runs from GDP to TSE, TSE to TDE and TDE to TISE, meaning that in the short run, economic growth is causing total security expenditure on one hand, and on the other hand total security expenditure is causing total defense expenditure and finally total defense expenditure will cause total internal security but all in the short run.

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However, the result shows that the presence of bi-directional causality between total internal security expenditure and total security expenditure with the latter leading the former.

The result shows that that there is no short run causal relationship between GDP, TSE, TISE. Similarly, TSE does not granger cause TDE and vice versa, and also TISE does not granger cause TDE.

### 4.4.2 Long run Causality Test:

**Table 4.8: Long run Causality Test[9]**

| Equations/ Variables | GDP | TDE | TISE | TSE | EXG | INF |
|---|---|---|---|---|---|---|
| GDP | - | 1.99(0.057) | 4.049(0.0004) | -2.69(0.012) | -0.14(0.886) | 1.4321(0.1640) |
| TISE | -7.64(0000) | 13.30(0.000) | - | 1.797(0.08) | -0.63(0.528) | -1.065(0.1640) |
| EXG | -0.16(0.86) | -0.937(0.35) | 0.696(0.492) | 1.008(0.32) | - | 0.537(0.595) |

[9] The long run causality test was conducted using Weak and Strong exogeneity test

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| | | | | | | |
|---|---|---|---|---|---|---|
| INF | 1.26(0.216) | 0.020(0.98) | -1.054(0.30) | 0.41(0.67) | -0.519(0.60) | - |

**Probability values are in parenthesis**

**Sources:** Author Calculation

Table 4.8 presents the long run causal relationship between the four equations we initially found them to have correct error correction terms, that is, we only considered those variables for causality test whose error correction terms/loading factors satisfied the theoretical assumption of being negative, less than one and statistically significant. The causality test was carried out using Wald test. For the GDP equation, the result shows that TDE, TISE and INF have positive relationships with GDP, but only INF is statistically insignificant. TSE and EXG have negative relationship with GDP, while TSE is significant and INF is not. For the TISE equation INF, EXG and GDP have negative relationship while TDE and TSE have a negative relationship with TISE. All the variables are significant except INF and EXG. For the EXG equation, GDP and TDE have a negative relationship with EXG while TISE, INF and TSE have a positive relationship with EXG, and all the variables are not statistically significant. For INF equation TISE and EXG

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have a negative relationship with INF and all are statistically insignificant, while TSE, TDE, and GDP have a positive relationship with INF and none of the variables was significant. The long run causality shows that the presence of bi-direction relationship between total internal security expenditure and economic growth in Nigeria.

**4.5 IMPACT OF SECURITY EXPENDITURE ON ECONOMIC GROWTH IN NIGERIA:**

In order to assess the impact of Boko-Haram insurgencies/Niger-Delta militancy on economic growth, we divide the sample into two (2), that is the security expenditure of pre-Niger-Delta militancy/Boko-Haram insurgencies era which is from 1961 to 2006 and then we estimate the full sample which is between 1961and 2014. We ran two (2) separate vector error correction models. Before we arrived at the specification of the model, we first of all test for the appropriate lag to use using the lag selection criterion. We also test for the presence of serial correlation since the model involves lag values of the explanatory variables. We estimated the models using lag two each which is the lag that ensures that the model is free from serial correlation. We also test the residuals for hetroscadesticity, but the result also shows that at lag

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two the residual of the model is homoskedestic. These two tests have made our model robust and adequate to assess the impact.

**Table 4.9 Vector Error Correction Model Estimates-Model I**

| | Constant | TSE | EXG | INF |
|---|---|---|---|---|
| Pre-Sample | 0.18(2.02) | -0.11(-0.47) | -0.0005(-0.10) | 0.005(0.92) |
| Full Sample | 0.17(2.18) | -0.11(-0.58) | 0.0005(0.12) | 0.004(0.88) |

**Sources:** Extracted from VECM model output

Table 4.9 presents the result for the impact of total security expenditure on economic growth in Nigeria, the analysis here is to see how have the coefficients changed as a result of inclusion of the data from 2006 to 2014 which covers the beginning of security expenditure of Niger-Delta militancy and Boko-Haram insurgencies in Nigeria. The t-statistic(s) are in parentheses. In terms of signs, the total security expenditure of pre Niger-Delta militancy and Boko-Haram insurgencies shows a negative relationship between total security expenditure and exchange rate on economic growth, however, inflation shows a negative impact on economic

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growth. In terms of magnitude, the security expenditure of pre- Niger-Delta militancy and Boko-Haram insurgencies sample shows that all the coefficients are less than unity and looking at the t-statistic, the result shows that all the variables are statistically insignificant in the sub-sample period. The justification for this finding can be attributed to the fact that before the beginning of militancy activities in Niger-Delta in 2006 and the emergence of Boko-Haram insurgencies in the Northeast, the security spending in Nigeria is very minimal and not capable of affecting economic activities either positively or negatively.

For the full sample result, the signs for total security expenditure and inflation are consistent with the pre-sample evidence; however, for exchange rate the sign in the full sample from 1961 to 2014 became positive, this implies that for the nine (9) years of Niger-Delta militancy and Boko-Haram insurgencies there are some forces that affect this variable positively which make its impact on economic growth to be negative. In terms of magnitude, the result shows that there is an increase in, but there is no significant change in the size of the coefficients in all the variables considered, this implies that with activities of Niger-Delta militancy and

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Boko-Haram insurgencies as a threat to security, it had minimum impact on the economic growth in Nigeria. But the question is how significant is the impact? Is it enough to either positively or otherwise affect economic growth? To answer these questions, looking at the significance of the impact of all the coefficients, based on the t-statistic reported in the parentheses in table 4.9 shows that all the coefficients are statistically insignificant; however, the magnitude of the impact has increased when compared with the pre-sample period. This finding of insignificant coefficient justifies the claims that government fight to curtail the activities of Boko-Haram has not been adequate which is why the fighting has not been won by the country.

**Table 4.10 Vector Error Correction Model Estimates-Model II**

| | Constant | TDE | TISE | EXG | INF |
|---|---|---|---|---|---|
| Pre-Sample | 0.06(3.02) | 0.08(1.67) | 0.17(2.32) | -0.001(-1.50) | 0.0008(1.37) |
| Full Sample | 0.02(1.86) | -0.48(-0.76) | 0.024(0.41) | 0.0001(0.24) | 0.0007(1.11) |

**Sources:** Extracted from VECM model output

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Table 4.10 presents the result for the impact of total internal security expenditure and total defense expenditure on economic growth in Nigeria; this was done in order to avoid the problem of multi-collinearity if all the security expenditures were estimated in a single model. The strategy is to see also whether the coefficients changed as a result of inclusion of the data from 2006 to 2014 which covers the beginning of security expenditure of Niger-Delta militancy and Boko-Haram insurgencies in Nigeria, the t-statistic(s) are in parentheses. In terms of signs, the total defense expenditure, total internal security expenditure and inflation of pre Niger-Delta militancy and Boko-Haram insurgencies shows a positive relationship on economic growth, however, only exchange rate shows a negative impact on economic growth. In terms of magnitude, the security expenditure of pre- Niger-Delta militancy and Boko-Haram insurgencies sample shows that all the coefficients are less than unity and looking at the t-statistic, the result shows that all the variables are statistically significant at 10% except exchange rate that shows an insignificant result in the sub-sample period.

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For the full sample result, the signs for total internal security expenditure and inflation are consistent with the pre-sample evidence, however, for exchange rate and defense expenditure, the sign in the full sample from 1961 to 2014 became negative, this implies that for the nine (9) years of Niger-Delta militancy and Boko-Haram insurgencies there are some forces also that affect these variables negatively which make its impact on economic growth to be negative. In terms of magnitude, the result shows that there is an increase in is no significant change in the size of the coefficients in all security expenditure variables considered, this implies that with activities of Niger-Delta militancy and Boko-Haram insurgencies as a threat to security, it has negative impact on the economic growth in Nigeria.

Since we have examined the impact of security expenditure of Niger-Delta militancy and Boko-Haram insurgencies on the Nigeria's economic growth, the next is to see how all the variables we considered in this study systematically respond to their shocks, to achieve that, we analyzed the impulse response of the variables. The results are presented in figures 4.5 and 4.6

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below. The impulse responses are for both the security expenditure of pre- Niger-Delta militancy /Boko-Haram insurgencies and the full samples periods.

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**4.6 NON SYSTEMATIC RESPONSE OF GDP TO GOVERNMENT EXPENDITURES ON SECURITY SHOCKS:**

In order to assess the systematic response of our variables to shocks, we also estimated the impulse response function for the sub (security expenditure of pre-Niger-Delta militancy /Boko-Haram insurgencies) and full sample periods.

### 4.6.1 Security Expenditure of pre- Niger-Delta Militancy/Boko-Haram Insurgencies Impulse Response Function

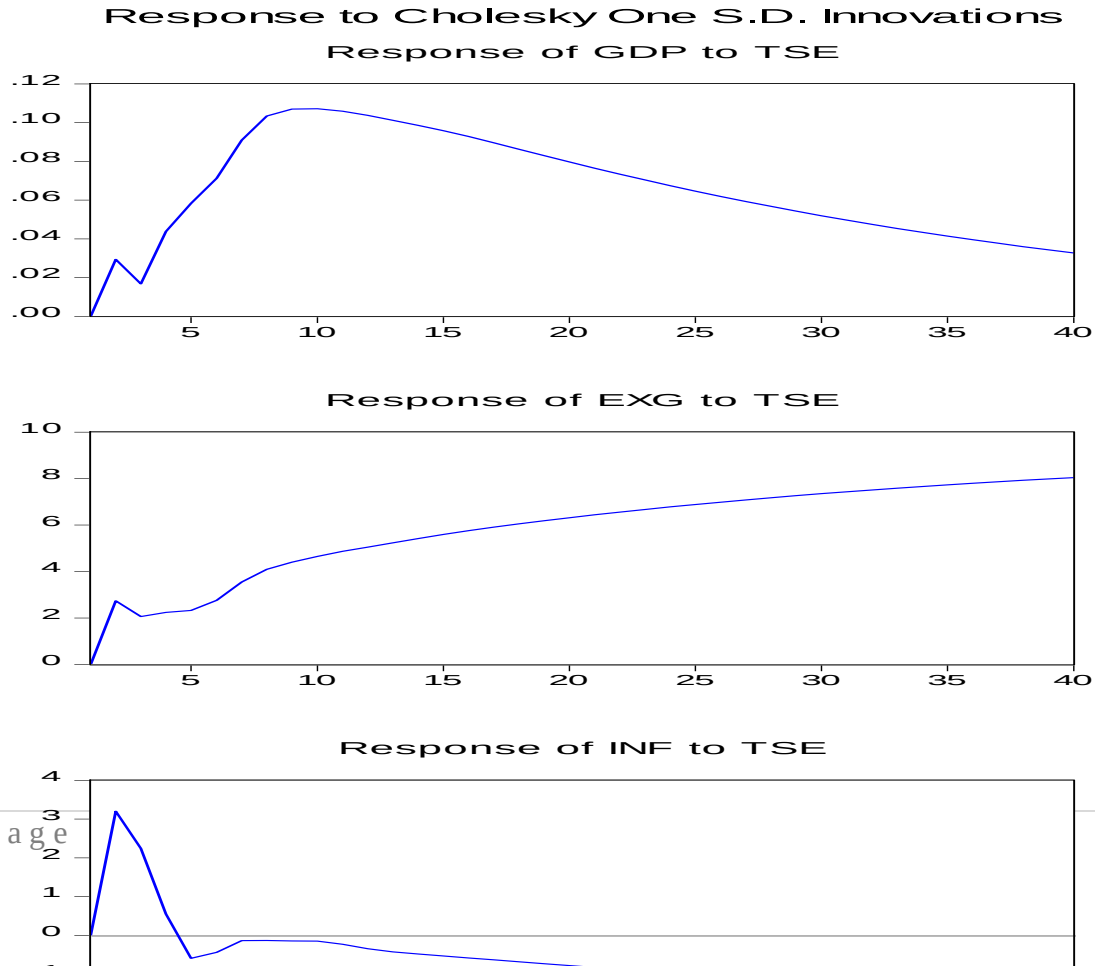
**Figure 4.5: Security Expenditure of Pre Niger-Delta Militancy/Boko-Haram Insurgencies Impulse Response-Model I**

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**Sources:** Author's Computation

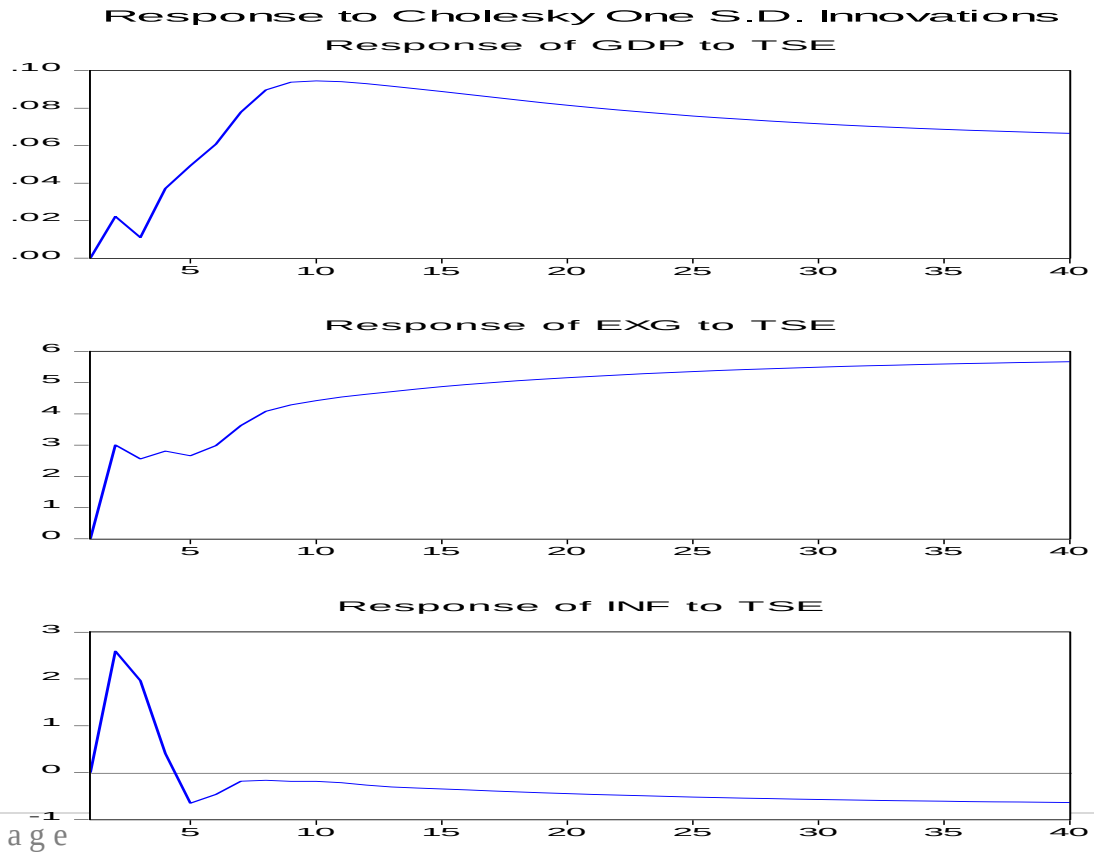
**Figure 4.6: Security Expenditure Impulse Response Full Sample-Model I**

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**Sources:** Author's Computation

Figure 4.5 presents the response of GDP, inflation and exchange rate to one standard deviation shock of total security expenditure for pre-sample. The first panel shows how GDP response to TSE shock over a period of 40 horizons. The shock which has a long lasting positive impact started with a positive value up to lag 3 with a magnitude of 0.02, from where it drift down to 0.01 and then pick up at an increase rate from lag four. The peak impact of the shock was attained at lag 10 with a magnitude of 0.10 from where the impact of TSE shock on GDP decline and become stable around 0.08 values until the end of the sample. This implies that, one standard deviation impact of TSE shock will have positive and long lasting impact on economic growth in Nigeria.

Panel two of figure 4.5 presents the response of exchange rate to TSE shock, just like the GDP response, the exchange rate response is also positive throughout the entire sample horizons. The impact of the shock pool-up the series instantaneously to value of three from where it stabilized around until it reaches lags six and it went up at an increase rate. The peak impact of

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the shock was attained at lag 20 from where is become stable and increase but at decreasing rate until the end of the sample. Unlike the evidence on the response of GDP to TSE shock that start decreasing after lag 10, this one was increase until the end of the sample although at decreasing rate. In related development, the response of inflation to TSE was presented in panel three of figure 4.5, it shows that when there is a shock coming from TSE, inflation will respond instantaneously just like exchange rate but with different timing and magnitude. Inflation response positively to TSE shock up to lags 3 with a magnitude of 2.8, from where it decline down to negative one after lag five and it continues at negative values until the end of the sample. Therefore, when there is TSE shock, it will have mixed effect on inflation; that is, both positive and negative.

The impulse response of GDP, exchange rate and inflation for the full-sample period is presented in figure 4.6 above. The pattern, dynamics as well as the signs and magnitude of the response are same with that of pre sample period only that the impact is more pronounced under the full-sample than in the sub-sample data. For example, in both the pre and full sample, the

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GDP series reaches its peak value just like the pre-sample model and then declined to 0.02 which is lower than the pre sample dynamics. This is same for all the other variables; therefore, we ignore their interpretations here.

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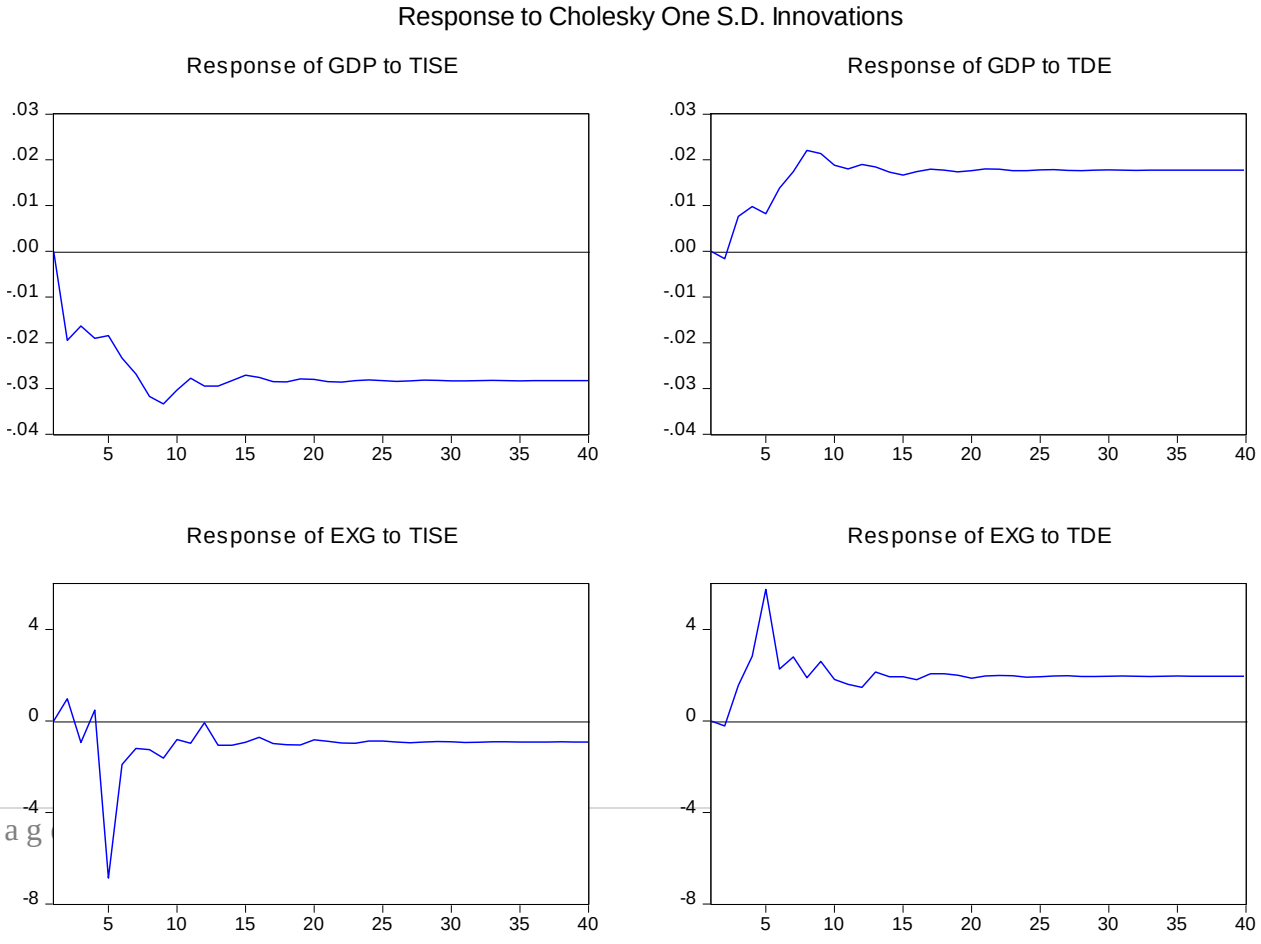
**Figure 4.7: Security Expenditure of Pre Niger-Delta Militancy/Boko-Haram Insurgencies Impulse Response-Model II**

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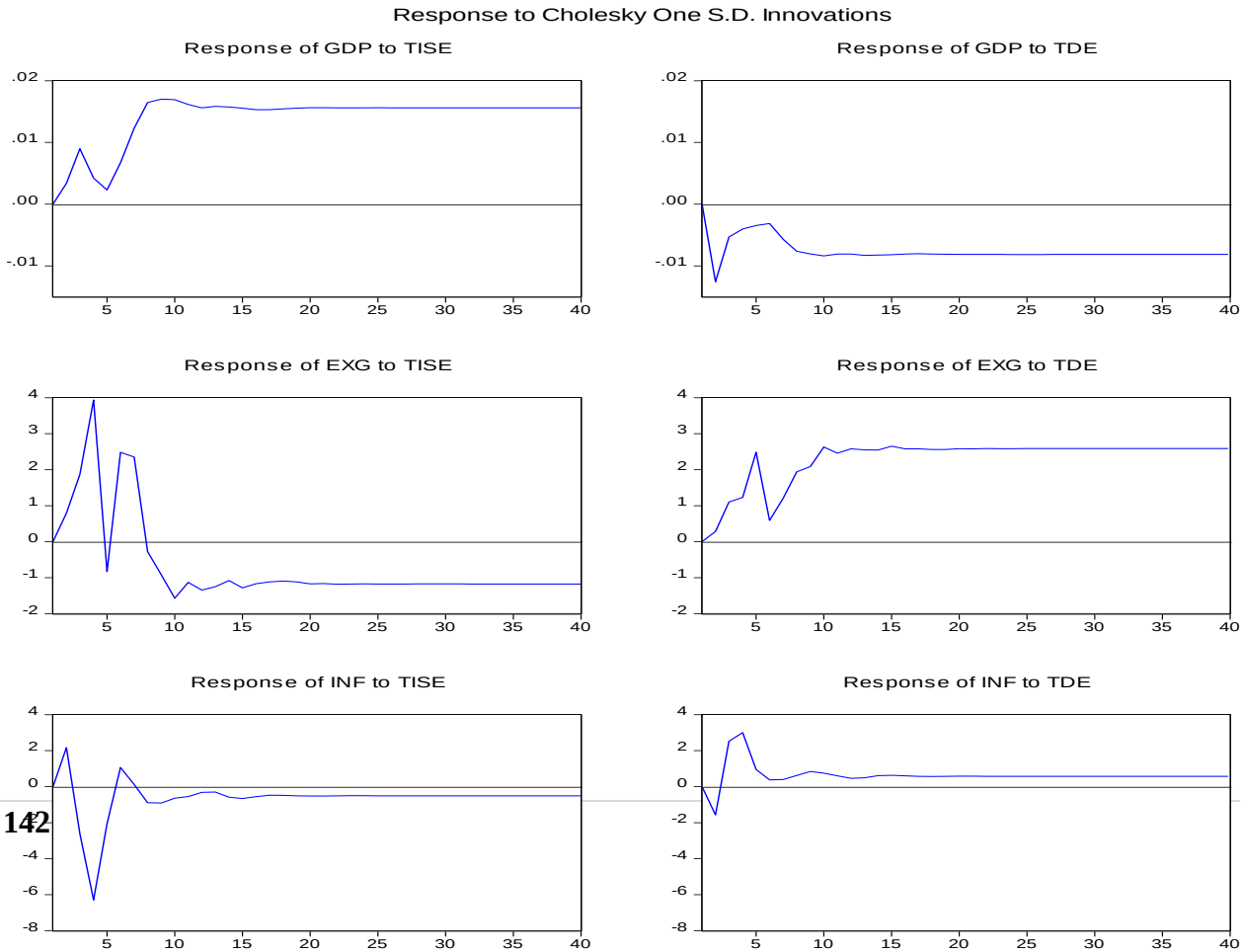
**Figure 4.8: Security Expenditure Impulse Response Full-Model II**

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**Sources:** Author's Computation

Figure 4.7 presents the response of GDP, inflation and exchange rate to one standard deviation shock of total internal security expenditure and total defense expenditure for pre-sample; this represent the evidence of model II. The first panel which is in row one column one shows how GDP response to TISE shock over a period of 40 horizons. The shock which has a long lasting negative impact, it started with a declining trend up to lag 3 with a magnitude of negative 0.02, from where it drift down to negative 0.03 at lag 10 and then became stable at that value until the end of the sample. The peak impact of the shock was attained at lag 10 with a magnitude of negative 0.03 from where the impact of TISE shock on GDP become stable around negative 0.03 values until the end of the sample. This implies that, one standard deviation impact of TISE shock will have negative impact and long lasting impact on economic growth in Nigeria.

Panel tow in first row second column of figure 4.7 presents the one standard deviation shock of total defense security expenditure. It shows how GDP response to TDE shock over a period of 40 horizons. The shock which has long positive impact, it started with a raising trend

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up to lag 10 with a magnitude of positive 0.02, from where it became stable until the end of the sample. The peak impact of the shock was attained at lag 10 with a magnitude of 0.02 from where the impact of TDE shock on GDP become stable around 0.02 values until the end of the sample. This implies that, one standard deviation impact of TDE shock will have positive impact and long lasting impact on economic growth in Nigeria.

Panel three and four in row two of figure 4.7 presents the response of exchange rate to TISE and TDE shocks, just like the GDP response, the exchange rate response also follows same pattern. The impact of the shock was volatile around positive and negative values until lag 15 within the bond of negative seven to positive one. From where the series became stable until the end of the sample periods. However, the response of exchange rate to TDE shock is different, it started with a positive value and reaches its peak level after lag five and from then it fluctuate around magnitude 2 up to lag 15 from where it become stable until the end of the sample horizon. Therefore, from this, it can be seen that the response of exchange rate to TISE and TDE shocks is different. The down panels of figure 4.7 which present the response of inflation to one

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standard deviation shocks of TISE and TDE shows that inflation response positive to TISE shock and the impact of the shock last until the end of the sample period. The response starts with a positive value of 7 which represent the peak value of the response. From there, the value decline and fluctuate around 2 up to lag 10 and then it become stable until the end of the sample. However, the response of inflation to TDE shows different pattern, the impact was negative up to lag 10, it became positive after then and drift back to the negative value until the end of the sample. Although, the impact become statistically insignificant after lag five.

The impulse response of GDP, exchange rate and inflation for the full-sample period is presented in figure 4.8 above. The pattern, dynamics as well as the signs and magnitude of the response are same with that of pre sample period only that the impact is more pronounced under the full-sample than in the sub-sample data. For example, in both the pre and full sample, the GDP series reaches its peak value just like the pre-sample model and then declined to 0.02 which is lower than the pre sample dynamics. This is same for all the other variables; therefore we ignore their interpretations here.

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## 4.7 FORECAST ERROR VARIANCE:

### 4.7.1: Security Expenditure of Pre Niger-Delta Militancy/Boko-Haram Insurgencies Forecast Error Variance

**Figure: 4.9: Security Expenditure of Pre Niger-Delta Militancy/Boko-Haram Insurgencies Forecast Error Variance-Model I**

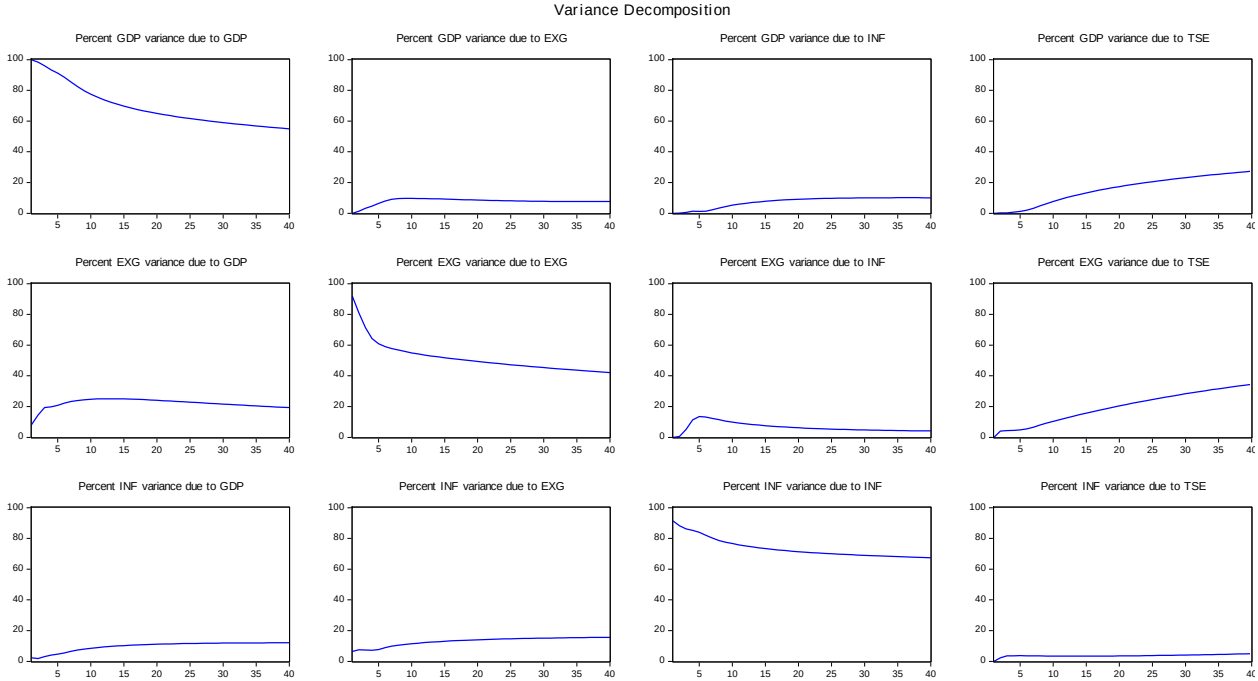
**Figure: 4.10: Security Expenditure Forecast Error Variance-Model Full Sample I**

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Figure 4.10 column one presents the result for the forecast error variance of GDP to GDP, total security expenditure, exchange rate and inflation. In the period 1, the result reveals that GDP alone accounts for 100 percent of the forecast error variance. Similarly in the second period GDP accounts for the highest forecast error variance which is 92 percent, while TSE, and EXG account for, 3 percent and 1 percent respectively, however the forecast error variance of INF is insignificant. The result further reveals that at lag 10, GDP has forecasted error variance of 33 percent. TSE accounts for 5% percent of the forecasted error variance respectively.

Figure 4.10 column two presents the result for variance decomposition of exchange rate to GDP, TDE and INF. The result reveals that at lag 1, only GDP and TSE accounts for the total forecast error variance. At lag 5, GDP and TSE account for the 33 percent, 33 percent of the forecasted error variance respectively, while EXG and INF account for 8 and 12 percents of the variance in forecasting TSE. At lag 10, GDP and TSE have the highest variance of 49, 18, and 14 percents in forecasting TSE, while other variables record lowest variance, with EXG having 10 percent and INF 7 percent.

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Figure 4.10 column three presents the result for variance decomposition of inflation to GDP, TSE and exchange rate. The result reveals that at lag 1, only GDP and TSE account for the total forecast error variance. At lag 5, GDP and TSE account for the 33 percent, 33 percent of the forecasted error variance respectively, while EXG and INF account for 8 and 12 percents of the variance in forecasting TSE. At lag 10, GDP and TSE have the highest variance of 49 and 18, in forecasting inflation, while other variables record lowest variance, with EXG having 10 percent.

Figure 4.10 column four presents the result for variance decomposition of TSE to GDP, TSE and INF. The result reveals that at lag 1, only GDP and TSE account for the total forecast error variance. At lag 5, GDP and TSE account for the 33 percent, 33 percent of the forecasted error variance respectively, while EXG and INF accounted for 8 and 12 percents of the variance in forecasting TSE. At lag 10, GDP, TSE and TISE have the highest variance of 49, 18, and 14 percents in forecasting TSE, while other variables record lowest variance, with EXG having 10 percent and INF 7 percent.

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### 4.7.2 Pre Sample Forecast Error Variance-Model II:

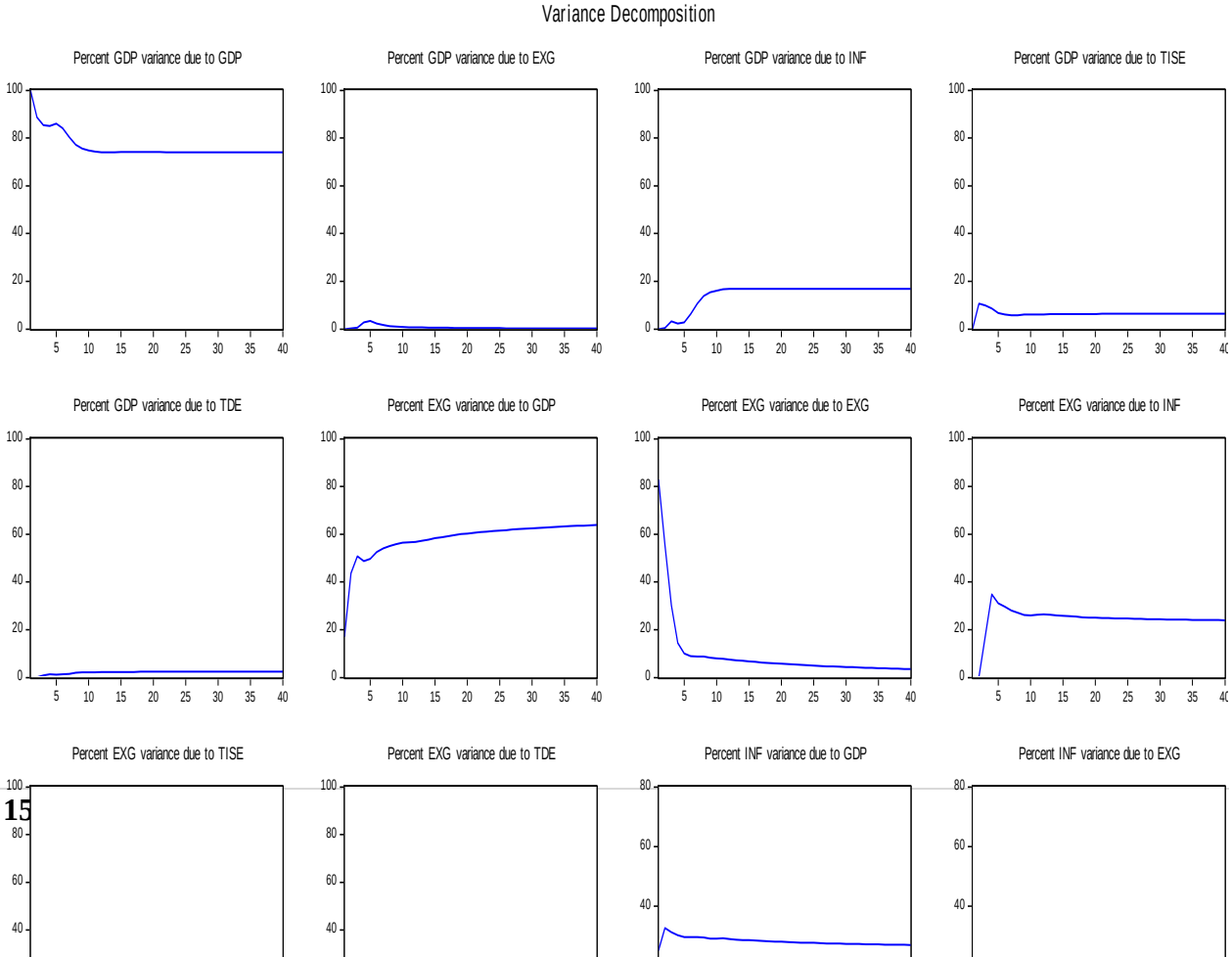
**Figure 4.11: Forecast Error Variance of pre Sample.**

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### 4.7.3 Full Sample Forecast Error Variance-Model II:

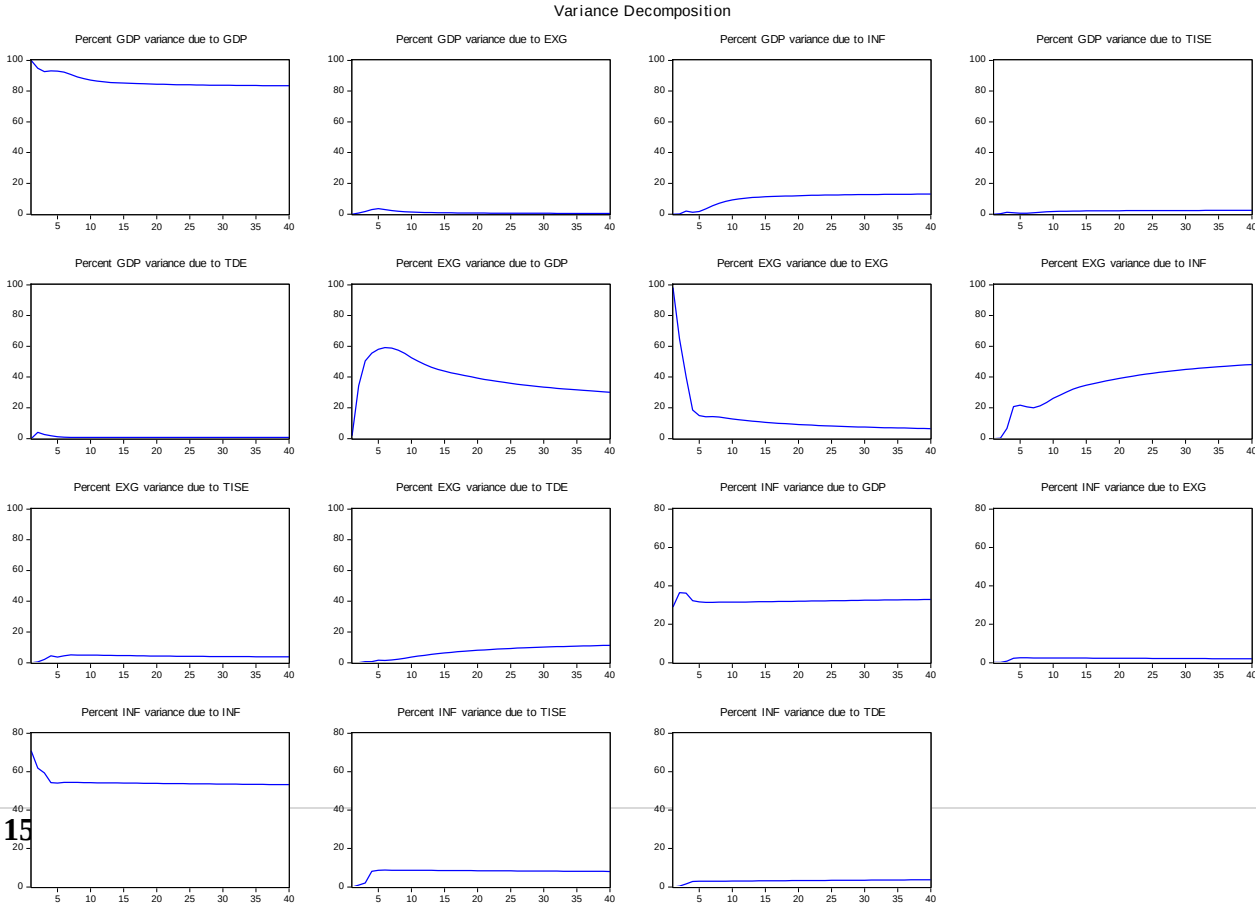
**Figure 4.12: Forecast Error Variance of Full Sample.**

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**Sources:** Author's Computation

Figure 4.11 column one presents the result for the forecast error variance of GDP to GDP, total internal security expenditure, total defense expenditure, exchange rate and inflation in the period that captures the activities of Niger-Delta militancy/Boko-Haram insurgencies. In the period 1, the result reveals that GDP alone accounts for 100 percent of the forecast error variance; this shows a similar pattern to the variance forecasted before Boko-Haram activities started in the country. Similarly in the second period, GDP accounts for the highest forecast error variance which was 91 percent as against 92 percent in the pre Boko-Haram period, while TISE, and EXG accounted for 0.15 percent, 2 percent and 1 percent respectively, however the forecast error variance by INF and TDE were 2, and 2 percent as against the security expenditure of pre Niger-Delta militancy/Boko-Haram insurgencies period when the variable's contribution appeared to be insignificant. The result further reveals that at lag 10, GDP has forecasted error variance of 45 percent. TISE and TDE accounts for 12 percent and 9 percent of the forecast error variance respectively.

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Figure 4.11 column two presents the result for variance decomposition of exchange rate to GDP, TISE and INF. The result reveals that at lag 1, only GDP and TDE accounts for the total forecast error variance, this also shows the same pattern as the security of pre Niger-Delta militancy/Boko-Haram insurgencies period. At lag 5, GDP and TISE accounts for the 45 percent and 10 percent of the forecasted error variance respectively, while EXG and INF accounts for 2 and 2 percent of the variance in forecasting TSE, however, TDE's contribution to the variance is 21 as against insignificant contribution in the security expenditure of pre Niger-Delta militancy/Boko-Haram insugencies period. At lag 10, GDP and TISE contributed variance of 36 and 9 percent in forecasting TISE, while TDE, EXG and INF have a variance of 24, 4 and 9 respectively in forecasting TISE.

Figure 4.12 column one presents the result for the forecast error variance of GDP to GDP, total internal security expenditure, total defense expenditure, exchange rate and inflation in the period that captures the activities of Niger-Delta militancy/Boko-Haram insurgencies. In the period 1, the result reveals that GDP alone accounts for 100 percent of the forecast error

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variance; this shows a similar pattern to the variance forecasted before Boko-Haram activities started in the country. Similarly in the second period, GDP accounts for the highest forecast error variance which was 91 percent as against 92 percent in the pre Boko-Haram period, while TISE, and EXG accounted for 0.15 percent, 2 percent and 1 percent respectively, however the forecast error variance by INF and TDE are 2, and 2 percent as against the security expenditure of pre Niger-Delta militancy/Boko-Haram insurgencies period when the variable's contribution appeares to be insignificant. The result further reveals that at lag 10, GDP has forecasted error variance of 45 percent. TISE and TDE accounts for 12 percent and 9 percent of the forecast error variance respectively.

Figure 4.12 column two presents the result for variance decomposition of exchange rate to GDP, TISE and INF. The result reveals that at lag 1, only GDP and TDE accounts for the total forecast error variance, this also shows the same pattern as the security of pre Niger-Delta militancy/Boko-Haram insurgencies period. At lag 5, GDP and TISE accounts for the 17 percent

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and 10 percent of the forecasted error variance respectively, while EXG and INF accounts for 2 and 2 percent of the variance in forecasting TISE.

## 4.8 SUMMARY OF FINDINGS:

Based on the forgone result analysis, the following findings were extracted.

i) The security expenditure has negative impact on economic growth in Nigeria in both pre and full samples. While defence expenditure has positive impact on economic growth in pre-sample and negative in full sample. Also internal security expenditure has positive impact on economic growth in both samples

ii) The activities of Boko-Haram insurgences and Niger-Delta militants have impact on Nigeria's economic growth; this can be seen from the magnitude of the coefficients of the pre and full samples.

iii) In the short run, causal result shows the presence of uni-directional causality that runs from

   a) GDP to total security expenditure

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b) Total security expenditure to total defense expenditure
c) Total defense expenditure to total internal security expenditure, and
d) Bi-direction causality between total internal security and total security expenditure, with the total security expenditure leading the internal security expenditure.

iv) In the long run, the study found the existence of bi-directional causality between GDP and total internal security expenditure with former leading the later

v) The long run impact model shows that total defense expenditure and total security expenditure is negatively affecting economic growth. Whereas, total internal security expenditure positively affecting economic growth in Nigeria.

vi) The forecast error variance shows that GDP explains at least 40% of errors made in forecasting total security expenditure and vice versa. This finding is consistent for both pre and full samples Niger-Delta militancy/Boko-Haram insurgences periods.

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# CHAPTER FIVE

## 5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

### 5.1 INTRODUCTION:

In this chapter, we presented the summary of the entire research work, the conclusion we drew from the findings and the possible recommendations are based on the findings of the research work.

### 5.2 SUMMARY OF THE WORK:

This thesis titled *"Impact of Security Expenditure on Economic Growth: Evidence from Nigerian Economy"* is designed in five chapters, the Chapter One covers the general introduction of the work which includes: the background of the study, statement of the research problem, objectives of the study, hypothesis of the study, justification for conducting the research, scope and limitations of the study, as well as the organisation of the study. In Chapter Two, the study

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presents the reviewed conceptual, theoretical and empirical evidences on the subject area from which gaps are identified which form the basis of the research problem. The research methodology is presented in Chapter Three, here, the conceptual, theoretical and empirical frameworks upon which the empirical model was derived, also the techniques of data analysis and various diagnostics checks to ensure adequacy and robustness of both the model and the estimates were presented in the chapter. Chapter Four which is the most important chapter in the study presents the empirical results, and were analyzed in order to achieve the stated objectives of the study and the summary of the findings were presented in the chapter. And finally, Chapter Five covers the summary of findings, conclusion and recommendations.

## 5.3: SUMMARY OF THE RESEARCH FINDINGS:

I) The security expenditure has negative impact on economic growth in Nigeria in both pre and full samples. While defence expenditure has positive impact on economic growth in pre sample and negative in full sample. Also internal security expenditure has positive impact on economic growth in both samples.

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II) The activities of Niger-Delta militancy and Boko-Haram insurgencies have impact on Nigeria's economic growth; this can be seen from the magnitude of the coefficients of the pre and full samples.

III) In the short run, causal result shows the presence of uni-directional causality that runs from

a) GDP to total security expenditure
b) Total security expenditure to total defense expenditure
c) Total defense expenditure to total internal security expenditure, and
d) Bi-directional causality between total internal security and total security expenditure, with the total security expenditure leading the internal security expenditure.

IV) In the long run, the study found the existence of bi-directional causality between GDP and total internal security expenditure with the former leading the latter

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V) The long run impact model shows that total defense expenditure and total security expenditure are negatively affecting economic growth. While the total internal security expenditure is negatively affecting economic growth in Nigeria.

VI) The forecast error variance shows that GDP explains at least 40% of errors made in forecasting total security expenditure and vice versa. These findings are consistent with both pre Boko-Haram insurgences/Niger-Delta militancy and full samples.

## 5.4 CONCLUSION:

Based on the findings of this research we derived the following conclusions:

- Boko-Haram insurgences and Niger-Delta militancy have raised government spending on security in Nigeria which in turn and also affected economic growth negatively. When there is high economic activity, government invest more on security than on the period of low economic activity in Nigeria; therefore, the investment on security sector retard economic growth

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- Finally, the study concluded that total security expenditure is capable of explaining at least 40% of the fluctuation of economic activities in Nigeria.

## 5.5 RECOMMENDATIONS:

This study considers both the aggregate and disaggregates impact of security expenditure on the Nigeria's economic growth; therefore it proffers two sets of recommendations based on the empirical findings of the study. The first set of recommendation is for policy purpose and the second one is for the direction on future research in the areas.

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### 5.5.1 Policy Recommendations:

i) Government should vigorously decrease its finances on security in Nigeria as our result shows that security expenditure has a negative relationship with economic growth. This can retard growth by way of crowd out investment in sectors that are directly drivers to economic growth such as education, agriculture, health among others.

ii) Since economic activities are capable of improving government spending on other sectors that are directly drivers to economic growth, government should come up with policies that will enhance economic growth in Nigeria. These includes diversifying the economy and improve its productive base.

iii) In terms of the component of the security expenditure, government should budget more on internal security expenditure than defence expenditure as our findings shows that internal security spending has positive and significant impact on economic growth in both samples. While defence expenditure shows positive in pre-sample,

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becomes negative in full samples, despite the inclusion huge amount in recent years, as a result of Niger-Delta militancy and Boko-Haram insurgencies.

### 5.5.2 Recommendation for Further Studies:

In this study, we conducted a complete time series analysis that assumes a linear relationship in both the deterministic and stochastic components of the relationships. We also assume no presence of breaks that is why we assume to have a stable linear trend on the variables. However, the following direction can also be explored to see whether the empirical evidence will be in agreement or otherwise with our study.

**i)** A complete time series analysis that assumes the presence of break(s) in the trend function can be performed, the break can be a structural one, a regime shift or a break as a result of natural disaster such as flood or war. The econometric methodology has evolved in this direction.

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**ii)** We recommend for further studies that will use non-linear and regime switching models to assess the impact of Niger-Delta militancy/Boko-Haram insurgencies/ in Nigeria.

**iii)** In assessing the impact of Niger-Delta militancy/Boko-Haram insurgencies, we divide the period into pre and full samples as against the normal method of constructing dummy variable. Therefore, we also recommend for a study that will look at the impact of security spending in Nigeria using dummy variables.

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**SABITU, ABUBAKAR**
**M.SC/SOC-SCI//3836/11-12.**

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## Appendix 1

### Table 3.1: Summary of the Empirical Literature for the Relationship between Security Expenditure and Economic

| S/No | Author | Title | Objective | Methodology | Result | Conclusion /Recommendations |
|---|---|---|---|---|---|---|
| 1. | Khilji, N.M and Mahamood, A. (1997). | Military Expenditures and Economic Growth in Pakistan, 1992-1995. | To explore the impact of defence expenditures on economic growth and major economic variables in the Pakistan economy. | OLS, Granger Causality, Full Information Maximum Likelihood Method (FIML). | The results generally found that the defence burden to be negatively related to GDP growth. | Further research efforts should be geared to understanding more clearly the determinants of defense expenditures with explicit recognition of the strategic environment that Pakistan found itself. |
| 2. | Anwar, M.A, Rafique, Z and Joiya, S.A (2012). | Defense Spending-Economic Growth Nexus: A Case Study of Pakistan, 1980 -2010. | To empirically investigates the relationship between defense spending and economic growth in Pakistan. | Error Correction Model (ECM), Johansen Co-integration, Granger Causality. | The results indicated that defence spending do not hurt economic growth. | The study found defense spending and economic growth co integration but the relation is flowing from economic growth to defense spending. |

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| 3. | Edeme et al (2013). | The Interaction Between Defence Spending, Debt Service Obligation and Economic Growth in Nigeria, 1970-2003. | To analyze the interaction between defence spending, debt service obligation and economic growth in developing countries, with special reference to Nigeria. | OLS, Vector Autoregressive Model (VAR),Vector Error Correction Model (VECM), Johansen Maximum Likelihood. | The results showed a negative relationship between military spending and economic growth. | The study concluded that government should spend more money on human capital development which is the bedrock of every society, rather than on military spending. |
| 4. | Enimola, Sam S. and Akobo, A. (2008) | Defence Expenditure Trend Economic Growth: The Nigerian Experience, 1977-2006. | To determines the relationship between the level of economic growth and defence expenditure. | Production unction (Supply Model), Vector Error Correction Model (VECM), Granger Causality. | The results of the Granger causality test showed that there is unidirectional causality running from economic growth to defense spending. | The study concluded that a policy of increasing the defense budget to promote economic growth and development might be inappropriate, but that same funds channeled towards other government programme. |

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| 5. | Oriavwote,_Victor E. and Eshenake, Samuel J.(2013) | A Vector Error Correction Modelling of Security Spending and Economic Growth in Nigeria. | To examine the impact of security expenditure on the level of economic growth in Nigeria, using data covering the period between 1980 and 2010. | Error Correction Model (ECM). | The results show that the expenditure on defence has a negative impact on the level of economic growth. | Thus, the study recommended that government should reassess the content of her defence expenditure and make it more transparent and growth oriented. |
| 6. | Dunne, J Paul (2000) | The Economic Effects of Military Expenditure in Developing Countries. | To provide the relationship between the military spending and economic growth in developing countries. | Theoretical Approach | The results suggest that disarmament need not to be costly and does indeed provide an opportunity for improved economic performance. Keynesian framework suggest that military expenditure as at best no effect on growth, but is likely to have a negative impact. Certainly there is no evidence of a positive effect. | The data in both developed and developing world suggest a clear reduction in military spending; the expectation is that this reduction in the burden of military spending will lead to improved economic performance. |

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| 7. | Kollias, C. (1989). | Military Expenditure and Economic Development: The Case of Greece, 1952- 1987. | To examines the link between military expenditure and economic growth. | 2 Stage Least Squares (2SLS). | The results indicated that military expenditure has adversely affected growth in the period under study, mainly through the crowding out of investment. | The study concluded that military expenditure should be relatively manageable in order not harm substantial amount of investment. |
| 8. | Tiwari, A. and Shahbaz, M. (2011). | Does Defence Spending Stimulate Economic Growth in India? | To re-investigates the effect of defence spending on economic growth. | Ordinary Least Square (OLS), Vector Error Correction Model (VECM) and Granger Causality. | The result indicated a positive effect of defence spending on economic growth, while economic growth is inversely related to interest rate. | The same |
| 9. | Adebakin, M.A and Rami, L (2012). | National Security Challenges and Sustainable Economic Development: Evidence from Nigeria. | To examines the link between national security and sustainable economic development in Nigeria. | Ordinary Least Square (OLS), Descriptive Statistics. | The result indicated that there is positive relationship between gross domestic product (GDP) and expenditure on security. | This present arrangement where security gulf larger proportion of the nation's budget is unhealthy, because it continues to deny critical sectors like health, education, agriculture, construction as well as welfare projects that needed attention. |

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| 10 | El-Husseiny,Al-Sayed and El – Sayed(2013). | Does the Military Public Expenditure Matters for Economic Growth? Evidence from Egypt During the Period (1981/82-2011/12). | To analyze the relationship between military/civilian component of public expenditure and economic growth in the Egyptian economy. | Guns and Butter Approach, Error Correction Model (ECM). | The results showed that civilian expenditure to GDP is positively and significantly correlated to economic growth in the long run. Military to GDP ratio is insignificantly correlated to the economic growth rates in the long run. The ECM estimates showed that both shares of military and civilian expand to GDP are negatively correlated to the economic growth in the short run. | The same |
| 11. | Antonakis, N and Apostolou, A (2003). | Assessing the Impact of Military Expenditure on Economic Growth: A Longitudinal Analysis of Greece, 1958-1993. | To investigates the growth-defence relationship in the case of Greece over the period of study. | Ordinary Least Square (OLS), Error Correction Model (ECM), Co-integration, Granger Causality Test. | The findings revealed that military expenditure retards the output growth rates in Greece, contrary to the inconclusive findings of previous studies. | The growth- defence relationship in this country has remained somatically stable over the entire time period considered. The implication of the study is that a reduction in Greek military burdens will enhance the process of economic development of Greece. |

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| 12. | Collier, Paul and Hoeffler, Anke. (2002). | Military Expenditure: Threats, Aid and Arms Races, 1960-1999. | To investigate what determines military expenditures? | Descriptive Statistics. | The study found that the level of military expenditure chosen by a government is strongly influenced by the levels chosen by neighbouring governments. This creates multiplier effects for the other influences on military spending notably war | In conclusion, the donor community has a further interest in the reduction of military expenditure in aid-recipient countries. Military expenditure in the context of poverty is highly seen as wasteful. |
| 13. | Tekeogbu, Ertugrul (2008). | Defense Expenditure and Economic Growth: Empirical Study in Case of Turkey. | The thesis set out to find the relationship between defense spending and economic growth for Turkey. | Ordinary Least Square (OLS). | The result showed that there is negative linkage between defense spending and economic growth in Turkey. | The Turkish republic's defense polity has been continually guided by a Turkish's proverb "Peace at home, peace in the world''. Hence sustaining a peaceful environment has required a high level of military expenditures. |
| 14. | Halicioglu, Ferda (2004). | Defense Spending and Economic Growth in Turkey: An Empirical Application of New | To finds out the relationship between the level of economic growth and defense expenditures in Turkey. | Keynesian Cross Model, Multivariate Co integration Procedures. | The results showed that there is a positive long run relationship between aggregate defense spending and aggregate output in Turkey. The impact of military | The study concluded that the effect of monetary policy on the real output is negligible. Both the cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals tests confirmed |

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| | | Macroeconomic Theory, 1950-2002. | | | expenditure on the real output level is positive. | the stability of long run coefficient of the aggregate output function augmented with the non-defense and defense expenditures and real interest rates. |
| 15. | Yildrim, J. Oscal, N and Keskin, H (2011). | Military Expenditure, Economic Growth and Spatial Spill-Overs: A Global Perspective, 2000-2008. | To investigates the relationship between military expenditure and economic growth for 133 countries taking spatial aspects into account. | Ordinary Least Square (OLS), Spatial Error, Spatial Lag and Generalized Two Stage Least Square (G2SLS). | The results showed that military expenditure has a positive effect on economic growth. | The study concluded that the empirical evidence in a global context is scarce. Also there is strong synergy between military expenditure and economic growth supporting the findings of other authors. |
| 16. | Alptekin, Aynur and Levine, Paul (2010). | Military Expenditure and Economic Growth: A Meta-Analysis. | To finds the combined overall effect of military expenditure on economic growth. | Meta Fixed, Random Fixed and Ordinary Least Square (OLS) Regression Analysis. | The results showed that the net effect between military expenditure and economic growth is positive and the magnitude is small. | There is genuine empirical effect without publication bias, and that the main methodological differences in the primary studies that contribute to the variations in the findings of the existing literatures are sample, time periods, and functional forms. |
| 17. | Ali, M. K and Mustapha, B. (2014). | Long run Relationship and Causality Tests between Military | To re-examines the effect of military spending and economic growth in India. | Autoregressive Distributed Lags (ARDL),Co integration Approach and Granger | The findings revealed that there is positive relationship between military spending and economic growth in the short run. | There is no sufficient evidence that the economy currently being hindered by its present defense burden. However, the current increase in military expenditure and |

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| | | Expenditure and Economic Growth in India, 1980-2011. | | Causality Test. | | downturn cyclical fluctuations has led the defense expenditure close to its optimal level. Thus, further increases are likely to be at the cost of economic growth in the long run. |
| 18. | Ebiringa, Oforegbunam T. and Charles (2012) | Impact of Government Sectorial Expenditure on the Economic Growth of Nigeria. | To evaluate the impact of government expenditure in some priority sectors on economic growth. | Cochrane –Orcult, Error Correction Model (ECM). | The results show that expenditure on telecommunication, defence and security, education and health sectors have made positive impact on Nigeria's economic growth. But transport and agricultural expenditure have impacted negatively in the economic growth in Nigeria. | The study concluded that the level of government expenditure for transportation and agricultural development is still not adequate to build the much need capacity in the sectors to impact positively to economic growth. |
| 19. | Mohammadi, T. Maleki, B. and Gashti, H. P. (2012). | The Effect of Government Expenditure Composition on Economic Growth: Evidence on ECO Countries, 1995-2009. | To examines the effect of governmental expenditure composition on economic development of ECO countries. | Generalized Method of Moment (GMM) and Dynamic Panel Data Method (DPDM). | The findings showed that the effect of defense expenditure is significant and statistically positive on the economic development of ECO counties. | Therefore, investment in defense sector certainly will have important and positive impacts on economic growth of ECO's countries. Hence, increase in public and private sector in various fields will reduce the unemployment and poverty, subsequently will cause growth and development of economic. |

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| 20. | Pradhan, Gyan(2007). | Nepal's Civil War and Its Economic Costs. | To examines the relationships between defense spending and investment. | Investment Function. | The result indicated that there is a significant negative effect of defense spending on investment. | The study concluded that between 1996 and 2006, the opportunity cost of the conflict interns of lost output has been about 3% of Nepal's current GDP and the most serious cottage conflict has been loss of over 13000 lives. |
| 21. | Myo, Khin Ma Ma (2013). | Military Expenditures and Economic Growth in Asia. | To investigates the relationship between military expenditure s and economic growth in 18 Asian countries during the period of 1985-2000 | Ordinary Least Square (OLS). | The result indicated that there is no clear cut impact of defence spending on economic growth rate but has a negative impact on savings- income ratio in Asian countries. Hence, indicated that the result is indifference. | The study concluded that unless new evidence is found, the policy advice to be derived from this study is that in Asian countries, the defence burden has no clear-cut effect on growth and negative effect on saving rate. |
| 22 | Shahbaz, M. Afza, T and Shabbir, M.S (2011) | Does Defence Spending Impede Economic Growth? Co integration and Causality Analysis for Pakistan. | To re-visits the impact of defence spending on economic growth using Augmented Keynesian Model in long and short runs in case of Pakistan. | Vector Error Correction Model (VECM). | The results indicated that the defence spending retard the pace of economic growth. Thus, indicated a negative effect of military spending on economic growth for Pakistanis economy. | The same |

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| 23. | Shahbaz, M. andShabbir, M.S (2011). | Military Spending and Economic Growth in Pakistan: New Evidence from Rolling Window Approach.. | To re-visits the impact of defence spending on economic growth. | Rolling Window Approach (RWA), Descriptive Statistics, Correlation Matix. | The results indicated a long run relationship between military spending and economic growth using RWA and also negative and significant correlation between military spending and economic growth in case of Pakistan. | The same |
| 24. | Looney, R. E (1991). | Defense Expenditures and Economic Performance in South Asia. Test of Causality and Independence. | To examines the interdependence between arms races and economic allocation in a developing world context. | Ordinary Least Square (OLS), Granger Causality Test | There exists a positive relationship | The study concluded that there is little evidence that this relationship exists any longer. |
| 25. | Abu-Bader, Suleiman and Abu- Qarn, Aamer S. (2003). | Government Expenditures Military Spending and Economic Growth: Causality Evidence from Egypt, Israel and Syria. | To examines the causal relationship between government expenditure and economic growth for Egypt, Israel and Syria for the past three decades. | Multivariate Co integration and Variance Decomposition Techniques. | The study found that the military burden negatively effect economic growth for all the countries and that civilian government expenditure causes positive economic growth in Israel and Egypt. | Same |

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| 26. | Abraham, A. A (2011) | The Impact of Defence Expenditure on Economic Growth in Nigeria, 1970-2008: A Simulation Approach. | To analyze the impact of defence expenditure on economic growth and some macroeconomic variables. And to test the validity of simulation series. | Two (2) Stage Least Square Techniques, Simulation Approach. | The result revealed positive effect between defence expenditure and economic growth. | Thus, an increase in defence spending will add economic growth. |
| 27. | Gaiya, Blessing (2011) | The Impact of Defence Expenditure on Economic Growth in Nigeria, 1970-2008. | To analyze defence expenditure and economic growth in Nigeria, 1970-2008. | Ordinary Least Square (OLS), ARIMA. | The result found that defence expenditure does not retard economic growth in Nigeria. | The defence sector needs to critically and strategically reassess the structure of expenditure to enable the sector operate more efficiently and effectively. |
| 28. | Fefa, J and Irefin, D (2014). | The Cost of Insecurity on Emerging Economies: The Nigerian Experience. | To examines the cost of insecurity on the Nigerian emerging economy. | Vector Error Correction Model (VECM). | The result revealed that insecurity would exert negative influence on GDP. | The study concluded that northern Nigerian economy has been negatively affected by the activities of Boko-Haram sect. |

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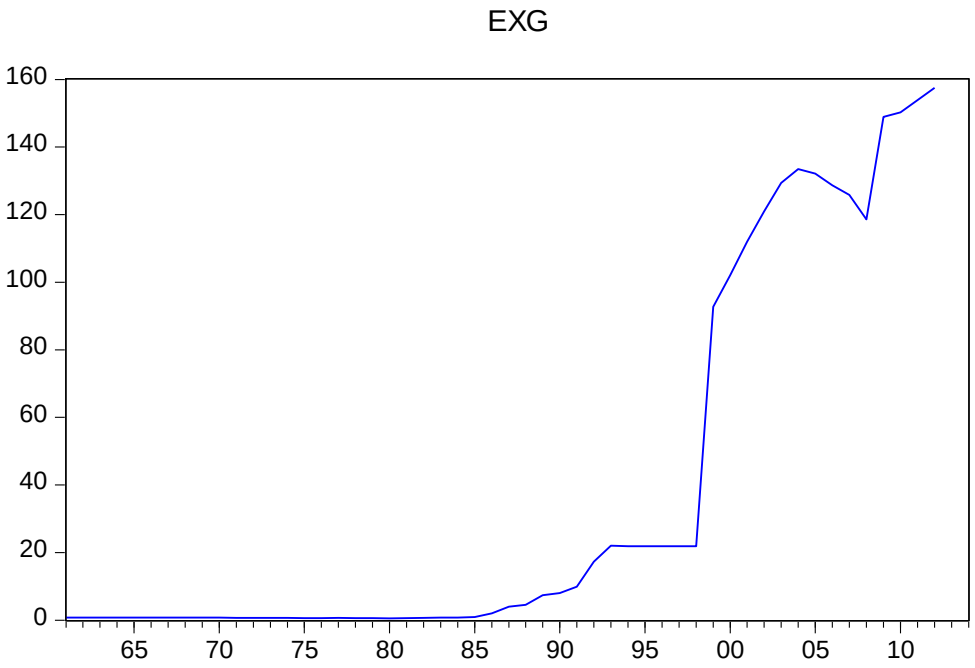
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## Appendix 2

## Logs of EXG, GDP, INF, TDE, TISE and TSE

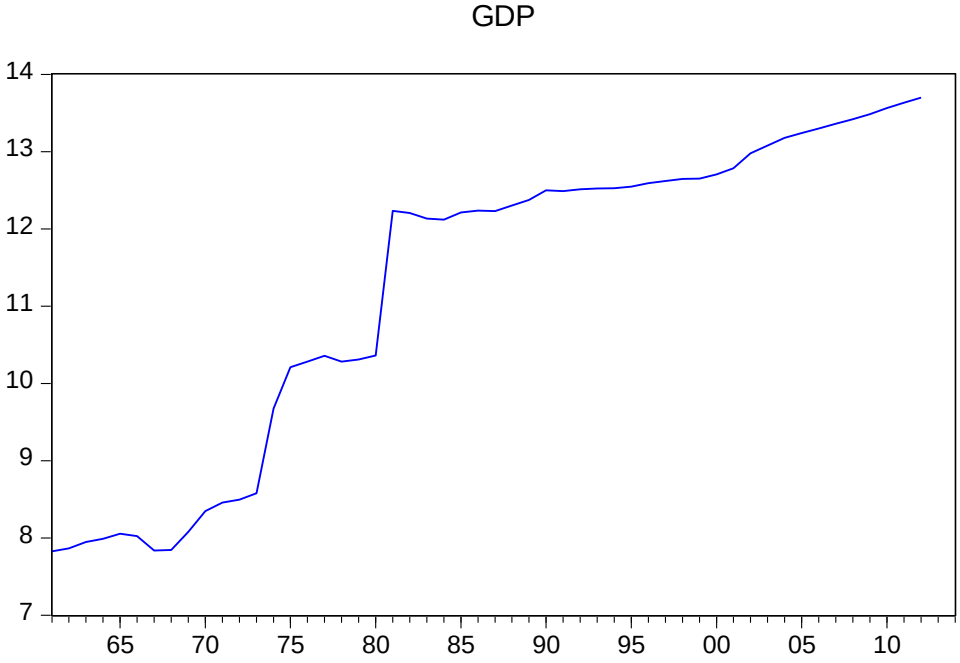


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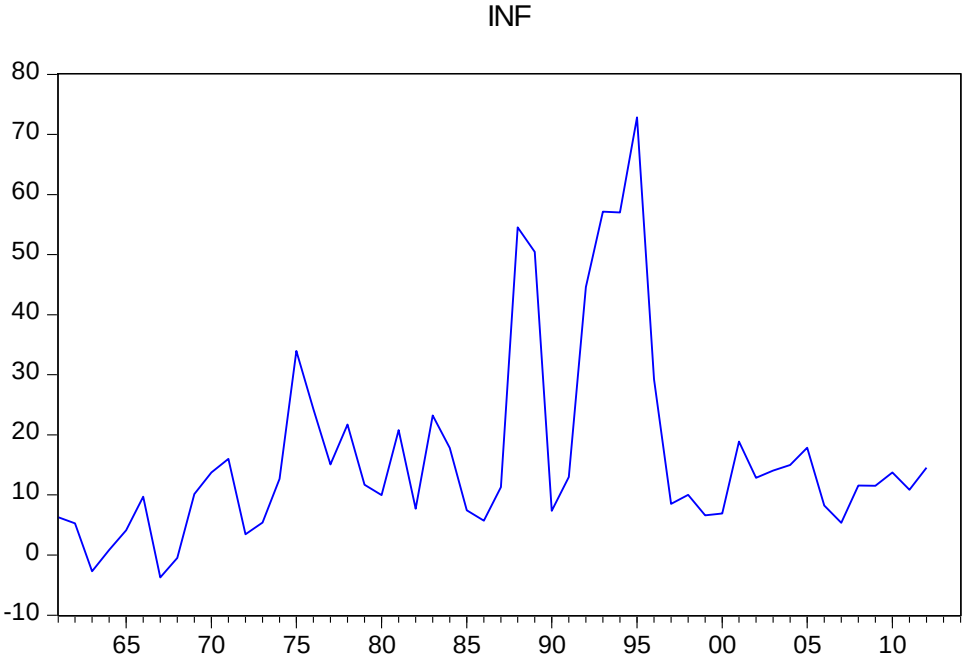


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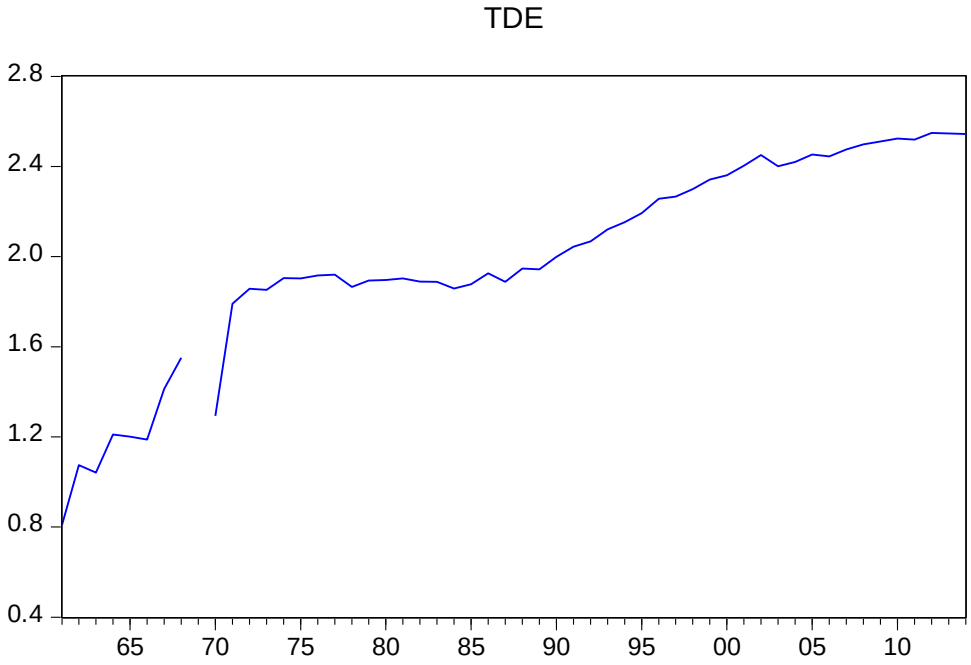


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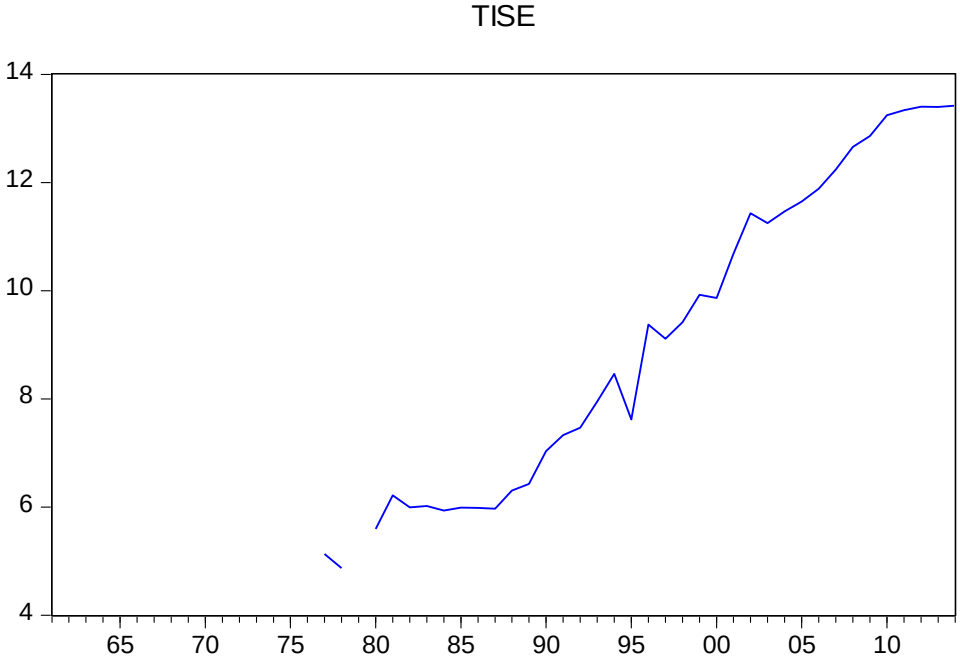


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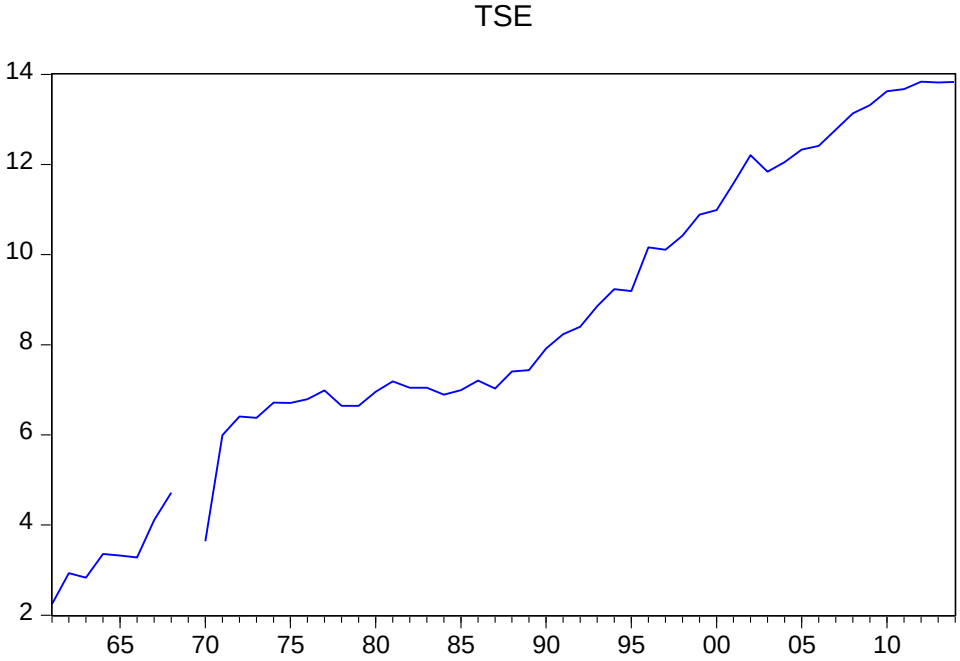


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## Appendix 3

| | EXG | GDP | INF | TDE | TISE | TSE |
|---|---|---|---|---|---|---|
| Mean | 57.04249 | 12.54452 | 20.38697 | 2.187109 | 8.858491 | 9.771229 |
| Median | 21.88610 | 12.54756 | 13.72020 | 2.192630 | 8.460030 | 9.231524 |
| Maximum | 157.4994 | 13.69773 | 72.83550 | 2.548908 | 13.40150 | 13.83603 |
| Minimum | 0.546358 | 10.28235 | 5.382224 | 1.857784 | 4.869072 | 6.641313 |
| Std. Dev. | 61.22352 | 0.832039 | 17.68692 | 0.251224 | 2.785372 | 2.500004 |
| Skewness | 0.479198 | -1.326386 | 1.598867 | 0.008365 | 0.240058 | 0.226315 |
| Kurtosis | 1.418433 | 4.981163 | 4.355377 | 1.373711 | 1.607545 | 1.523296 |
| | | | | | | |
| Jarque-Bera | 4.987320 | 15.98656 | 17.59122 | 3.857432 | 3.163768 | 3.478894 |
| Probability | 0.082607 | 0.000338 | 0.000151 | 0.145335 | 0.205587 | 0.175618 |
| | | | | | | |
| Sum | 1996.487 | 439.0583 | 713.5439 | 76.54880 | 310.0472 | 341.9930 |
| Sum Sq. Dev. | 127442.9 | 23.53780 | 10636.12 | 2.145861 | 263.7820 | 212.5006 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| Observations | 35 | 35 | 35 | 35 | 35 | 35 |

## Appendix 4

**Level of Exg ADF**

Null Hypothesis: EXG has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | 0.816772 | 0.9934 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| | 10% level | -2.597905 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXG)
Method: Least Squares
Date: 12/05/15 Time: 13:09

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Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EXG(-1) | 0.023235 | 0.028447 | 0.816772 | 0.4180 |
| C | 2.231115 | 1.853566 | 1.203688 | 0.2345 |

| | | | |
|---|---|---|---|
| R-squared | 0.013432 | Mean dependent var | 3.074218 |
| Adjusted R-squared | -0.006702 | S.D. dependent var | 10.95788 |
| S.E. of regression | 10.99454 | Akaike info criterion | 7.671100 |
| Sum squared resid | 5923.114 | Schwarz criterion | 7.746858 |
| Log likelihood | -193.6131 | Hannan-Quinn criter. | 7.700050 |
| F-statistic | 0.667117 | Durbin-Watson stat | 1.933771 |
| Prob(F-statistic) | 0.418012 | | |

**Ist Diff of Exg ADF**

Null Hypothesis: D(EXG) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -6.482213 | 0.0000 |
| Test critical values: | 1% level | -3.568308 | |
| | 5% level | -2.921175 | |

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| | | |
|---|---|---|
| | 10% level | -2.598551 |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXG,2)
Method: Least Squares
Date: 12/05/15 Time: 13:11
Sample (adjusted): 1963 2012
Included observations: 50 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(EXG(-1)) | -0.932783 | 0.143899 | -6.482213 | 0.0000 |
| C | 2.929820 | 1.637226 | 1.789502 | 0.0798 |

| | | | |
|---|---|---|---|
| R-squared | 0.466780 | Mean dependent var | 0.072756 |
| Adjusted R-squared | 0.455671 | S.D. dependent var | 15.11215 |
| S.E. of regression | 11.14954 | Akaike info criterion | 7.699852 |
| Sum squared resid | 5966.991 | Schwarz criterion | 7.776333 |
| Log likelihood | -190.4963 | Hannan-Quinn criter. | 7.728976 |
| F-statistic | 42.01908 | Durbin-Watson stat | 2.011548 |
| Prob(F-statistic) | 0.000000 | | |

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**level of Exg PP**

Null Hypothesis: EXG has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | 0.781298 | 0.9928 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| | 10% level | -2.597905 | |

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

| | |
|---|---|
| Residual variance (no correction) | 116.1395 |
| HAC corrected variance (Bartlett kernel) | 119.8898 |

Phillips-Perron Test Equation
Dependent Variable: D(EXG)
Method: Least Squares

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Date: 12/05/15 Time: 13:12
Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EXG(-1) | 0.023235 | 0.028447 | 0.816772 | 0.4180 |
| C | 2.231115 | 1.853566 | 1.203688 | 0.2345 |

| | | | |
|---|---|---|---|
| R-squared | 0.013432 | Mean dependent var | 3.074218 |
| Adjusted R-squared | -0.006702 | S.D. dependent var | 10.95788 |
| S.E. of regression | 10.99454 | Akaike info criterion | 7.671100 |
| Sum squared resid | 5923.114 | Schwarz criterion | 7.746858 |
| Log likelihood | -193.6131 | Hannan-Quinn criter. | 7.700050 |
| F-statistic | 0.667117 | Durbin-Watson stat | 1.933771 |
| Prob(F-statistic) | 0.418012 | | |

**Ist Diff of Exg PP**

Null Hypothesis: D(EXG) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

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| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -6.493936 | 0.0000 |
| Test critical values: | 1% level | -3.568308 | |
| | 5% level | -2.921175 | |
| | 10% level | -2.598551 | |

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

| | |
|---|---|
| Residual variance (no correction) | 119.3398 |
| HAC corrected variance (Bartlett kernel) | 123.8803 |

Phillips-Perron Test Equation
Dependent Variable: D(EXG,2)
Method: Least Squares
Date: 12/05/15 Time: 13:13
Sample (adjusted): 1963 2012
Included observations: 50 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(EXG(-1)) | -0.932783 | 0.143899 | -6.482213 | 0.0000 |
| C | 2.929820 | 1.637226 | 1.789502 | 0.0798 |

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| | | | |
|---|---|---|---|
| R-squared | 0.466780 | Mean dependent var | 0.072756 |
| Adjusted R-squared | 0.455671 | S.D. dependent var | 15.11215 |
| S.E. of regression | 11.14954 | Akaike info criterion | 7.699852 |
| Sum squared resid | 5966.991 | Schwarz criterion | 7.776333 |
| Log likelihood | -190.4963 | Hannan-Quinn criter. | 7.728976 |
| F-statistic | 42.01908 | Durbin-Watson stat | 2.011548 |
| Prob(F-statistic) | 0.000000 | | |

**Level of GDP ADF**

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -1.186035 | 0.6737 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| S | 10% level | -2.597905 | |

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

Augmented Dickey-Fuller Test Equation

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Dependent Variable: D(GDP)
Method: Least Squares
Date: 12/05/15 Time: 13:14
Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP(-1) | -0.024889 | 0.020985 | -1.186035 | 0.2413 |
| C | 0.393904 | 0.238868 | 1.649043 | 0.1055 |

| | | | |
|---|---|---|---|
| R-squared | 0.027907 | Mean dependent var | 0.115161 |
| Adjusted R-squared | 0.008068 | S.D. dependent var | 0.306169 |
| S.E. of regression | 0.304931 | Akaike info criterion | 0.500966 |
| Sum squared resid | 4.556172 | Schwarz criterion | 0.576724 |
| Log likelihood | -10.77462 | Hannan-Quinn criter. | 0.529915 |
| F-statistic | 1.406678 | Durbin-Watson stat | 1.876151 |
| Prob(F-statistic) | 0.241328 | | |

**Ist Diff of GDP ADF**

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

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| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -6.498550 | 0.0000 |
| Test critical values: | 1% level | -3.568308 | |
| | 5% level | -2.921175 | |
| | 10% level | -2.598551 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 12/05/15 Time: 13:15
Sample (adjusted): 1963 2012
Included observations: 50 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(GDP(-1)) | -0.935702 | 0.143986 | -6.498550 | 0.0000 |
| C | 0.109237 | 0.047140 | 2.317293 | 0.0248 |

| | | | |
|---|---|---|---|
| R-squared | 0.468033 | Mean dependent var | 0.000519 |
| Adjusted R-squared | 0.456950 | S.D. dependent var | 0.422885 |
| S.E. of regression | 0.311632 | Akaike info criterion | 0.545192 |

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| | | | |
|---|---|---|---|
| Sum squared resid | 4.661502 | Schwarz criterion | 0.621673 |
| Log likelihood | -11.62980 | Hannan-Quinn criter. | 0.574316 |
| F-statistic | 42.23116 | Durbin-Watson stat | 1.986213 |
| Prob(F-statistic) | 0.000000 | | |

**Level of GDP PP**

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -1.208736 | 0.6639 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| | 10% level | -2.597905 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.089337 |
| HAC corrected variance (Bartlett kernel) | 0.071471 |

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Phillips-Perron Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 12/05/15 Time: 13:17
Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| GDP(-1) | -0.024889 | 0.020985 | -1.186035 | 0.2413 |
| C | 0.393904 | 0.238868 | 1.649043 | 0.1055 |

| | | | |
|---|---|---|---|
| R-squared | 0.027907 | Mean dependent var | 0.115161 |
| Adjusted R-squared | 0.008068 | S.D. dependent var | 0.306169 |
| S.E. of regression | 0.304931 | Akaike info criterion | 0.500966 |
| Sum squared resid | 4.556172 | Schwarz criterion | 0.576724 |
| Log likelihood | -10.77462 | Hannan-Quinn criter. | 0.529915 |
| F-statistic | 1.406678 | Durbin-Watson stat | 1.876151 |
| Prob(F-statistic) | 0.241328 | | |

**Ist Diff of GDP PP**

Null Hypothesis: D(GDP) has a unit root
Exogenous: Constant

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Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -6.484352 | 0.0000 |
| Test critical values: | 1% level | -3.568308 | |
| | 5% level | -2.921175 | |
| | 10% level | -2.598551 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.093230 |
| HAC corrected variance (Bartlett kernel) | 0.070458 |

Phillips-Perron Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 12/05/15 Time: 13:18
Sample (adjusted): 1963 2012
Included observations: 50 after adjustments

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

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| | | | | |
|---|---|---|---|---|
| D(GDP(-1)) | -0.935702 | 0.143986 | -6.498550 | 0.0000 |
| C | 0.109237 | 0.047140 | 2.317293 | 0.0248 |

| | | | |
|---|---|---|---|
| R-squared | 0.468033 | Mean dependent var | 0.000519 |
| Adjusted R-squared | 0.456950 | S.D. dependent var | 0.422885 |
| S.E. of regression | 0.311632 | Akaike info criterion | 0.545192 |
| Sum squared resid | 4.661502 | Schwarz criterion | 0.621673 |
| Log likelihood | -11.62980 | Hannan-Quinn criter. | 0.574316 |
| F-statistic | 42.23116 | Durbin-Watson stat | 1.986213 |
| Prob(F-statistic) | 0.000000 | | |

**Level of INF ADF**

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -3.376429 | 0.0660 |
| Test critical values: | 1% level | -4.148465 | |
| | 5% level | -3.500495 | |
| | 10% level | -3.179617 | |

**THE IMPACT OF SECURITY EXPENDITURE ON ECONOMIC GROWTH: EVIDENCE FROM THE NIGERIAN ECONOMY.**

**BY:**

**SABITU, ABUBAKAR**
**M.SC/SOC-SCI//3836/11-12.**

**BEING AN M.SC THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS/ POSTGRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTERS OF SCIENCE (ECONOMICS), DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, AHMADU BELLO UNIVERSITY ZARIA, NIGERIA.**

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 12/06/15 Time: 20:58
Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| INF(-1) | -0.386017 | 0.114327 | -3.376429 | 0.0015 |
| C | 4.710193 | 3.854531 | 1.221989 | 0.2277 |
| @TREND("1961") | 0.072430 | 0.127047 | 0.570106 | 0.5713 |

| | | | |
|---|---|---|---|
| R-squared | 0.192686 | Mean dependent var | 0.161773 |
| Adjusted R-squared | 0.159048 | S.D. dependent var | 14.14823 |
| S.E. of regression | 12.97441 | Akaike info criterion | 8.020857 |
| Sum squared resid | 8080.093 | Schwarz criterion | 8.134494 |
| Log likelihood | -201.5319 | Hannan-Quinn criter. | 8.064281 |
| F-statistic | 5.728220 | Durbin-Watson stat | 1.686882 |
| Prob(F-statistic) | 0.005875 | | |

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**Ist Diff of INF ADF**

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -7.293907 | 0.0000 |
| Test critical values: | 1% level | -4.156734 | |
| | 5% level | -3.504330 | |
| | 10% level | -3.181826 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 12/06/15 Time: 21:01
Sample (adjusted): 1964 2012
Included observations: 49 after adjustments

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

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| | | | | |
|---|---|---|---|---|
| D(INF(-1)) | -1.392152 | 0.190865 | -7.293907 | 0.0000 |
| D(INF(-1),2) | 0.405215 | 0.135737 | 2.985292 | 0.0046 |
| C | 2.308226 | 4.180169 | 0.552185 | 0.5836 |
| @TREND("1961") | -0.070247 | 0.137150 | -0.512188 | 0.6110 |

| | | | |
|---|---|---|---|
| R-squared | 0.580566 | Mean dependent var | 0.237736 |
| Adjusted R-squared | 0.552604 | S.D. dependent var | 20.26682 |
| S.E. of regression | 13.55601 | Akaike info criterion | 8.129644 |
| Sum squared resid | 8269.440 | Schwarz criterion | 8.284079 |
| Log likelihood | -195.1763 | Hannan-Quinn criter. | 8.188236 |
| F-statistic | 20.76246 | Durbin-Watson stat | 2.088760 |
| Prob(F-statistic) | 0.000000 | | |

**Level of INF PP**

Null Hypothesis: INF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -3.219775 | 0.0921 |
| Test critical values: | 1% level | -4.148465 | |
| | 5% level | -3.500495 | |

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| | | |
|---|---|---|
| | 10% level | -3.179617 |

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

| | |
|---|---|
| Residual variance (no correction) | 158.4332 |
| HAC corrected variance (Bartlett kernel) | 137.0383 |

Phillips-Perron Test Equation
Dependent Variable: D(INF)
Method: Least Squares
Date: 12/06/15 Time: 21:03
Sample (adjusted): 1962 2012
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| INF(-1) | -0.386017 | 0.114327 | -3.376429 | 0.0015 |
| C | 4.710193 | 3.854531 | 1.221989 | 0.2277 |
| @TREND("1961") | 0.072430 | 0.127047 | 0.570106 | 0.5713 |

| | | | |
|---|---|---|---|
| R-squared | 0.192686 | Mean dependent var | 0.161773 |
| Adjusted R-squared | 0.159048 | S.D. dependent var | 14.14823 |
| S.E. of regression | 12.97441 | Akaike info criterion | 8.020857 |

**THE IMPACT OF SECURITY EXPENDITURE ON ECONOMIC GROWTH: EVIDENCE FROM THE NIGERIAN ECONOMY.**

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| | | | |
|---|---|---|---|
| Sum squared resid | 8080.093 | Schwarz criterion | 8.134494 |
| Log likelihood | -201.5319 | Hannan-Quinn criter. | 8.064281 |
| F-statistic | 5.728220 | Durbin-Watson stat | 1.686882 |
| Prob(F-statistic) | 0.005875 | | |

**Ist Diff of INF PP**

Null Hypothesis: D(INF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 49 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -16.25861 | 0.0000 |
| Test critical values: | 1% level | -4.152511 | |
| | 5% level | -3.502373 | |
| | 10% level | -3.180699 | |

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

| | |
|---|---|
| Residual variance (no correction) | 199.8827 |
| HAC corrected variance (Bartlett kernel) | 8.716114 |

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Phillips-Perron Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 12/06/15 Time: 21:04
Sample (adjusted): 1963 2012
Included observations: 50 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(INF(-1)) | -0.989538 | 0.145972 | -6.778973 | 0.0000 |
| C | 1.072239 | 4.315298 | 0.248474 | 0.8049 |
| @TREND("1961") | -0.033506 | 0.143022 | -0.234273 | 0.8158 |

| | | | |
|---|---|---|---|
| R-squared | 0.494385 | Mean dependent var | 0.094046 |
| Adjusted R-squared | 0.472869 | S.D. dependent var | 20.08466 |
| S.E. of regression | 14.58222 | Akaike info criterion | 8.255608 |
| Sum squared resid | 9994.133 | Schwarz criterion | 8.370329 |
| Log likelihood | -203.3902 | Hannan-Quinn criter. | 8.299294 |
| F-statistic | 22.97805 | Durbin-Watson stat | 1.985313 |
| Prob(F-statistic) | 0.000000 | | |

**Level of TDE ADF**

Null Hypothesis: TDE has a unit root

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Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -2.887168 | 0.1761 |
| Test critical values: | 1% level | -4.175640 | |
| | 5% level | -3.513075 | |
| | 10% level | -3.186854 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TDE)
Method: Least Squares
Date: 12/06/15 Time: 20:15
Sample (adjusted): 1965 2014
Included observations: 45 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TDE(-1) | -0.172479 | 0.059740 | -2.887168 | 0.0063 |
| D(TDE(-1)) | -0.030551 | 0.144824 | -0.210952 | 0.8340 |
| D(TDE(-2)) | -0.098588 | 0.177101 | -0.556674 | 0.5809 |
| D(TDE(-3)) | 0.132461 | 0.075895 | 1.745315 | 0.0888 |

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| | | | | |
|---|---|---|---|---|
| C | 0.261233 | 0.082107 | 3.181606 | 0.0029 |
| @TREND("1961") | 0.003870 | 0.001550 | 2.497243 | 0.0168 |

| | | | |
|---|---|---|---|
| R-squared | 0.246233 | Mean dependent var | 0.022943 |
| Adjusted R-squared | 0.149596 | S.D. dependent var | 0.045533 |
| S.E. of regression | 0.041989 | Akaike info criterion | -3.379236 |
| Sum squared resid | 0.068761 | Schwarz criterion | -3.138348 |
| Log likelihood | 82.03282 | Hannan-Quinn criter. | -3.289436 |
| F-statistic | 2.548020 | Durbin-Watson stat | 1.367381 |
| Prob(F-statistic) | 0.043455 | | |

**Ist diff of TDE ADF**

Null Hypothesis: D(TDE) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -2.957760 | 0.0468 |
| Test critical values: | 1% level | -3.584743 | |
| | 5% level | -2.928142 | |
| | 10% level | -2.602225 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TDE,2)
Method: Least Squares
Date: 12/05/15 Time: 13:23
Sample (adjusted): 1965 2014
Included observations: 45 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TDE(-1)) | -0.835008 | 0.282311 | -2.957760 | 0.0051 |
| D(TDE(-1),2) | -0.097205 | 0.206381 | -0.470995 | 0.6401 |
| D(TDE(-2),2) | -0.128759 | 0.078633 | -1.637478 | 0.1092 |
| C | 0.017330 | 0.009259 | 1.871753 | 0.0684 |

| | | | |
|---|---|---|---|
| R-squared | 0.502858 | Mean dependent var | -0.000614 |
| Adjusted R-squared | 0.466482 | S.D. dependent var | 0.062176 |
| S.E. of regression | 0.045415 | Akaike info criterion | -3.261266 |
| Sum squared resid | 0.084563 | Schwarz criterion | -3.100674 |
| Log likelihood | 77.37850 | Hannan-Quinn criter. | -3.201399 |
| F-statistic | 13.82382 | Durbin-Watson stat | 1.501772 |
| Prob(F-statistic) | 0.000002 | | |

**Level of TDE PP**

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Null Hypothesis: TDE has a unit root
Exogenous: None
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | 1.836112 | 0.9829 |
| Test critical values: | 1% level | -2.611094 | |
| | 5% level | -1.947381 | |
| | 10% level | -1.612725 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.008306 |
| HAC corrected variance (Bartlett kernel) | 0.011956 |

Phillips-Perron Test Equation
Dependent Variable: D(TDE)
Method: Least Squares
Date: 12/06/15 Time: 21:49
Sample (adjusted): 1962 2014
Included observations: 51 after adjustments

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| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TDE(-1) | 0.014386 | 0.006329 | 2.273099 | 0.0274 |

| | | | |
|---|---|---|---|
| R-squared | -0.087532 | Mean dependent var | 0.039076 |
| Adjusted R-squared | -0.087532 | S.D. dependent var | 0.088263 |
| S.E. of regression | 0.092045 | Akaike info criterion | -1.913661 |
| Sum squared resid | 0.423616 | Schwarz criterion | -1.875782 |
| Log likelihood | 49.79835 | Hannan-Quinn criter. | -1.899186 |
| Durbin-Watson stat | 1.210843 | | |

**Ist diff of TDE PP**

Null Hypothesis: D(TDE) has a unit root
Exogenous: None
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -9.482285 | 0.0000 |
| Test critical values: | 1% level | -2.613010 | |
| | 5% level | -1.947665 | |
| | 10% level | -1.612573 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.002918 |
| HAC corrected variance (Bartlett kernel) | 0.004681 |

Phillips-Perron Test Equation
Dependent Variable: D(TDE,2)
Method: Least Squares
Date: 12/06/15 Time: 21:47
Sample (adjusted): 1963 2014
Included observations: 49 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TDE(-1)) | -0.881790 | 0.081531 | -10.81538 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.704233 | Mean dependent var | -0.012771 |
| Adjusted R-squared | 0.704233 | S.D. dependent var | 0.100356 |
| S.E. of regression | 0.054578 | Akaike info criterion | -2.958174 |
| Sum squared resid | 0.142980 | Schwarz criterion | -2.919566 |
| Log likelihood | 73.47527 | Hannan-Quinn criter. | -2.943526 |
| Durbin-Watson stat | 1.826015 | | |

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**Level of TISE ADF**

Null Hypothesis: TISE has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | 0.333713 | 0.9765 |
| Test critical values: | 1% level | -3.653730 | |
| | 5% level | -2.957110 | |
| | 10% level | -2.617434 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TISE)
Method: Least Squares
Date: 12/05/15 Time: 13:26
Sample (adjusted): 1983 2014
Included observations: 32 after adjustments

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

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| | | | | |
|---|---|---|---|---|
| TISE(-1) | 0.009104 | 0.027281 | 0.333713 | 0.7411 |
| D(TISE(-1)) | -0.500083 | 0.194310 | -2.573631 | 0.0156 |
| D(TISE(-2)) | -0.118090 | 0.190579 | -0.619639 | 0.5405 |
| C | 0.287374 | 0.257826 | 1.114604 | 0.2745 |

| | | | |
|---|---|---|---|
| R-squared | 0.206020 | Mean dependent var | 0.232155 |
| Adjusted R-squared | 0.120950 | S.D. dependent var | 0.421778 |
| S.E. of regression | 0.395449 | Akaike info criterion | 1.098879 |
| Sum squared resid | 4.378640 | Schwarz criterion | 1.282096 |
| Log likelihood | -13.58207 | Hannan-Quinn criter. | 1.159611 |
| F-statistic | 2.421786 | Durbin-Watson stat | 1.911865 |
| Prob(F-statistic) | 0.086906 | | |

**ist diff**

Null Hypothesis: D(TISE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -9.182303 | 0.0000 |
| Test critical values: | 1% level | -3.646342 | |
| | 5% level | -2.954021 | |

**BY:**

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| | | |
|---|---|---|
| | 10% level | -2.615817 |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TISE,2)
Method: Least Squares
Date: 12/05/15 Time: 13:26
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TISE(-1)) | -1.452617 | 0.158197 | -9.182303 | 0.0000 |
| C | 0.325365 | 0.076278 | 4.265507 | 0.0002 |

| | | | |
|---|---|---|---|
| R-squared | 0.731170 | Mean dependent var | -0.018021 |
| Adjusted R-squared | 0.722499 | S.D. dependent var | 0.724984 |
| S.E. of regression | 0.381910 | Akaike info criterion | 0.971428 |
| Sum squared resid | 4.521512 | Schwarz criterion | 1.062126 |
| Log likelihood | -14.02856 | Hannan-Quinn criter. | 1.001945 |
| F-statistic | 84.31470 | Durbin-Watson stat | 2.020484 |
| Prob(F-statistic) | 0.000000 | | |

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**Level**

Null Hypothesis: TISE has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | 0.344506 | 0.9774 |
| Test critical values: | 1% level | -3.632900 | |
| | 5% level | -2.948404 | |
| | 10% level | -2.612874 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.174418 |
| HAC corrected variance (Bartlett kernel) | 0.095913 |

Phillips-Perron Test Equation
Dependent Variable: D(TISE)
Method: Least Squares

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Date: 12/05/15 Time: 13:27
Sample (adjusted): 1978 2014
Included observations: 35 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TISE(-1) | 0.001421 | 0.026352 | 0.053921 | 0.9573 |
| C | 0.203220 | 0.250638 | 0.810811 | 0.4233 |

| | | | |
|---|---|---|---|
| R-squared | 0.000088 | Mean dependent var | 0.216153 |
| Adjusted R-squared | -0.030212 | S.D. dependent var | 0.423749 |
| S.E. of regression | 0.430103 | Akaike info criterion | 1.205861 |
| Sum squared resid | 6.104623 | Schwarz criterion | 1.294738 |
| Log likelihood | -19.10257 | Hannan-Quinn criter. | 1.236541 |
| F-statistic | 0.002907 | Durbin-Watson stat | 2.842135 |
| Prob(F-statistic) | 0.957323 | | |

**Ist diff**

Null Hypothesis: D(TISE) has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

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| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -8.862144 | 0.0000 |
| Test critical values: | 1% level | -3.646342 | |
| | 5% level | -2.954021 | |
| | 10% level | -2.615817 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.137016 |
| HAC corrected variance (Bartlett kernel) | 0.162649 |

Phillips-Perron Test Equation
Dependent Variable: D(TISE,2)
Method: Least Squares
Date: 12/05/15 Time: 13:28
Sample (adjusted): 1982 2014
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TISE(-1)) | -1.452617 | 0.158197 | -9.182303 | 0.0000 |
| C | 0.325365 | 0.076278 | 4.265507 | 0.0002 |

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| | | | |
|---|---|---|---|
| R-squared | 0.731170 | Mean dependent var | -0.018021 |
| Adjusted R-squared | 0.722499 | S.D. dependent var | 0.724984 |
| S.E. of regression | 0.381910 | Akaike info criterion | 0.971428 |
| Sum squared resid | 4.521512 | Schwarz criterion | 1.062126 |
| Log likelihood | -14.02856 | Hannan-Quinn criter. | 1.001945 |
| F-statistic | 84.31470 | Durbin-Watson stat | 2.020484 |
| Prob(F-statistic) | 0.000000 | | |

**Level**

Null Hypothesis: TSE has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -1.489614 | 0.5308 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| | 10% level | -2.597905 | |

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

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Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TSE)
Method: Least Squares
Date: 12/05/15 Time: 13:28
Sample (adjusted): 1962 2014
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TSE(-1) | -0.025842 | 0.017348 | -1.489614 | 0.1427 |
| C | 0.464609 | 0.156082 | 2.976708 | 0.0045 |

| | | | |
|---|---|---|---|
| R-squared | 0.043323 | Mean dependent var | 0.248156 |
| Adjusted R-squared | 0.023799 | S.D. dependent var | 0.411863 |
| S.E. of regression | 0.406933 | Akaike info criterion | 1.078088 |
| Sum squared resid | 8.114112 | Schwarz criterion | 1.153845 |
| Log likelihood | -25.49123 | Hannan-Quinn criter. | 1.107037 |
| F-statistic | 2.218950 | Durbin-Watson stat | 1.503457 |
| Prob(F-statistic) | 0.142735 | | |

**Ist diff**

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Null Hypothesis: D(TSE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

| | | t-Statistic | Prob.* |
|---|---|---|---|
| Augmented Dickey-Fuller test statistic | | -10.38684 | 0.0000 |
| Test critical values: | 1% level | -3.571310 | |
| | 5% level | -2.922449 | |
| | 10% level | -2.599224 | |

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

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TSE,2)
Method: Least Squares
Date: 12/05/15 Time: 13:29
Sample (adjusted): 1963 2014
Included observations: 49 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TSE(-1)) | -1.016507 | 0.097865 | -10.38684 | 0.0000 |
| C | 0.200442 | 0.046889 | 4.274799 | 0.0001 |

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| | | | |
|---|---|---|---|
| R-squared | 0.696552 | Mean dependent var | -0.049261 |
| Adjusted R-squared | 0.690096 | S.D. dependent var | 0.506209 |
| S.E. of regression | 0.281802 | Akaike info criterion | 0.344733 |
| Sum squared resid | 3.732371 | Schwarz criterion | 0.421950 |
| Log likelihood | -6.445962 | Hannan-Quinn criter. | 0.374029 |
| F-statistic | 107.8865 | Durbin-Watson stat | 2.166984 |
| Prob(F-statistic) | 0.000000 | | |

**Level**

Null Hypothesis: TSE has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -1.435133 | 0.5579 |
| Test critical values: | 1% level | -3.565430 | |
| | 5% level | -2.919952 | |
| | 10% level | -2.597905 | |

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

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| | |
|---|---|
| Residual variance (no correction) | 0.159100 |
| HAC corrected variance (Bartlett kernel) | 0.193995 |

Phillips-Perron Test Equation
Dependent Variable: D(TSE)
Method: Least Squares
Date: 12/05/15 Time: 13:29
Sample (adjusted): 1962 2014
Included observations: 51 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| TSE(-1) | -0.025842 | 0.017348 | -1.489614 | 0.1427 |
| C | 0.464609 | 0.156082 | 2.976708 | 0.0045 |

| | | | |
|---|---|---|---|
| R-squared | 0.043323 | Mean dependent var | 0.248156 |
| Adjusted R-squared | 0.023799 | S.D. dependent var | 0.411863 |
| S.E. of regression | 0.406933 | Akaike info criterion | 1.078088 |
| Sum squared resid | 8.114112 | Schwarz criterion | 1.153845 |
| Log likelihood | -25.49123 | Hannan-Quinn criter. | 1.107037 |
| F-statistic | 2.218950 | Durbin-Watson stat | 1.503457 |
| Prob(F-statistic) | 0.142735 | | |

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**Ist diff**

Null Hypothesis: D(TSE) has a unit root
Exogenous: Constant
Bandwidth: 4 (Newey-West automatic) using Bartlett kernel

| | | Adj. t-Stat | Prob.* |
|---|---|---|---|
| Phillips-Perron test statistic | | -10.28090 | 0.0000 |
| Test critical values: | 1% level | -3.571310 | |
| | 5% level | -2.922449 | |
| | 10% level | -2.599224 | |

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

| | |
|---|---|
| Residual variance (no correction) | 0.076171 |
| HAC corrected variance (Bartlett kernel) | 0.079112 |

Phillips-Perron Test Equation
Dependent Variable: D(TSE,2)
Method: Least Squares
Date: 12/05/15 Time: 13:30
Sample (adjusted): 1963 2014

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Included observations: 49 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| D(TSE(-1)) | -1.016507 | 0.097865 | -10.38684 | 0.0000 |
| C | 0.200442 | 0.046889 | 4.274799 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.696552 | Mean dependent var | -0.049261 |
| Adjusted R-squared | 0.690096 | S.D. dependent var | 0.506209 |
| S.E. of regression | 0.281802 | Akaike info criterion | 0.344733 |
| Sum squared resid | 3.732371 | Schwarz criterion | 0.421950 |
| Log likelihood | -6.445962 | Hannan-Quinn criter. | 0.374029 |
| F-statistic | 107.8865 | Durbin-Watson stat | 2.166984 |
| Prob(F-statistic) | 0.000000 | | |

## Appendix 5

**INTERCEPT (NO TREND) IN CE AND TEST VAR**

Date: 12/08/15 Time: 11:46
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP EXG INF TDE TSE TISE
Lags interval (in first differences): 1 to 1

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Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.756779 | 125.4185 | 95.75366 | 0.0001 |
| At most 1 * | 0.643134 | 81.59118 | 69.81889 | 0.0043 |
| At most 2 * | 0.583389 | 49.64893 | 47.85613 | 0.0336 |
| At most 3 | 0.341868 | 22.50528 | 29.79707 | 0.2712 |
| At most 4 | 0.253047 | 9.536438 | 15.49471 | 0.3181 |
| At most 5 | 0.015749 | 0.492090 | 3.841466 | 0.4830 |

Trace test indicates 3 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.756779 | 43.82730 | 40.07757 | 0.0181 |
| At most 1 | 0.643134 | 31.94225 | 33.87687 | 0.0836 |
| At most 2 | 0.583389 | 27.14365 | 27.58434 | 0.0568 |
| At most 3 | 0.341868 | 12.96884 | 21.13162 | 0.4551 |

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| | | | | |
|---|---|---|---|---|
| At most 4 | 0.253047 | 9.044348 | 14.26460 | 0.2825 |
| At most 5 | 0.015749 | 0.492090 | 3.841466 | 0.4830 |

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|
| -1.716516 | 0.012372 | 0.070210 | -16.77614 | 0.459064 | 1.123681 |
| 14.15981 | 0.008186 | -0.010395 | 19.60218 | 7.909494 | -11.90188 |
| 7.105790 | -0.051751 | -0.026071 | 28.68810 | -5.775117 | 2.132942 |
| 5.549413 | 0.032030 | -0.030103 | 11.90166 | -4.368614 | 0.839421 |
| 5.782491 | 0.026588 | -0.001752 | 68.80324 | -17.91626 | 8.559412 |
| -7.133527 | 0.026646 | 0.003297 | 23.22327 | -6.170477 | 3.966063 |

Unrestricted Adjustment Coefficients (alpha):

| | | | | | | |
|---|---|---|---|---|---|---|
| D(GDP) | 0.000624 | 0.012890 | -0.020151 | -0.005150 | 0.003122 | 0.003037 |
| D(EXG) | -6.275431 | -0.002426 | 5.274431 | -3.692591 | -2.355231 | 0.405602 |
| D(INF) | -7.906644 | -3.462343 | 3.294964 | 5.460409 | 3.062467 | 0.032775 |
| D(TDE) | 0.004005 | 0.009299 | 0.008334 | -0.005184 | 0.008402 | 0.001133 |
| D(TSE) | 0.001395 | 0.133443 | 0.032040 | -0.062562 | 0.061814 | 0.003136 |
| D(TISE) | -0.014828 | 0.251272 | -0.005892 | -0.062831 | 0.025886 | -0.002455 |

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1 Cointegrating Equation(s): Log likelihood -45.60302

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | -0.007207 | -0.040902 | 9.773366 | -0.267439 | -0.654629 |
| | (0.00501) | (0.00510) | (4.93370) | (1.49895) | (0.95365) |

Adjustment coefficients (standard error in parentheses)

| | |
|---|---|
| D(GDP) | -0.001071 |
| | (0.01457) |
| D(EXG) | 10.77188 |
| | (4.12143) |
| D(INF) | 13.57188 |
| | (4.82444) |
| D(TDE) | -0.006875 |
| | (0.00945) |
| D(TSE) | -0.002394 |
| | (0.08517) |
| D(TISE) | 0.025452 |
| | (0.12025) |

2 Cointegrating Equation(s): Log likelihood -29.63190

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Normalized cointegrating coefficients (standard error in parentheses)

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | -0.003717 | 2.007283 | 0.497251 | -0.826735 |
| | | (0.00083) | (0.77593) | (0.23877) | (0.15633) |
| 0.000000 | 1.000000 | 5.159411 | -1077.525 | 106.0988 | -23.87928 |
| | | (0.65204) | (611.274) | (188.104) | (123.152) |

Adjustment coefficients (standard error in parentheses)

| | | |
|---|---|---|
| D(GDP) | 0.181444 | 0.000113 |
| | (0.11480) | (0.00012) |
| D(EXG) | 10.73752 | -0.077656 |
| | (34.2472) | (0.03562) |
| D(INF) | -35.45424 | -0.126160 |
| | (38.7438) | (0.04030) |
| D(TDE) | 0.124794 | 0.000126 |
| | (0.07354) | (7.6E-05) |
| D(TSE) | 1.887135 | 0.001110 |
| | (0.58595) | (0.00061) |
| D(TISE) | 3.583422 | 0.001873 |
| | (0.66332) | (0.00069) |

3 Cointegrating Equation(s): Log likelihood -16.06007

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|

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**BEING AN M.SC THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS/ POSTGRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTERS OF SCIENCE (ECONOMICS), DEPARTMENT OF ECONOMICS, FACULTY OF SOCIAL SCIENCES, AHMADU BELLO UNIVERSITY ZARIA, NIGERIA.**

| | | | | | |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 1.432563 | 0.444173 | -0.732588 |
| | | | (0.69458) | (0.21846) | (0.14451) |
| 0.000000 | 1.000000 | 0.000000 | -279.7491 | 179.7766 | -154.5659 |
| | | | (244.978) | (77.0503) | (50.9698) |
| 0.000000 | 0.000000 | 1.000000 | -154.6253 | -14.28028 | 25.32975 |
| | | | (128.543) | (40.4292) | (26.7445) |

Adjustment coefficients (standard error in parentheses)

| | | | |
|---|---|---|---|
| D(GDP) | 0.038254 | 0.001156 | 0.000435 |
| | (0.10940) | (0.00037) | (0.00052) |
| D(EXG) | 48.21652 | -0.350614 | -0.578084 |
| | (34.0119) | (0.11490) | (0.16138) |
| D(INF) | -12.04092 | -0.296677 | -0.605036 |
| | (41.8779) | (0.14148) | (0.19871) |
| D(TDE) | 0.184011 | -0.000306 | -3.27E-05 |
| | (0.07735) | (0.00026) | (0.00037) |
| D(TSE) | 2.114804 | -0.000548 | -0.002125 |
| | (0.64592) | (0.00218) | (0.00306) |
| D(TISE) | 3.541553 | 0.002178 | -0.003499 |
| | (0.74082) | (0.00250) | (0.00352) |

4 Cointegrating Equation(s): Log likelihood -9.575653

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|

**THE IMPACT OF SECURITY EXPENDITURE ON ECONOMIC GROWTH: EVIDENCE FROM THE NIGERIAN ECONOMY.**

**BY:**

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| | | | | | |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 2.703255 | -2.574687 |
| | | | | (0.54739) | (0.49860) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | -261.3740 | 205.1569 |
| | | | | (91.4195) | (83.2711) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | -258.1169 | 224.1588 |
| | | | | (64.0577) | (58.3480) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | -1.576951 | 1.285877 |
| | | | | (0.36467) | (0.33217) |

Adjustment coefficients (standard error in parentheses)

| | | | | |
|---|---|---|---|---|
| D(GDP) | 0.009674 | 0.000991 | 0.000590 | -0.397199 |
| | (0.11441) | (0.00042) | (0.00055) | (0.27377) |
| D(EXG) | 27.72481 | -0.468887 | -0.466926 | 212.5954 |
| | (33.5901) | (0.12470) | (0.16201) | (80.3767) |
| D(INF) | 18.26115 | -0.121781 | -0.769410 | 224.2877 |
| | (39.9666) | (0.14837) | (0.19276) | (95.6347) |
| D(TDE) | 0.155242 | -0.000472 | 0.000123 | 0.292459 |
| | (0.07985) | (0.00030) | (0.00039) | (0.19106) |
| D(TSE) | 1.767619 | -0.002552 | -0.000241 | 2.766943 |
| | (0.64757) | (0.00240) | (0.00312) | (1.54956) |
| D(TISE) | 3.192878 | 0.000166 | -0.001608 | 4.257409 |
| | (0.75266) | (0.00279) | (0.00363) | (1.80103) |

5 Cointegrating Equation(s): Log likelihood -5.053479

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Normalized cointegrating coefficients (standard error in parentheses)

| GDP | EXG | INF | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | -0.248526 |
| | | | | | (0.01824) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | -19.75639 |
| | | | | | (1.81317) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.000000 | 2.048300 |
| | | | | | (1.49855) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 | -0.071096 |
| | | | | | (0.00726) |
| 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | -0.860504 |
| | | | | | (0.01783) |

Adjustment coefficients (standard error in parentheses)

| | | | | | |
|---|---|---|---|---|---|
| D(GDP) | 0.027728 | 0.001074 | 0.000585 | -0.182382 | 0.185174 |
| | (0.12039) | (0.00046) | (0.00055) | (0.53841) | (0.14096) |
| D(EXG) | 14.10571 | -0.531508 | -0.462800 | 50.54793 | 24.96796 |
| | (34.4101) | (0.13128) | (0.15703) | (153.896) | (40.2901) |
| D(INF) | 35.96983 | -0.040355 | -0.774775 | 434.9953 | -128.7662 |
| | (40.6837) | (0.15521) | (0.18566) | (181.954) | (47.6357) |
| D(TDE) | 0.203829 | -0.000248 | 0.000109 | 0.870570 | -0.100632 |
| | (0.07841) | (0.00030) | (0.00036) | (0.35067) | (0.09180) |
| D(TSE) | 2.125058 | -0.000909 | -0.000350 | 7.019941 | 0.036911 |
| | (0.64478) | (0.00246) | (0.00294) | (2.88371) | (0.75496) |
| D(TISE) | 3.342567 | 0.000854 | -0.001653 | 6.038481 | 1.825354 |
| | (0.78978) | (0.00301) | (0.00360) | (3.53224) | (0.92474) |

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---

**INTERCEPT AND TREND IN CE NO INTERCEPT VAR**

Date: 12/08/15 Time: 11:51
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: GDP INF EXG TDE TSE TISE
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.770707 | 166.2219 | 117.7082 | 0.0000 |
| At most 1 * | 0.755658 | 120.5665 | 88.80380 | 0.0000 |
| At most 2 * | 0.635279 | 76.88165 | 63.87610 | 0.0028 |
| At most 3 * | 0.569633 | 45.61437 | 42.91525 | 0.0262 |
| At most 4 | 0.338893 | 19.47775 | 25.87211 | 0.2535 |
| At most 5 | 0.193035 | 6.648705 | 12.51798 | 0.3826 |

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level

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* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.770707 | 45.65542 | 44.49720 | 0.0372 |
| At most 1 * | 0.755658 | 43.68480 | 38.33101 | 0.0110 |
| At most 2 | 0.635279 | 31.26728 | 32.11832 | 0.0633 |
| At most 3 * | 0.569633 | 26.13662 | 25.82321 | 0.0455 |
| At most 4 | 0.338893 | 12.82905 | 19.38704 | 0.3420 |
| At most 5 | 0.193035 | 6.648705 | 12.51798 | 0.3826 |

Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| -14.03636 | 0.021513 | 0.038063 | -18.05892 | -4.329990 | 3.444740 | 1.138909 |
| 2.066138 | 0.066802 | 0.001722 | -12.53393 | 1.628219 | 0.301782 | -0.320236 |
| -18.48641 | 0.014535 | 0.007562 | -25.38945 | -8.645637 | 12.69964 | 0.265966 |
| 0.427414 | -0.023531 | -0.043166 | 24.92640 | -9.729426 | 6.000233 | 0.337497 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 4.873990 | -0.030561 | 0.035867 | 18.96840 | -7.120754 | 2.451013 | 0.087886 |
| 12.12364 | 0.003246 | 0.014547 | 70.25992 | -13.71031 | 5.286016 | -0.434197 |

Unrestricted Adjustment Coefficients (alpha):

| | | | | | | |
|---|---|---|---|---|---|---|
| D(GDP) | 0.029269 | -0.007834 | -0.003258 | -0.014195 | -0.003511 | -0.003316 |
| D(INF) | -2.586002 | -7.436146 | 3.020681 | 4.020855 | 5.947393 | 1.714678 |
| D(EXG) | -2.639008 | -5.743922 | -0.936858 | 5.099519 | -3.827311 | -2.366864 |
| D(TDE) | 0.015275 | -0.000200 | -0.007091 | 0.011333 | -0.003131 | 0.003868 |
| D(TSE) | 0.112010 | -0.031330 | -0.111788 | 0.043184 | -0.049554 | 0.041343 |
| D(TISE) | 0.095982 | -0.044921 | -0.229286 | -0.024752 | -0.059153 | 0.028884 |

1 Cointegrating Equation(s): Log likelihood -44.68896

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| 1.000000 | -0.001533 | -0.002712 | 1.286582 | 0.308484 | -0.245416 | -0.081140 |
| | (0.00064) | (0.00059) | (0.58073) | (0.17765) | (0.11279) | (0.00783) |

Adjustment coefficients (standard error in parentheses)

| | |
|---|---|
| D(GDP) | -0.410826 |
| | (0.08277) |
| D(INF) | 36.29805 |
| | (45.1062) |

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| | |
|---|---|
| D(EXG) | 37.04205 |
| | (37.5965) |
| D(TDE) | -0.214400 |
| | (0.06416) |
| D(TSE) | -1.572207 |
| | (0.61447) |
| D(TISE) | -1.347241 |
| | (0.94335) |

2 Cointegrating Equation(s): Log likelihood -22.84656

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| 1.000000 | 0.000000 | -0.002551 | 0.953791 | 0.330189 | -0.227698 | -0.084482 |
| | | (0.00059) | (0.57250) | (0.17637) | (0.11336) | (0.00740) |
| 0.000000 | 1.000000 | 0.104694 | -217.1287 | 14.16133 | 11.56010 | -2.180827 |
| | | (0.12376) | (120.067) | (36.9896) | (23.7736) | (1.55261) |

Adjustment coefficients (standard error in parentheses)

| | | |
|---|---|---|
| D(GDP) | -0.427012 | 0.000106 |
| | (0.08039) | (0.00040) |
| D(INF) | 20.93394 | -0.552382 |
| | (39.9339) | (0.19754) |
| D(EXG) | 25.17432 | -0.440479 |
| | (33.9910) | (0.16814) |

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| | | |
|---|---|---|
| D(TDE) | -0.214813 | 0.000315 |
| | (0.06485) | (0.00032) |
| D(TSE) | -1.636939 | 0.000317 |
| | (0.61413) | (0.00304) |
| D(TISE) | -1.440053 | -0.000936 |
| | (0.94421) | (0.00467) |

3 Cointegrating Equation(s): Log likelihood -7.212921

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 1.239255 | 0.500639 | -0.744007 | -0.006058 |
| | | | (0.65597) | (0.20530) | (0.13737) | (0.00894) |
| 0.000000 | 1.000000 | 0.000000 | -228.8430 | 7.166767 | 32.74726 | -5.399041 |
| | | | (118.845) | (37.1947) | (24.8877) | (1.62002) |
| 0.000000 | 0.000000 | 1.000000 | 111.8910 | 66.80987 | -202.3731 | 30.73937 |
| | | | (347.059) | (108.618) | (72.6784) | (4.73088) |

Adjustment coefficients (standard error in parentheses)

| | | | |
|---|---|---|---|
| D(GDP) | -0.366790 | 5.90E-05 | 0.001076 |
| | (0.13109) | (0.00040) | (0.00022) |
| D(INF) | -34.90761 | -0.508477 | -0.088397 |
| | (63.9281) | (0.19661) | (0.10656) |
| D(EXG) | 42.49347 | -0.454096 | -0.117426 |
| | (55.6442) | (0.17114) | (0.09276) |

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| | | | |
|---|---|---|---|
| D(TDE) | -0.083734 | 0.000212 | 0.000527 |
| | (0.10078) | (0.00031) | (0.00017) |
| D(TSE) | 0.429625 | -0.001308 | 0.003364 |
| | (0.84997) | (0.00261) | (0.00142) |
| D(TISE) | 2.798619 | -0.004269 | 0.001842 |
| | (1.07886) | (0.00332) | (0.00180) |

4 Cointegrating Equation(s): Log likelihood 5.855389

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.858816 | -0.658408 | -0.086102 |
| | | | | (0.10794) | (0.09563) | (0.01034) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | -58.97483 | 16.94038 | 9.381978 |
| | | | | (28.7450) | (25.4670) | (2.75267) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 99.14927 | -194.6444 | 23.51231 |
| | | | | (40.7433) | (36.0969) | (3.90164) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | -0.289026 | -0.069073 | 0.064590 |
| | | | | (0.10978) | (0.09726) | (0.01051) |

Adjustment coefficients (standard error in parentheses)

| | | | | |
|---|---|---|---|---|
| D(GDP) | -0.372857 | 0.000393 | 0.001689 | -0.701499 |
| | (0.11150) | (0.00036) | (0.00028) | (0.20008) |
| D(INF) | -33.18904 | -0.603093 | -0.261961 | 163.4366 |
| | (60.8797) | (0.19704) | (0.15169) | (109.245) |

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| | | | | |
|---|---|---|---|---|
| D(EXG) | 44.67308 | -0.574094 | -0.337552 | 270.5506 |
| | (49.8310) | (0.16128) | (0.12416) | (89.4188) |
| D(TDE) | -0.078890 | -5.45E-05 | 3.82E-05 | 0.189186 |
| | (0.08442) | (0.00027) | (0.00021) | (0.15149) |
| D(TSE) | 0.448083 | -0.002324 | 0.001500 | 2.284587 |
| | (0.82380) | (0.00267) | (0.00205) | (1.47826) |
| D(TISE) | 2.788040 | -0.003686 | 0.002911 | 4.034163 |
| | (1.07232) | (0.00347) | (0.00267) | (1.92421) |

5 Cointegrating Equation(s): Log likelihood 12.26991

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE | @TREND(62) |
|---|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.452809 | -0.183959 |
| | | | | | (0.10634) | (0.02948) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | -59.36674 | 16.10187 |
| | | | | | (12.8978) | (3.57559) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.000000 | -66.35588 | 12.21474 |
| | | | | | (10.5735) | (2.93124) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 | -0.443042 | 0.097523 |
| | | | | | (0.05942) | (0.01647) |
| 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | -1.293893 | 0.113945 |
| | | | | | (0.11001) | (0.03050) |

Adjustment coefficients (standard error in parentheses)

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| | | | | | |
|---|---|---|---|---|---|
| D(GDP) | -0.389969 | 0.000500 | 0.001563 | -0.768094 | 0.051786 |
| | (0.11257) | (0.00038) | (0.00032) | (0.21711) | (0.07347) |
| D(INF) | -4.201503 | -0.784850 | -0.048648 | 276.2491 | -108.4965 |
| | (54.7401) | (0.18711) | (0.15691) | (105.575) | (35.7269) |
| D(EXG) | 26.01880 | -0.457129 | -0.474825 | 197.9526 | -12.18779 |
| | (47.2295) | (0.16144) | (0.13538) | (91.0892) | (30.8249) |
| D(TDE) | -0.094150 | 4.12E-05 | -7.41E-05 | 0.129797 | -0.093134 |
| | (0.08483) | (0.00029) | (0.00024) | (0.16362) | (0.05537) |
| D(TSE) | 0.206556 | -0.000810 | -0.000277 | 1.344621 | 0.363175 |
| | (0.80486) | (0.00275) | (0.00231) | (1.55229) | (0.52530) |
| D(TISE) | 2.499730 | -0.001878 | 0.000789 | 2.912133 | 2.155611 |
| | (1.05541) | (0.00361) | (0.00303) | (2.03552) | (0.68883) |

**INTERCEPT AND TREND IN CE. INTERCEPT IN VAR**

Date: 12/08/15 Time: 11:56
Sample (adjusted): 1982 2012
Included observations: 31 after adjustments
Trend assumption: Quadratic deterministic trend
Series: GDP INF EXG TDE TSE TISE
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

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| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.768110 | 154.8560 | 107.3466 | 0.0000 |
| At most 1 * | 0.726071 | 109.5497 | 79.34145 | 0.0001 |
| At most 2 * | 0.632102 | 69.40825 | 55.24578 | 0.0018 |
| At most 3 * | 0.542758 | 38.40980 | 35.01090 | 0.0208 |
| At most 4 | 0.298740 | 14.15099 | 18.39771 | 0.1776 |
| At most 5 | 0.096615 | 3.149792 | 3.841466 | 0.0759 |

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.768110 | 45.30631 | 43.41977 | 0.0308 |
| At most 1 * | 0.726071 | 40.14144 | 37.16359 | 0.0221 |
| At most 2 * | 0.632102 | 30.99846 | 30.81507 | 0.0475 |
| At most 3 * | 0.542758 | 24.25881 | 24.25202 | 0.0499 |
| At most 4 | 0.298740 | 11.00119 | 17.14769 | 0.3116 |
| At most 5 | 0.096615 | 3.149792 | 3.841466 | 0.0759 |

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Max-eigenvalue test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| -12.37812 | 0.042376 | 0.035985 | -20.83815 | -3.579840 | 3.318000 |
| 5.806661 | 0.062992 | -0.008289 | -9.840085 | 3.610332 | -0.591238 |
| -19.24371 | 0.005708 | 0.004854 | -22.35407 | -10.09595 | 13.45299 |
| 4.918880 | -0.010566 | -0.052165 | 29.23597 | -7.785300 | 4.100702 |
| -11.34921 | 0.025293 | -0.028276 | -44.42711 | 11.48180 | -3.924145 |
| -3.778176 | -0.010500 | -0.025971 | -67.24053 | 12.76692 | -5.831339 |

Unrestricted Adjustment Coefficients (alpha):

| | | | | | | |
|---|---|---|---|---|---|---|
| D(GDP) | 0.023950 | -0.012669 | -0.004153 | -0.014367 | 0.005938 | 0.000530 |
| D(INF) | -4.901484 | -6.815408 | 4.175426 | 1.784853 | -5.869812 | -0.117448 |
| D(EXG) | -4.395106 | -5.129447 | -0.006792 | 4.798590 | 4.171968 | 0.974084 |
| D(TDE) | 0.014357 | -0.006778 | -0.005336 | 0.012009 | 0.000129 | -0.002519 |
| D(TSE) | 0.092791 | -0.065841 | -0.104801 | 0.064205 | 0.018955 | -0.032085 |
| D(TISE) | 0.072810 | -0.073326 | -0.229599 | 0.011721 | 0.035443 | -0.027316 |

1 Cointegrating Equation(s): Log likelihood -39.18058

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Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | -0.003423 | -0.002907 | 1.683466 | 0.289207 | -0.268054 |
| | (0.00075) | (0.00069) | (0.67828) | (0.20749) | (0.13174) |

Adjustment coefficients (standard error in parentheses)

| | |
|---|---|
| D(GDP) | -0.296455 |
| | (0.08017) |
| D(INF) | 60.67116 |
| | (39.1567) |
| D(EXG) | 54.40315 |
| | (32.5979) |
| D(TDE) | -0.177707 |
| | (0.05913) |
| D(TSE) | -1.148576 |
| | (0.56230) |
| D(TISE) | -0.901257 |
| | (0.85345) |

2 Cointegrating Equation(s): Log likelihood -19.10986

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | -0.002552 | 0.873137 | 0.368978 | -0.228178 |

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| | | | | | |
|---|---|---|---|---|---|
| | | (0.00065) | (0.63146) | (0.19454) | (0.12503) |
| 0.000000 | 1.000000 | 0.103679 | -236.6969 | 23.30122 | 11.64767 |
| | | (0.12392) | (120.227) | (37.0389) | (23.8053) |

Adjustment coefficients (standard error in parentheses)

| | | |
|---|---|---|
| D(GDP) | -0.370021 | 0.000217 |
| | (0.08048) | (0.00045) |
| D(INF) | 21.09639 | -0.637026 |
| | (38.4184) | (0.21333) |
| D(EXG) | 24.61819 | -0.509364 |
| | (32.7551) | (0.18188) |
| D(TDE) | -0.217068 | 0.000181 |
| | (0.06225) | (0.00035) |
| D(TSE) | -1.530892 | -0.000215 |
| | (0.59069) | (0.00328) |
| D(TISE) | -1.327034 | -0.001534 |
| | (0.91813) | (0.00510) |

3 Cointegrating Equation(s): Log likelihood -3.610632

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 1.112173 | 0.546998 | -0.740057 |
| | | | (0.61240) | (0.19166) | (0.12824) |
| 0.000000 | 1.000000 | 0.000000 | -246.4073 | 16.06955 | 32.44176 |

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| | | | | | |
|---|---|---|---|---|---|
| | | | (123.086) | (38.5218) | (25.7757) |
| 0.000000 | 0.000000 | 1.000000 | 93.65816 | 69.75072 | -200.5624 |
| | | | (346.604) | (108.476) | (72.5833) |

Adjustment coefficients (standard error in parentheses)

| | | | |
|---|---|---|---|
| D(GDP) | -0.290108 | 0.000193 | 0.000947 |
| | (0.13737) | (0.00044) | (0.00022) |
| D(INF) | -59.25429 | -0.613194 | -0.099619 |
| | (62.9149) | (0.20291) | (0.09927) |
| D(EXG) | 24.74890 | -0.509403 | -0.115674 |
| | (56.5536) | (0.18239) | (0.08923) |
| D(TDE) | -0.114381 | 0.000151 | 0.000547 |
| | (0.10407) | (0.00034) | (0.00016) |
| D(TSE) | 0.485875 | -0.000813 | 0.003376 |
| | (0.87288) | (0.00282) | (0.00138) |
| D(TISE) | 3.091304 | -0.002844 | 0.002113 |
| | (1.08518) | (0.00350) | (0.00171) |

4 Cointegrating Equation(s): Log likelihood 8.518773

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.831689 | -0.638494 |
| | | | | (0.10772) | (0.09544) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | -47.00516 | 9.939927 |

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| | | | | | |
|---|---|---|---|---|---|
| | | | | (27.6111) | (24.4624) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 93.72510 | -192.0096 |
| | | | | (41.8234) | (37.0539) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | -0.255977 | -0.091320 |
| | | | | (0.10933) | (0.09686) |

Adjustment coefficients (standard error in parentheses)

| | | | | |
|---|---|---|---|---|
| D(GDP) | -0.360780 | 0.000345 | 0.001696 | -0.701625 |
| | (0.11931) | (0.00038) | (0.00032) | (0.21485) |
| D(INF) | -50.47482 | -0.632053 | -0.192727 | 128.0462 |
| | (63.6078) | (0.20276) | (0.16908) | (114.543) |
| D(EXG) | 48.35259 | -0.560105 | -0.365994 | 282.5033 |
| | (52.2359) | (0.16651) | (0.13885) | (94.0646) |
| D(TDE) | -0.055307 | 2.40E-05 | -7.96E-05 | 0.237929 |
| | (0.08654) | (0.00028) | (0.00023) | (0.15584) |
| D(TSE) | 0.801693 | -0.001492 | 2.68E-05 | 2.934132 |
| | (0.82829) | (0.00264) | (0.00220) | (1.49155) |
| D(TISE) | 3.148957 | -0.002968 | 0.001502 | 4.679434 |
| | (1.10685) | (0.00353) | (0.00294) | (1.99318) |

5 Cointegrating Equation(s): Log likelihood 14.01937

Normalized cointegrating coefficients (standard error in parentheses)

| GDP | INF | EXG | TDE | TSE | TISE |
|---|---|---|---|---|---|
| 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.660414 |

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| | | | | | |
|---|---|---|---|---|---|
| | | | | | (0.13069) |
| 0.000000 | 1.000000 | 0.000000 | 0.000000 | 0.000000 | -63.47137 |
| | | | | | (13.7030) |
| 0.000000 | 0.000000 | 1.000000 | 0.000000 | 0.000000 | -45.63245 |
| | | | | | (10.0925) |
| 0.000000 | 0.000000 | 0.000000 | 1.000000 | 0.000000 | -0.491098 |
| | | | | | (0.06701) |
| 0.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 | -1.561771 |
| | | | | | (0.13598) |

Adjustment coefficients (standard error in parentheses)

| | | | | | |
|---|---|---|---|---|---|
| D(GDP) | -0.428171 | 0.000495 | 0.001528 | -0.965431 | 0.090482 |
| | (0.12748) | (0.00039) | (0.00034) | (0.29715) | (0.08559) |
| D(INF) | 16.14290 | -0.780517 | -0.026754 | 388.8250 | -130.5059 |
| | (61.8860) | (0.18790) | (0.16268) | (144.257) | (41.5537) |
| D(EXG) | 1.004055 | -0.454584 | -0.483959 | 97.15484 | 7.826587 |
| | (52.6414) | (0.15983) | (0.13838) | (122.708) | (35.3464) |
| D(TDE) | -0.056775 | 2.73E-05 | -8.32E-05 | 0.232184 | -0.114006 |
| | (0.09564) | (0.00029) | (0.00025) | (0.22294) | (0.06422) |
| D(TSE) | 0.586565 | -0.001012 | -0.000509 | 2.091999 | 0.205969 |
| | (0.90909) | (0.00276) | (0.00239) | (2.11909) | (0.61041) |
| D(TISE) | 2.746711 | -0.002071 | 0.000500 | 3.104820 | 2.108336 |
| | (1.20663) | (0.00366) | (0.00317) | (2.81268) | (0.81020) |

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## Appendix 6

Johensen (1991) critical values at 5% for assumptions 1, 2 and 3 respectively.

| Intercept (no trend) in the CE- and test VAR | Intercept (no trend) in the CE and VAR | Intercept (no trend) in the CE-no trend in VAR |
|---|---|---|
| 95.75366 | 117.7082 | 107.3466 |
| 69.81889 | 88.80380 | 79.34145 |
| 47.85613 | 63.87610 | 55.24578 |
| 29.79707 | 42.91525 | 35.01090 |
| 15.49471 | 25.87211 | 18.39771 |
| 3.841466 | 12.51798 | 3.841466 |

## Appendix 7

**SPEED OF ADJUSTMENT**

Dependent Variable: D(GDP)
Method: Least Squares
Date: 12/08/15 Time: 15:45
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.083306 | 0.043449 | 1.917305 | 0.0662 |
| D(TDE) | 8.786788 | 4.411250 | 1.991904 | 0.0570 |

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| | | | | |
|---|---|---|---|---|
| D(TISE) | 1.327116 | 0.327686 | 4.049961 | 0.0004 |
| D(TSE) | -2.228194 | 0.826639 | -2.695484 | 0.0122 |
| D(EXG) | -0.000371 | 0.002570 | -0.144282 | 0.8864 |
| D(INF) | 0.003154 | 0.002202 | 1.432193 | 0.1640 |
| M(-1) | -0.843452 | 0.117065 | -7.204990 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.718080 | Mean dependent var | 0.098863 |
| Adjusted R-squared | 0.653021 | S.D. dependent var | 0.322866 |
| S.E. of regression | 0.190184 | Akaike info criterion | -0.295820 |
| Sum squared resid | 0.940417 | Schwarz criterion | 0.021621 |
| Log likelihood | 11.88103 | Hannan-Quinn criter. | -0.189011 |
| F-statistic | 11.03745 | Durbin-Watson stat | 0.900224 |
| Prob(F-statistic) | 0.000004 | | |

Dependent Variable: D(TISE)
Method: Least Squares
Date: 12/08/15 Time: 15:56
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.035706 | 0.021436 | -1.665708 | 0.1078 |
| D(GDP) | 0.204456 | 0.063651 | 3.212152 | 0.0035 |
| D(TSE) | 2.097316 | 0.159298 | 13.16599 | 0.0000 |

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| | | | | |
|---|---|---|---|---|
| D(TDE) | -8.915761 | 1.405624 | -6.342922 | 0.0000 |
| D(EXG) | -0.001074 | 0.001280 | -0.838816 | 0.4092 |
| D(INF) | -0.001146 | 0.001102 | -1.039798 | 0.3080 |
| M(-1) | -0.553068 | 0.191535 | -2.887557 | 0.0077 |

| | | | |
|---|---|---|---|
| R-squared | 0.960949 | Mean dependent var | 0.228650 |
| Adjusted R-squared | 0.951937 | S.D. dependent var | 0.433537 |
| S.E. of regression | 0.095045 | Akaike info criterion | -1.683093 |
| Sum squared resid | 0.234874 | Schwarz criterion | -1.365652 |
| Log likelihood | 34.77103 | Hannan-Quinn criter. | -1.576284 |
| F-statistic | 106.6325 | Durbin-Watson stat | 1.741260 |
| Prob(F-statistic) | 0.000000 | | |

Dependent Variable: D(INF)
Method: Least Squares
Date: 12/08/15 Time: 16:26
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.308750 | 3.525125 | 0.087585 | 0.9309 |
| D(GDP) | 11.01929 | 8.689520 | 1.268112 | 0.2160 |
| D(TSE) | 27.65341 | 66.27578 | 0.417248 | 0.6799 |
| D(TDE) | 7.339217 | 350.8746 | 0.020917 | 0.9835 |

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| | | | | |
|---|---|---|---|---|
| D(EXG) | -0.109488 | 0.210575 | -0.519945 | 0.6075 |
| D(TISE) | -27.68196 | 26.24691 | -1.054675 | 0.3013 |
| M(-1) | -0.446353 | 0.176593 | -2.527574 | 0.0179 |

| | | | |
|---|---|---|---|
| R-squared | 0.331550 | Mean dependent var | 0.338749 |
| Adjusted R-squared | 0.177292 | S.D. dependent var | 16.41010 |
| S.E. of regression | 14.88449 | Akaike info criterion | 8.424348 |
| Sum squared resid | 5760.251 | Schwarz criterion | 8.741789 |
| Log likelihood | -132.0017 | Hannan-Quinn criter. | 8.531157 |
| F-statistic | 2.149323 | Durbin-Watson stat | 1.493037 |
| Prob(F-statistic) | 0.081464 | | |

Dependent Variable: D(EXG)
Method: Least Squares
Date: 12/08/15 Time: 16:32
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 2.367421 | 2.991241 | 0.791451 | 0.4358 |
| D(GDP) | -1.287683 | 7.611389 | -0.169179 | 0.8670 |
| D(TSE) | 57.10118 | 56.63084 | 1.008305 | 0.3226 |
| D(TDE) | -281.5427 | 300.2277 | -0.937764 | 0.3570 |
| D(INF) | 0.081508 | 0.151595 | 0.537671 | 0.5954 |

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| | | | | |
|---|---|---|---|---|
| D(TISE) | -15.89379 | 22.82042 | -0.696472 | 0.4923 |
| M(-1) | -0.397544 | 0.145083 | -2.740112 | 0.0110 |

| | | | |
|---|---|---|---|
| R-squared | 0.259995 | Mean dependent var | 4.754920 |
| Adjusted R-squared | 0.089224 | S.D. dependent var | 13.39267 |
| S.E. of regression | 12.78123 | Akaike info criterion | 8.119665 |
| Sum squared resid | 4247.359 | Schwarz criterion | 8.437106 |
| Log likelihood | -126.9745 | Hannan-Quinn criter. | 8.226474 |
| F-statistic | 1.522482 | Durbin-Watson stat | 1.913277 |
| Prob(F-statistic) | 0.210152 | | |

Dependent Variable: D(TDE)
Method: Least Squares
Date: 12/08/15 Time: 16:40
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.003002 | 0.001869 | -1.606163 | 0.1203 |
| D(GDP) | 0.005389 | 0.004884 | 1.103479 | 0.2799 |
| D(TSE) | 0.184138 | 0.011364 | 16.20399 | 0.0000 |
| D(EXG) | -6.93E-05 | 0.000110 | -0.629836 | 0.5343 |

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| | | | | |
|---|---|---|---|---|
| D(INF) | 8.18E-07 | 9.72E-05 | 0.008415 | 0.9934 |
| D(TISE) | -0.067351 | 0.007733 | -8.709695 | 0.0000 |
| M(-1) | -0.071048 | 0.078305 | -0.907320 | 0.3726 |

| | | | |
|---|---|---|---|
| R-squared | 0.942331 | Mean dependent var | 0.018121 |
| Adjusted R-squared | 0.929023 | S.D. dependent var | 0.030769 |
| S.E. of regression | 0.008197 | Akaike info criterion | -6.584182 |
| Sum squared resid | 0.001747 | Schwarz criterion | -6.266741 |
| Log likelihood | 115.6390 | Hannan-Quinn criter. | -6.477373 |
| F-statistic | 70.80856 | Durbin-Watson stat | 1.422973 |
| Prob(F-statistic) | 0.000000 | | |

Dependent Variable: D(TSE)
Method: Least Squares
Date: 12/08/15 Time: 16:43
Sample (adjusted): 1978 2012
Included observations: 33 after adjustments

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.019734 | 0.009302 | 2.121475 | 0.0436 |
| D(GDP) | -0.048313 | 0.027326 | -1.768061 | 0.0888 |
| D(TDE) | 4.842326 | 0.329299 | 14.70496 | 0.0000 |
| D(EXG) | 0.000533 | 0.000573 | 0.929670 | 0.3611 |
| D(INF) | 0.000157 | 0.000500 | 0.313118 | 0.7567 |

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| | | | | |
|---|---|---|---|---|
| D(TISE) | 0.400617 | 0.026255 | 15.25850 | 0.0000 |
| M(-1) | -0.166989 | 0.122483 | -1.363361 | 0.1845 |

| | | | |
|---|---|---|---|
| R-squared | 0.981709 | Mean dependent var | 0.197963 |
| Adjusted R-squared | 0.977488 | S.D. dependent var | 0.282824 |
| S.E. of regression | 0.042435 | Akaike info criterion | -3.295863 |
| Sum squared resid | 0.046819 | Schwarz criterion | -2.978422 |
| Log likelihood | 61.38174 | Hannan-Quinn criter. | -3.189054 |
| F-statistic | 232.5777 | Durbin-Watson stat | 1.531817 |
| Prob(F-statistic) | 0.000000 | | |

## Appendix 8
## Pairwise Granger Causality Tests

Date: 12/05/15 Time: 16:54
Sample: 1961 2014
Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| D(TDE) does not Granger Cause D(GDP) | 45 | 0.15267 | 0.8589 |
| D(GDP) does not Granger Cause D(TDE) | | 1.26780 | 0.2925 |
| D(TSE) does not Granger Cause D(GDP) | 45 | 0.02097 | 0.9793 |
| D(GDP) does not Granger Cause D(TSE) | | 2.23872 | 0.1198 |

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| | | | |
|---|---|---|---|
| D(TISE) does not Granger Cause D(GDP) | 30 | 0.06277 | 0.9393 |
| D(GDP) does not Granger Cause D(TISE) | | 1.28973 | 0.2930 |
| D(TSE) does not Granger Cause D(TDE) | 47 | 2.36051 | 0.1068 |
| D(TDE) does not Granger Cause D(TSE) | | 1.06022 | 0.3555 |
| D(TISE) does not Granger Cause D(TDE) | 32 | 0.92647 | 0.4082 |
| D(TDE) does not Granger Cause D(TISE) | | 3.20112 | 0.0566 |
| D(TISE) does not Granger Cause D(TSE) | 32 | 3.36362 | 0.0496 |
| D(TSE) does not Granger Cause D(TISE) | | 5.16720 | 0.0126 |

## Appendix 9

VAR Lag Order Selection Criteria
Endogenous variables: GDP INF EXG TDE TSE TISE
Exogenous variables: C
Date: 12/08/15 Time: 12:24
Sample: 1961 2014
Included observations: 31

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -212.0731 | NA | 0.051928 | 14.06923 | 14.34678 | 14.15971 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | -36.94667 | 271.1635* | 6.88e-06* | 5.093334* | 7.036155* | 5.726645* |
| 2 | -4.807434 | 37.32298 | 1.17e-05 | 5.342415 | 8.950512 | 6.518565 |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

## Appendix 10

**WALD TEST.**

**GDP EQUATION.**

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.991904 | 26 | 0.0570 |
| F-statistic | 3.967683 | (1, 26) | 0.0570 |
| Chi-square | 3.967683 | 1 | 0.0464 |

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Null Hypothesis: C(2)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(2) | 8.786788 | 4.411250 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 4.049961 | 26 | 0.0004 |
| F-statistic | 16.40218 | (1, 26) | 0.0004 |
| Chi-square | 16.40218 | 1 | 0.0001 |

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|

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| | | |
|---|---|---|
| C(3) | 1.327116 | 0.327686 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -2.695484 | 26 | 0.0122 |
| F-statistic | 7.265636 | (1, 26) | 0.0122 |
| Chi-square | 7.265636 | 1 | 0.0070 |

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(4) | -2.228194 | 0.826639 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

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| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.144282 | 26 | 0.8864 |
| F-statistic | 0.020817 | (1, 26) | 0.8864 |
| Chi-square | 0.020817 | 1 | 0.8853 |

Null Hypothesis: C(5)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(5) | -0.000371 | 0.002570 |

Restrictions are linear in coefficients.
Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.432193 | 26 | 0.1640 |
| F-statistic | 2.051177 | (1, 26) | 0.1640 |
| Chi-square | 2.051177 | 1 | 0.1521 |

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Null Hypothesis: C(6)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(6) | 0.003154 | 0.002202 |

Restrictions are linear in coefficients.

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**TISE EQUATION WALD TEST**

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -7.647246 | 26 | 0.0000 |
| F-statistic | 58.48037 | (1, 26) | 0.0000 |
| Chi-square | 58.48037 | 1 | 0.0000 |

Null Hypothesis: C(2)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(2) | -10.93863 | 1.430401 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|

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| | | | |
|---|---|---|---|
| t-statistic | 1.797350 | 26 | 0.0839 |
| F-statistic | 3.230469 | (1, 26) | 0.0839 |
| Chi-square | 3.230469 | 1 | 0.0723 |

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(3) | 0.125641 | 0.069903 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 13.30131 | 26 | 0.0000 |
| F-statistic | 176.9249 | (1, 26) | 0.0000 |
| Chi-square | 176.9249 | 1 | 0.0000 |

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

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| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(4) | 2.314591 | 0.174012 |

Restrictions are linear in coefficients.
Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.638496 | 26 | 0.5287 |
| F-statistic | 0.407677 | (1, 26) | 0.5287 |
| Chi-square | 0.407677 | 1 | 0.5232 |

Null Hypothesis: C(5)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(5) | -0.000941 | 0.001473 |

Restrictions are linear in coefficients.

Wald Test:

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Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -1.065181 | 26 | 0.2966 |
| F-statistic | 1.134611 | (1, 26) | 0.2966 |
| Chi-square | 1.134611 | 1 | 0.2868 |

Null Hypothesis: C(6)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(6) | -0.001355 | 0.001272 |

Restrictions are linear in coefficients.

**WALD TEST FOR INF EQUATION**

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.268112 | 26 | 0.2160 |

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| | | | |
|---|---|---|---|
| F-statistic | 1.608108 | (1, 26) | 0.2160 |
| Chi-square | 1.608108 | 1 | 0.2048 |

Null Hypothesis: C(2)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(2) | 11.01929 | 8.689520 |

Restrictions are linear in coefficients.
Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 0.417248 | 26 | 0.6799 |
| F-statistic | 0.174096 | (1, 26) | 0.6799 |
| Chi-square | 0.174096 | 1 | 0.6765 |

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|

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| | | |
|---|---|---|
| C(3) | 27.65341 | 66.27578 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 0.020917 | 26 | 0.9835 |
| F-statistic | 0.000438 | (1, 26) | 0.9835 |
| Chi-square | 0.000438 | 1 | 0.9833 |

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(4) | 7.339217 | 350.8746 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

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| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.519945 | 26 | 0.6075 |
| F-statistic | 0.270342 | (1, 26) | 0.6075 |
| Chi-square | 0.270342 | 1 | 0.6031 |

Null Hypothesis: C(5)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(5) | -0.109488 | 0.210575 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -1.054675 | 26 | 0.3013 |
| F-statistic | 1.112340 | (1, 26) | 0.3013 |
| Chi-square | 1.112340 | 1 | 0.2916 |

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Null Hypothesis: C(6)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(6) | -27.68196 | 26.24691 |

Restrictions are linear in coefficients.

**INFLATION EQUATION . WALD TEST**

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.169179 | 26 | 0.8670 |
| F-statistic | 0.028621 | (1, 26) | 0.8670 |
| Chi-square | 0.028621 | 1 | 0.8657 |

Null Hypothesis: C(2)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|

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| | | |
|---|---|---|
| C(2) | -1.287683 | 7.611389 |

Restrictions are linear in coefficients.
Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 1.008305 | 26 | 0.3226 |
| F-statistic | 1.016680 | (1, 26) | 0.3226 |
| Chi-square | 1.016680 | 1 | 0.3133 |

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(3) | 57.10118 | 56.63084 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

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| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.937764 | 26 | 0.3570 |
| F-statistic | 0.879401 | (1, 26) | 0.3570 |
| Chi-square | 0.879401 | 1 | 0.3484 |

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(4) | -281.5427 | 300.2277 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | 0.537671 | 26 | 0.5954 |
| F-statistic | 0.289090 | (1, 26) | 0.5954 |
| Chi-square | 0.289090 | 1 | 0.5908 |

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Null Hypothesis: C(5)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(5) | 0.081508 | 0.151595 |

Restrictions are linear in coefficients.

Wald Test:
Equation: Untitled

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| t-statistic | -0.696472 | 26 | 0.4923 |
| F-statistic | 0.485074 | (1, 26) | 0.4923 |
| Chi-square | 0.485074 | 1 | 0.4861 |

Null Hypothesis: C(6)=0
Null Hypothesis Summary:

| Normalized Restriction (= 0) | Value | Std. Err. |
|---|---|---|
| C(6) | -15.89379 | 22.82042 |

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Restrictions are linear in coefficients.

## Appendix 11

## VECM Estimate for Full Sample-Model I and II

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:34
Sample (adjusted): 1964 2012
Included observations: 45 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 |
|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 |
| TSE(-1) | -0.270804 | -25.94831 | 3.130478 |
| | (0.23342) | (7.36335) | (3.27134) |
| | [-1.16016] | [-3.52398] | [ 0.95694] |
| C | -9.301644 | 180.7975 | -44.51194 |

| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TSE) |
|---|---|---|---|---|
| CointEq1 | -0.185998 | -1.877958 | 2.947115 | -0.043566 |
| | (0.07345) | (2.43935) | (2.97244) | (0.06463) |
| | [-2.53219] | [-0.76986] | [ 0.99148] | [-0.67409] |
| CointEq2 | -0.006374 | -0.305566 | -0.126696 | 0.002022 |
| | (0.00294) | (0.09757) | (0.11890) | (0.00259) |
| | [-2.16944] | [-3.13163] | [-1.06558] | [ 0.78228] |
| CointEq3 | -0.005039 | -0.441009 | -0.653137 | 0.006858 |
| | (0.00571) | (0.18963) | (0.23108) | (0.00502) |
| | [-0.88240] | [-2.32557] | [-2.82649] | [ 1.36502] |
| D(GDP(-1)) | 0.033906 | -6.015538 | -6.093600 | -0.174268 |
| | (0.16191) | (5.37708) | (6.55218) | (0.14246) |
| | [ 0.20941] | [-1.11874] | [-0.93001] | [-1.22324] |
| D(GDP(-2)) | -0.107892 | -2.371815 | 4.518547 | -0.116546 |
| | (0.16875) | (5.60420) | (6.82893) | (0.14848) |
| | [-0.63935] | [-0.42322] | [ 0.66168] | [-0.78491] |
| D(EXG(-1)) | 0.000581 | 0.009980 | -0.008722 | 0.000918 |
| | (0.00450) | (0.14944) | (0.18210) | (0.00396) |
| | [ 0.12920] | [ 0.06678] | [-0.04790] | [ 0.23177] |
| D(EXG(-2)) | 0.000931 | 0.070726 | 0.143514 | 0.003213 |
| | (0.00438) | (0.14544) | (0.17722) | (0.00385) |
| | [ 0.21248] | [ 0.48629] | [ 0.80979] | [ 0.83391] |
| D(INF(-1)) | 0.004277 | 0.375437 | 0.406661 | -0.002629 |
| | (0.00483) | (0.16040) | (0.19546) | (0.00425) |
| | [ 0.88540] | [ 2.34057] | [ 2.08054] | [-0.61862] |
| D(INF(-2)) | 0.002132 | 0.114106 | -0.083578 | -0.002485 |
| | (0.00496) | (0.16466) | (0.20065) | (0.00436) |

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:35
Sample (adjusted): 1964 2006
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 |
|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 |
| TSE(-1) | 0.033322 | -41.32589 | 8.614082 |
| | (0.46630) | (17.3293) | (7.14070) |
| | [ 0.07146] | [-2.38474] | [ 1.20634] |
| C | -11.59440 | 297.8321 | -86.44283 |

| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TSE) |
|---|---|---|---|---|
| CointEq1 | -0.188012 | -1.884503 | 2.948097 | -0.050538 |
| | (0.08179) | (2.52102) | (3.27535) | (0.06976) |
| | [-2.29864] | [-0.74751] | [ 0.90009] | [-0.72446] |
| CointEq2 | -0.006569 | -0.251083 | -0.148324 | 0.002261 |
| | (0.00305) | (0.09399) | (0.12212) | (0.00260) |
| | [-2.15415] | [-2.67128] | [-1.21460] | [ 0.86923] |
| CointEq3 | -0.006077 | -0.425409 | -0.658515 | 0.007936 |
| | (0.00651) | (0.20062) | (0.26065) | (0.00555) |
| | [-0.93364] | [-2.12045] | [-2.52642] | [ 1.42953] |
| D(GDP(-1)) | 0.021531 | -5.441585 | -6.429275 | -0.160592 |
| | (0.17945) | (5.53100) | (7.18596) | (0.15305) |
| | [ 0.11999] | [-0.98383] | [-0.89470] | [-1.04927] |
| D(GDP(-2)) | -0.114570 | -2.272659 | 4.896697 | -0.098293 |
| | (0.18697) | (5.76284) | (7.48717) | (0.15947) |
| | [-0.61277] | [-0.39436] | [ 0.65401] | [-0.61639] |
| D(EXG(-1)) | -0.000594 | -0.008694 | -0.042047 | 0.001279 |
| | (0.00554) | (0.17065) | (0.22171) | (0.00472) |
| | [-0.10732] | [-0.05095] | [-0.18965] | [ 0.27089] |
| D(EXG(-2)) | 0.000311 | 0.026012 | 0.217914 | 0.005963 |
| | (0.00540) | (0.16639) | (0.21617) | (0.00460) |
| | [ 0.05756] | [ 0.15634] | [ 1.00806] | [ 1.29522] |
| D(INF(-1)) | 0.005122 | 0.336447 | 0.427794 | -0.003136 |
| | (0.00551) | (0.16996) | (0.22081) | (0.00470) |
| | [ 0.92894] | [ 1.97961] | [ 1.93739] | [-0.66690] |
| D(INF(-2)) | 0.002708 | 0.092451 | -0.089728 | -0.003105 |
| | (0.00559) | (0.17242) | (0.22400) | (0.00477) |

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## Appendix 12

## VECM Estimates for Pre Sample-Model I and II

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:35
Sample (adjusted): 1964 2006
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 |
|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 |
| TSE(-1) | 0.033322 | -41.32589 | 8.614082 |
| | (0.46630) | (17.3293) | (7.14070) |
| | [ 0.07146] | [-2.38474] | [ 1.20634] |
| C | -11.59440 | 297.8321 | -86.44283 |

| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TSE) |
|---|---|---|---|---|
| CointEq1 | -0.188012 | -1.884503 | 2.948097 | -0.050538 |
| | (0.08179) | (2.52102) | (3.27535) | (0.06976) |
| | [-2.29864] | [-0.74751] | [ 0.90009] | [-0.72446] |
| CointEq2 | -0.006569 | -0.251083 | -0.148324 | 0.002261 |
| | (0.00305) | (0.09399) | (0.12212) | (0.00260) |
| | [-2.15415] | [-2.67128] | [-1.21460] | [ 0.86923] |
| CointEq3 | -0.006077 | -0.425409 | -0.658515 | 0.007936 |
| | (0.00651) | (0.20062) | (0.26065) | (0.00555) |
| | [-0.93364] | [-2.12045] | [-2.52642] | [ 1.42953] |
| D(GDP(-1)) | 0.021531 | -5.441585 | -6.429275 | -0.160592 |
| | (0.17945) | (5.53100) | (7.18596) | (0.15305) |
| | [ 0.11999] | [-0.98383] | [-0.89470] | [-1.04927] |
| D(GDP(-2)) | -0.114570 | -2.272659 | 4.896697 | -0.098293 |
| | (0.18697) | (5.76284) | (7.48717) | (0.15947) |
| | [-0.61277] | [-0.39436] | [ 0.65401] | [-0.61639] |
| D(EXG(-1)) | -0.000594 | -0.008694 | -0.042047 | 0.001279 |
| | (0.00554) | (0.17065) | (0.22171) | (0.00472) |
| | [-0.10732] | [-0.05095] | [-0.18965] | [ 0.27089] |
| D(EXG(-2)) | 0.000311 | 0.026012 | 0.217914 | 0.005963 |
| | (0.00540) | (0.16639) | (0.21617) | (0.00460) |
| | [ 0.05756] | [ 0.15634] | [ 1.00806] | [ 1.29522] |
| D(INF(-1)) | 0.005122 | 0.336447 | 0.427794 | -0.003136 |
| | (0.00551) | (0.16996) | (0.22081) | (0.00470) |
| | [ 0.92894] | [ 1.97961] | [ 1.93739] | [-0.66690] |
| D(INF(-2)) | 0.002708 | 0.092451 | -0.089728 | -0.003105 |
| | (0.00559) | (0.17242) | (0.22400) | (0.00477) |

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:37
Sample (adjusted): 1983 2006
Included observations: 24 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 | | |
|---|---|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 | | |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 | | |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 | | |
| TISE(-1) | -0.615703<br>(0.08296)<br>[-7.42127] | -40.84731<br>(5.94554)<br>[-6.87024] | 32.29848<br>(10.6815)<br>[ 3.02377] | | |
| TDE(-1) | 4.536826<br>(0.79875)<br>[ 5.67990] | 190.2408<br>(57.2413)<br>[ 3.32349] | -333.0965<br>(102.838)<br>[-3.23905] | | |
| C | -17.18607 | -111.8299 | 422.9172 | | |
| **Error Correction:** | **D(GDP)** | **D(EXG)** | **D(INF)** | **D(TISE)** | **D(TDE)** |
| CointEq1 | 0.201552<br>(0.13369)<br>[ 1.50757] | -21.93641<br>(32.9633)<br>[-0.66548] | -70.36551<br>(70.3047)<br>[-1.00087] | 4.231698<br>(0.96670)<br>[ 4.37749] | 0.193974<br>(0.11502)<br>[ 1.68645] |
| CointEq2 | 0.002105<br>(0.00086)<br>[ 2.43667] | -1.005435<br>(0.21300)<br>[-4.72025] | -0.089834<br>(0.45430)<br>[-0.19774] | 0.008879<br>(0.00625)<br>[ 1.42139] | -0.000617<br>(0.00074)<br>[-0.83045] |
| CointEq3 | -0.001182<br>(0.00098)<br>[-1.20938] | -0.625261<br>(0.24093)<br>[-2.59524] | 0.280781<br>(0.51385)<br>[ 0.54642] | -0.013129<br>(0.00707)<br>[-1.85825] | 0.000681<br>(0.00084)<br>[ 0.80968] |
| D(GDP(-1)) | -0.063902<br>(0.28839)<br>[-0.22158] | 166.5195<br>(71.1055)<br>[ 2.34186] | 44.61909<br>(151.655)<br>[ 0.29421] | -2.190143<br>(2.08527)<br>[-1.05029] | 0.074100<br>(0.24811)<br>[ 0.29866] |
| D(GDP(-2)) | -0.090500<br>(0.03207)<br>[-2.82205] | 8.652817<br>(7.90685)<br>[ 1.09434] | 21.05670<br>(16.8639)<br>[ 1.24863] | -0.346149<br>(0.23188)<br>[-1.49280] | -0.007838<br>(0.02759)<br>[-0.28409] |
| D(EXG(-1)) | -0.001529<br>(0.00101)<br>[-1.50781] | 0.351765<br>(0.25007)<br>[ 1.40664] | 0.238360<br>(0.53336)<br>[ 0.44690] | -0.012770<br>(0.00733)<br>[-1.74125] | 0.000859<br>(0.00087)<br>[ 0.98435] |
| D(EXG(-2)) | -0.001297<br>(0.00088)<br>[-1.46852] | 0.233714<br>(0.21784)<br>[ 1.07289] | 0.483600<br>(0.46461)<br>[ 1.04088] | -0.007565<br>(0.00639)<br>[-1.18420] | 0.000692<br>(0.00076)<br>[ 0.91078] |
| D(INF(-1)) | 0.000894<br>(0.00065)<br>[ 1.37377] | 0.621987<br>(0.16044)<br>[ 3.87687] | 0.212416<br>(0.34218)<br>[ 0.62077] | 0.004185<br>(0.00470)<br>[ 0.88951] | -0.000283<br>(0.00056)<br>[-0.50591] |
| D(INF(-2)) | 0.001088<br>(0.00096)<br>[ 1.13037] | 0.178944<br>(0.23733)<br>[ 0.75398] | -0.780933<br>(0.50619)<br>[-1.54277] | 0.010804<br>(0.00696)<br>[ 1.55233] | -0.000371<br>(0.00083)<br>[-0.44795] |
| D(TISE(-1)) | 0.178581<br>(0.07674)<br>[ 2.32703] | -29.72731<br>(18.9214)<br>[-1.57109] | -10.95928<br>(40.3559)<br>[-0.27157] | 1.111784<br>(0.55490)<br>[ 2.00358] | 0.031923<br>(0.06602)<br>[ 0.48352] |
| D(TISE(-2)) | 0.080697<br>(0.04810)<br>[ 1.67757] | -25.59106<br>(11.8600)<br>[-2.15788] | -12.83153<br>(25.2951)<br>[-0.50732] | 0.437146<br>(0.34781)<br>[ 1.25682] | -0.008243<br>(0.04138)<br>[-0.19919] |

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## Appendix 13

## Impulse Response Function for Full Sample

Response of GDP:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|
| 1 | 0.028564 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.018487 | -0.011384 | 0.006160 | -0.005068 | 0.000385 | 0.008478 |
| 3 | 0.008878 | -0.006323 | -0.000942 | -0.002892 | -0.001692 | 0.019906 |
| 4 | 0.015011 | -0.006834 | 0.008637 | -0.003067 | -0.014960 | 0.022190 |
| 5 | 0.023297 | 0.000689 | 0.012415 | -0.005193 | -0.031681 | 0.022957 |
| 6 | 0.028826 | 0.004194 | 0.016769 | -0.010908 | -0.046941 | 0.026535 |
| 7 | 0.028981 | 0.008188 | 0.020430 | -0.012484 | -0.052962 | 0.031392 |
| 8 | 0.027660 | 0.009192 | 0.022564 | -0.014253 | -0.054047 | 0.034270 |
| 9 | 0.027955 | 0.010691 | 0.023824 | -0.014482 | -0.055926 | 0.034964 |
| 10 | 0.030144 | 0.011688 | 0.025467 | -0.015190 | -0.060511 | 0.035247 |

Response of TDE:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|
| 1 | -0.000477 | 0.021622 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | -0.000245 | 0.006671 | 0.002577 | -0.005792 | -0.004136 | 9.38E-05 |
| 3 | -0.002405 | 0.008634 | -0.000883 | 0.003974 | -0.001960 | 0.000815 |
| 4 | -0.001947 | 0.000980 | -0.002552 | 0.002210 | -0.001484 | -0.000339 |
| 5 | -0.002844 | 0.001216 | -0.005813 | 0.005798 | 0.001209 | -0.001854 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | -0.003112 | -0.003214 | -0.006826 | 0.006304 | 0.003269 | -0.002942 |
| 7 | -0.004701 | -0.004122 | -0.009467 | 0.008338 | 0.007317 | -0.003987 |
| 8 | -0.005685 | -0.006906 | -0.010942 | 0.009098 | 0.010633 | -0.005201 |
| 9 | -0.006552 | -0.008035 | -0.012624 | 0.010664 | 0.013690 | -0.006406 |
| 10 | -0.007008 | -0.009681 | -0.013832 | 0.011281 | 0.015856 | -0.007454 |

Response of TSE:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|
| 1 | 0.032762 | 0.188692 | 0.088657 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.003925 | 0.094262 | 0.032365 | -0.123963 | -0.028407 | 0.003176 |
| 3 | -0.001254 | 0.103666 | 0.052826 | -0.013927 | -0.050136 | 0.023243 |
| 4 | 0.009604 | 0.051016 | 0.049160 | -0.026846 | -0.061836 | 0.024519 |
| 5 | 0.005305 | 0.062394 | 0.016302 | -0.018804 | -0.055807 | 0.013964 |
| 6 | 0.010751 | 0.031756 | 0.022955 | -0.010660 | -0.059022 | 0.010252 |
| 7 | 0.000216 | 0.028441 | 0.006177 | 0.001844 | -0.036099 | 0.007764 |
| 8 | -0.008081 | 0.010244 | -0.004843 | 0.003208 | -0.014400 | 0.001175 |
| 9 | -0.013246 | 0.002882 | -0.013666 | 0.015869 | 0.004308 | -0.006429 |
| 10 | -0.014985 | -0.008038 | -0.021409 | 0.019470 | 0.016310 | -0.013317 |

Response of TISE:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|
| 1 | 0.095528 | 0.165966 | 0.177872 | 0.084577 | 0.000000 | 0.000000 |
| 2 | 0.018472 | 0.093426 | -0.026722 | -0.177681 | -0.018976 | 0.008379 |
| 3 | 0.019955 | 0.093857 | 0.061058 | -0.010359 | -0.077396 | 0.048483 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 0.032853 | 0.039534 | 0.070608 | -0.013762 | -0.087582 | 0.061821 |
| 5 | 0.027307 | 0.061753 | 0.015335 | -0.032390 | -0.086751 | 0.045744 |
| 6 | 0.046229 | 0.031662 | 0.041185 | -0.015005 | -0.115832 | 0.043124 |
| 7 | 0.039221 | 0.032624 | 0.027696 | -0.004992 | -0.103558 | 0.046917 |
| 8 | 0.027439 | 0.017266 | 0.014397 | -0.010764 | -0.082264 | 0.043944 |
| 9 | 0.021432 | 0.010045 | 0.009870 | 0.004596 | -0.063793 | 0.037933 |
| 10 | 0.020934 | -0.000366 | 0.002852 | 0.008019 | -0.053918 | 0.031076 |

Response of INF:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|
| 1 | -7.788336 | -0.869162 | -5.341123 | -0.626387 | 12.36542 | 0.000000 |
| 2 | -5.901407 | -3.772801 | -2.652989 | 3.959114 | 12.58650 | -2.903164 |
| 3 | -1.838767 | -2.688491 | -3.581389 | 3.660242 | 7.072724 | -4.587125 |
| 4 | 0.075341 | -1.800817 | -3.342409 | 1.689506 | 2.454901 | -3.915639 |
| 5 | -1.103598 | -1.410264 | -2.541301 | 1.710940 | 2.989126 | -2.226432 |
| 6 | -2.993990 | -1.920734 | -2.873710 | 1.731442 | 5.905776 | -1.708883 |
| 7 | -3.306966 | -2.239818 | -3.192779 | 2.265356 | 7.059129 | -2.372865 |
| 8 | -2.325169 | -2.327510 | -3.085534 | 2.487045 | 5.947205 | -2.983715 |
| 9 | -1.668970 | -2.048784 | -3.038483 | 2.236034 | 4.724286 | -2.957724 |
| 10 | -1.826418 | -1.949208 | -2.962851 | 2.000325 | 4.618491 | -2.592070 |

Response of EXG:

| Period | GDP | TDE | TSE | TISE | INF | EXG |
|---|---|---|---|---|---|---|

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| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 1.027979 | 1.728320 | 0.303244 | 1.222361 | -6.368996 | 10.80588 |
| 2 | 2.964733 | 2.736202 | 3.199290 | -1.613577 | -5.618406 | 7.358520 |
| 3 | 6.121706 | 2.729150 | 3.104471 | -1.107931 | -10.80396 | 5.457868 |
| 4 | 7.928027 | 2.286968 | 3.637287 | -1.095008 | -15.29528 | 6.476444 |
| 5 | 6.707689 | 2.220291 | 3.147954 | -1.421245 | -14.53898 | 7.796158 |
| 6 | 5.083828 | 1.265077 | 2.679366 | -1.011000 | -11.86649 | 7.975169 |
| 7 | 4.716971 | 0.499297 | 2.187687 | -0.109476 | -10.42418 | 7.257072 |
| 8 | 5.290058 | 0.041454 | 1.765362 | 0.195541 | -10.68976 | 6.531703 |
| 9 | 5.662461 | -0.093912 | 1.520283 | 0.260078 | -11.12986 | 6.326787 |
| 10 | 5.400453 | -0.322410 | 1.322196 | 0.295022 | -10.70406 | 6.426718 |

Cholesky Ordering: GDP TDE TSE TISE INF EXG

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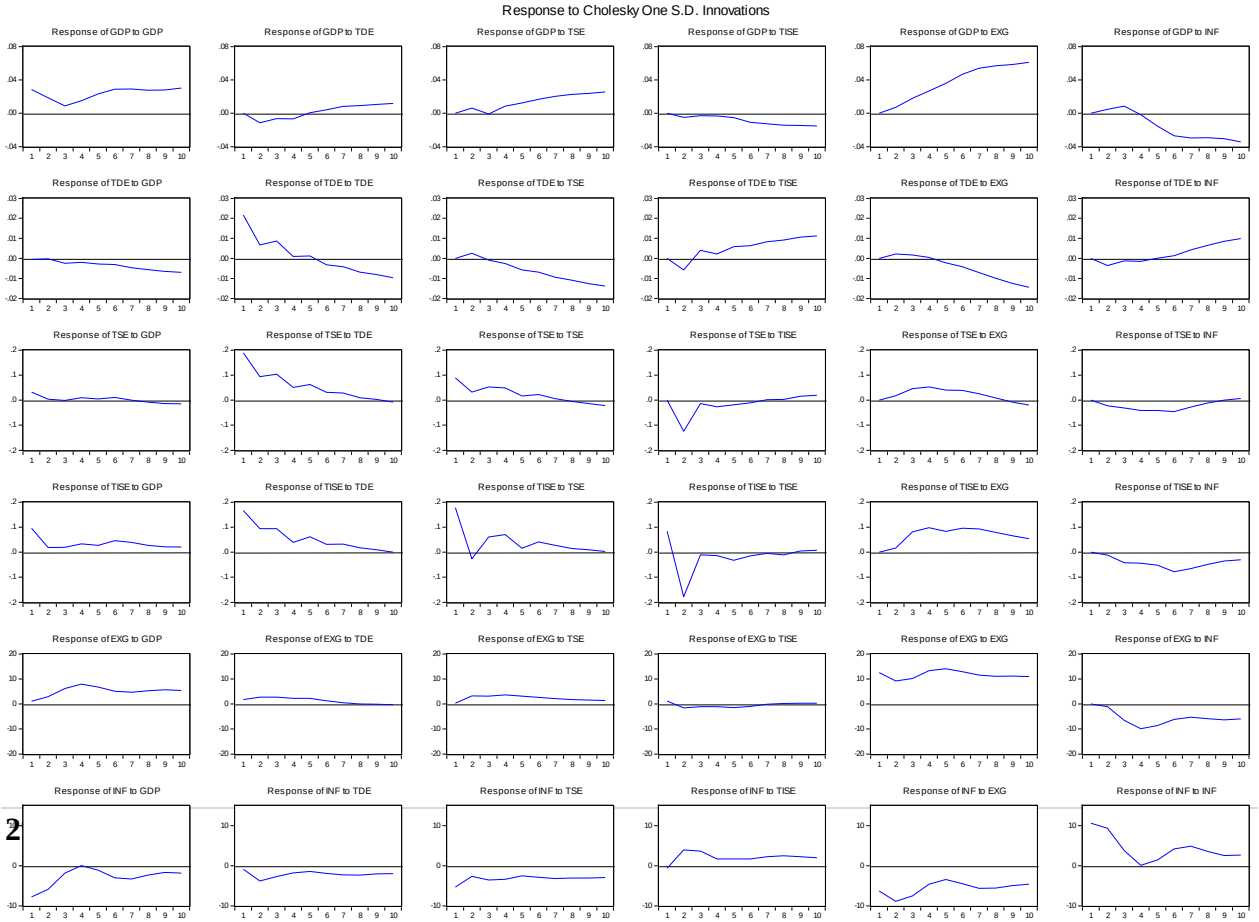
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## Impulse Response Function for Pre Sample

| | | | Response of GDP: | | | |
|---|---|---|---|---|---|---|
| Period | GDP | TDE | TSE | TISE | EXG | INF |
| 1 | 0.034711 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.026429 | -0.021907 | 0.008278 | -0.004841 | 0.005323 | 0.003852 |
| 3 | 0.012295 | -0.018953 | 0.007288 | 0.001033 | 0.019504 | 0.008309 |
| 4 | 0.023320 | -0.014519 | 0.020855 | -0.005306 | 0.032195 | 0.000607 |
| 5 | 0.034003 | -0.004387 | 0.031259 | -0.006567 | 0.044094 | -0.010961 |
| 6 | 0.040497 | 0.001093 | 0.042273 | -0.012271 | 0.056885 | -0.018115 |
| 7 | 0.037179 | 0.003290 | 0.044165 | -0.014660 | 0.058613 | -0.016890 |
| 8 | 0.033752 | 0.000350 | 0.042420 | -0.013739 | 0.055964 | -0.014077 |
| 9 | 0.033675 | -0.001235 | 0.041584 | -0.012243 | 0.055193 | -0.013739 |
| 10 | 0.035804 | -0.000632 | 0.042743 | -0.012416 | 0.056613 | -0.015330 |

| | | | Response of TDE: | | | |
|---|---|---|---|---|---|---|
| Period | GDP | TDE | TSE | TISE | EXG | INF |
| 1 | -0.006062 | 0.029072 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | -0.003640 | 0.015431 | -0.002600 | -0.008699 | 0.002363 | -0.003055 |
| 3 | -0.006219 | 0.013722 | 0.001914 | -0.001073 | 0.004239 | -0.001816 |
| 4 | -0.004228 | 0.007969 | 0.001958 | -0.003932 | 0.001762 | -0.001194 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | -0.005306 | 0.007560 | -0.001410 | -0.000645 | -0.001405 | -0.000801 |
| 6 | -0.003450 | 0.005173 | -0.000411 | -0.001163 | -0.001418 | -0.001230 |
| 7 | -0.004729 | 0.004938 | -0.002253 | -0.000555 | -0.003561 | -0.000169 |
| 8 | -0.005392 | 0.003328 | -0.003479 | -0.000119 | -0.005275 | 0.000815 |
| 9 | -0.005926 | 0.002603 | -0.004595 | 0.000552 | -0.006552 | 0.001479 |
| 10 | -0.005821 | 0.002209 | -0.005048 | 0.000740 | -0.007089 | 0.001610 |

Response of TSE:

| Period | GDP | TDE | TSE | TISE | EXG | INF |
|---|---|---|---|---|---|---|
| 1 | 0.005412 | 0.235773 | 0.090385 | 0.000000 | 0.000000 | 0.000000 |
| 2 | -0.035031 | 0.154591 | -0.043638 | -0.107126 | 0.033232 | -0.022158 |
| 3 | -0.037693 | 0.150924 | 0.065106 | -0.037908 | 0.101911 | -0.023687 |
| 4 | -0.008917 | 0.109294 | 0.080589 | -0.075391 | 0.086655 | -0.027820 |
| 5 | -0.012808 | 0.117353 | 0.057395 | -0.045464 | 0.077886 | -0.036792 |
| 6 | 0.011548 | 0.102655 | 0.084434 | -0.059131 | 0.095877 | -0.047844 |
| 7 | -0.003666 | 0.104028 | 0.068930 | -0.055640 | 0.076877 | -0.037363 |
| 8 | -0.010669 | 0.086951 | 0.058467 | -0.050724 | 0.062156 | -0.028017 |
| 9 | -0.014461 | 0.080562 | 0.049743 | -0.044504 | 0.052365 | -0.022916 |
| 10 | -0.011846 | 0.077983 | 0.047087 | -0.043454 | 0.049003 | -0.023191 |

Response of TISE:

| Period | GDP | TDE | TSE | TISE | EXG | INF |
|---|---|---|---|---|---|---|
| 1 | 0.112932 | 0.180867 | 0.226919 | 0.075340 | 0.000000 | 0.000000 |
| 2 | -0.011176 | 0.131928 | -0.106393 | -0.131024 | 0.049804 | -0.018370 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | -0.002196 | 0.136472 | 0.096229 | -0.026298 | 0.165127 | -0.023275 |
| 4 | 0.044715 | 0.070457 | 0.124497 | -0.081533 | 0.136605 | -0.031159 |
| 5 | 0.037743 | 0.089968 | 0.087339 | -0.036733 | 0.135520 | -0.049127 |
| 6 | 0.078549 | 0.074141 | 0.138409 | -0.063210 | 0.172470 | -0.069184 |
| 7 | 0.055031 | 0.079205 | 0.116519 | -0.058815 | 0.144556 | -0.054187 |
| 8 | 0.045073 | 0.053693 | 0.102737 | -0.051577 | 0.125612 | -0.041338 |
| 9 | 0.039938 | 0.045454 | 0.091481 | -0.043132 | 0.113205 | -0.034483 |
| 10 | 0.044292 | 0.042290 | 0.088393 | -0.042013 | 0.109021 | -0.035486 |

Response of EXG:

| Period | GDP | TDE | TSE | TISE | EXG | INF |
|---|---|---|---|---|---|---|
| 1 | 0.434831 | 2.847700 | 6.195439 | -3.536338 | 12.91611 | 0.000000 |
| 2 | 3.193270 | 5.673106 | 7.950976 | -5.731676 | 9.899664 | -1.292173 |
| 3 | 6.575035 | 5.564521 | 9.825195 | -3.875006 | 12.42398 | -4.925764 |
| 4 | 8.046121 | 6.853512 | 13.00417 | -5.956815 | 16.60346 | -6.430627 |
| 5 | 6.074131 | 7.116672 | 12.19396 | -6.550969 | 15.15064 | -5.018709 |
| 6 | 4.941265 | 5.410074 | 10.95785 | -5.542746 | 13.45623 | -3.909420 |
| 7 | 5.215173 | 4.874530 | 10.68924 | -5.050278 | 13.32853 | -3.946328 |
| 8 | 5.905765 | 5.240864 | 10.99280 | -5.216572 | 13.69435 | -4.452753 |
| 9 | 6.139741 | 5.513311 | 11.24117 | -5.393767 | 13.90498 | -4.689739 |
| 10 | 5.898818 | 5.437146 | 11.16930 | -5.443292 | 13.78990 | -4.517013 |

Response of INF:

| Period | GDP | TDE | TSE | TISE | EXG | INF |
|---|---|---|---|---|---|---|

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| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | -9.374391 | -3.952464 | -9.854100 | 1.819971 | -5.237762 | 7.868519 |
| 2 | -3.397314 | -8.407625 | -6.421385 | 5.364052 | -7.908256 | 5.884084 |
| 3 | 2.754232 | -6.165705 | -3.942437 | 5.283750 | -3.434303 | 0.310859 |
| 4 | 4.749913 | -3.320444 | -0.595702 | 2.525592 | 0.603325 | -1.872987 |
| 5 | 1.919339 | -3.955185 | -1.586963 | 2.029755 | -1.546957 | 0.302195 |
| 6 | -0.600921 | -6.544695 | -4.130459 | 3.465629 | -4.560745 | 2.635029 |
| 7 | -0.542908 | -7.651278 | -5.085123 | 4.413142 | -5.454906 | 2.979939 |
| 8 | 0.673592 | -7.207761 | -4.694026 | 4.373668 | -4.967497 | 2.130839 |
| 9 | 1.276300 | -6.609064 | -4.152174 | 4.004711 | -4.394444 | 1.564317 |
| 10 | 0.931369 | -6.571885 | -4.176003 | 3.828180 | -4.477317 | 1.777147 |

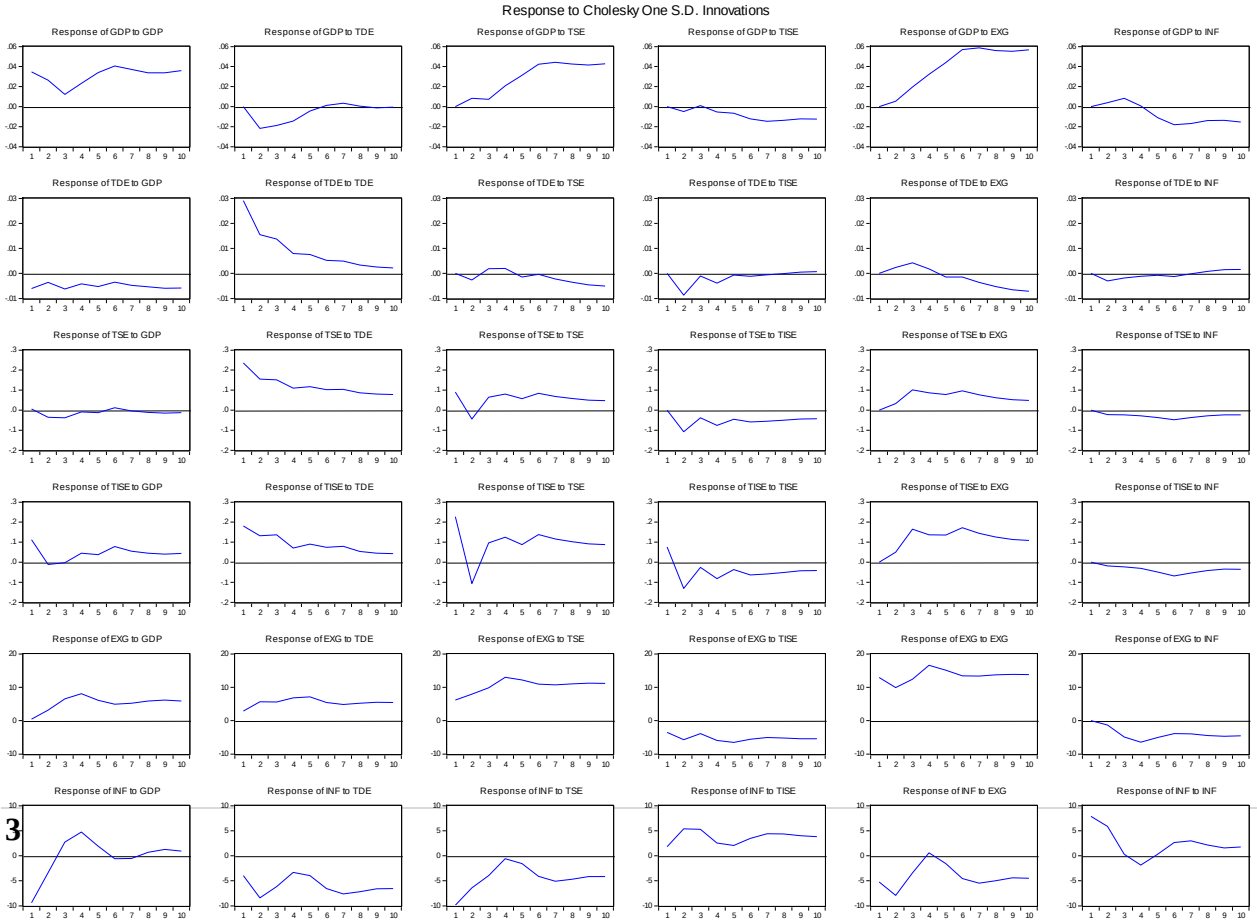
Cholesky Ordering: GDP TDE TSE TISE EXG INF

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## Appendix 14
## Variance Decomposition for Full Sample.

Variance Decomposition of GDP:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.040484 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.054369 | 91.27891 | 0.159000 | 2.319827 | 1.923990 | 2.209853 | 2.108423 |
| 3 | 0.069438 | 76.16474 | 0.752638 | 9.577671 | 5.465308 | 3.125273 | 4.914371 |
| 4 | 0.078763 | 73.64917 | 1.932904 | 8.913864 | 5.958529 | 2.437303 | 7.108234 |
| 5 | 0.088949 | 71.66668 | 3.508547 | 7.896186 | 6.727480 | 2.926398 | 7.274710 |
| 6 | 0.099969 | 68.15339 | 5.971807 | 7.397586 | 7.228403 | 4.277471 | 6.971339 |
| 7 | 0.110653 | 63.51579 | 9.780357 | 7.634266 | 8.369947 | 4.352395 | 6.347243 |
| 8 | 0.121832 | 57.70504 | 14.96151 | 8.367831 | 9.943042 | 3.644983 | 5.377589 |
| 9 | 0.134057 | 51.52503 | 20.39470 | 9.076098 | 11.50865 | 3.051136 | 4.444395 |
| 10 | 0.147441 | 45.67977 | 25.27637 | 9.704756 | 12.81102 | 2.697830 | 3.830255 |

Variance Decomposition of TSE:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.229138 | 17.18855 | 82.81145 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.334209 | 18.09950 | 53.18055 | 15.38666 | 12.83039 | 0.378692 | 0.124215 |
| 3 | 0.428831 | 18.13730 | 51.22885 | 19.42989 | 10.05180 | 0.804310 | 0.347856 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | 0.499271 | 18.02152 | 48.42798 | 20.08066 | 10.80282 | 1.576201 | 1.090832 |
| 5 | 0.582157 | 17.25309 | 45.54629 | 21.72460 | 10.51880 | 2.851724 | 2.105498 |
| 6 | 0.653263 | 16.49882 | 43.36294 | 22.53438 | 10.47176 | 4.277631 | 2.854479 |
| 7 | 0.724977 | 15.67089 | 41.21256 | 23.21152 | 10.35354 | 5.984449 | 3.567040 |
| 8 | 0.789647 | 15.11709 | 39.40127 | 23.63488 | 10.21658 | 7.490330 | 4.139847 |
| 9 | 0.848392 | 14.84126 | 37.82422 | 23.98457 | 10.07536 | 8.685423 | 4.589166 |
| 10 | 0.900723 | 14.78449 | 36.47291 | 24.31255 | 9.933080 | 9.599169 | 4.897806 |

Variance Decomposition of TDE:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.028253 | 18.91572 | 63.56801 | 17.51627 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.036860 | 20.58253 | 48.40190 | 27.38758 | 3.443053 | 0.141443 | 0.043506 |
| 3 | 0.047648 | 20.38748 | 42.39649 | 32.21213 | 2.847943 | 1.312219 | 0.843731 |
| 4 | 0.055303 | 20.53506 | 37.94416 | 33.98989 | 3.045624 | 2.765223 | 1.720034 |
| 5 | 0.063795 | 19.97187 | 33.69399 | 35.74327 | 3.001859 | 4.954661 | 2.634353 |
| 6 | 0.070918 | 19.63178 | 30.36380 | 36.73811 | 2.903284 | 7.158683 | 3.204344 |
| 7 | 0.077466 | 19.54500 | 27.47866 | 37.46002 | 2.762236 | 9.154717 | 3.599374 |
| 8 | 0.082970 | 19.91465 | 25.10365 | 38.04047 | 2.582785 | 10.57908 | 3.779357 |
| 9 | 0.087647 | 20.64346 | 23.10601 | 38.58012 | 2.398058 | 11.48487 | 3.787480 |
| 10 | 0.091629 | 21.60634 | 21.42634 | 39.07106 | 2.223256 | 12.00309 | 3.669915 |

Variance Decomposition of TISE:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.266324 | 11.39375 | 54.11659 | 24.59737 | 9.892281 | 0.000000 | 0.000000 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | 0.392259 | 18.35584 | 30.60795 | 29.29845 | 21.41742 | 0.262732 | 0.057620 |
| 3 | 0.476140 | 20.68852 | 34.78871 | 28.88550 | 15.22356 | 0.260858 | 0.152859 |
| 4 | 0.533582 | 21.81917 | 35.00562 | 27.07410 | 15.19627 | 0.670394 | 0.234440 |
| 5 | 0.612588 | 21.90315 | 35.25348 | 27.01379 | 13.71841 | 1.354058 | 0.757117 |
| 6 | 0.676341 | 21.84439 | 35.19676 | 26.72559 | 13.13979 | 1.948693 | 1.144778 |
| 7 | 0.746653 | 21.07662 | 34.81143 | 26.76682 | 12.61752 | 3.072407 | 1.655203 |
| 8 | 0.812767 | 20.25767 | 34.31959 | 26.71228 | 12.22985 | 4.351723 | 2.128880 |
| 9 | 0.876419 | 19.58659 | 33.71768 | 26.64108 | 11.91097 | 5.550639 | 2.593039 |
| 10 | 0.935115 | 19.16863 | 33.09871 | 26.60287 | 11.63656 | 6.509387 | 2.983850 |

Variance Decomposition of INF:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 14.14185 | 5.146853 | 0.328765 | 25.77246 | 2.297600 | 66.45432 | 0.000000 |
| 2 | 17.12040 | 5.929118 | 0.225863 | 17.87455 | 1.623988 | 74.03391 | 0.312577 |
| 3 | 17.55405 | 6.102398 | 2.477920 | 17.28406 | 2.070373 | 71.01441 | 1.050843 |
| 4 | 18.92134 | 7.676996 | 6.670369 | 15.11669 | 3.903602 | 65.65553 | 0.976813 |
| 5 | 19.96967 | 7.866463 | 10.02859 | 13.57126 | 4.911018 | 61.56488 | 2.057795 |
| 6 | 20.45637 | 7.578984 | 11.85924 | 13.01458 | 5.451105 | 58.70280 | 3.393285 |
| 7 | 20.83392 | 7.321696 | 13.32525 | 12.54716 | 5.927485 | 56.61909 | 4.259324 |
| 8 | 21.29765 | 7.178261 | 14.88728 | 12.09829 | 6.558743 | 54.45398 | 4.823443 |
| 9 | 21.99679 | 7.134886 | 16.31473 | 11.48641 | 7.197900 | 52.46053 | 5.405538 |
| 10 | 22.69711 | 7.056422 | 17.39775 | 10.85709 | 7.698095 | 50.82971 | 6.160936 |

Variance Decomposition of EXG:

| Period | S.E. | GDP | TSE | TDE | TISE | INF | EXG |
|---|---|---|---|---|---|---|---|

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 11.88559 | 0.076387 | 0.089068 | 0.138080 | 3.702930 | 17.04978 | 78.94376 |
| 2 | 13.74264 | 1.021617 | 1.250510 | 0.384093 | 2.782655 | 16.88950 | 77.67162 |
| 3 | 16.10404 | 7.635146 | 2.395807 | 0.302114 | 2.141385 | 27.48676 | 60.03879 |
| 4 | 18.87861 | 12.94802 | 2.878222 | 0.416995 | 1.588794 | 36.93355 | 45.23441 |
| 5 | 20.39286 | 15.15187 | 5.337226 | 2.693442 | 1.505918 | 35.93464 | 39.37691 |
| 6 | 21.64134 | 14.98644 | 9.577611 | 6.464088 | 2.052543 | 31.93710 | 34.98222 |
| 7 | 23.19877 | 14.05278 | 13.58556 | 9.640972 | 2.758940 | 29.22642 | 30.73532 |
| 8 | 24.70558 | 13.68921 | 16.16615 | 11.87070 | 3.220936 | 27.13903 | 27.91397 |
| 9 | 26.09307 | 13.85571 | 17.57154 | 13.82822 | 3.482756 | 25.30799 | 25.95379 |
| 10 | 27.44106 | 13.98701 | 18.26170 | 15.77003 | 3.655518 | 24.05706 | 24.26869 |

Cholesky Ordering: GDP TSE TDE TISE INF EXG

## Variance Decomposition for Pre Sample.

| Variance Decomposition of GDP: | | | | | | | |
|---|---|---|---|---|---|---|---|
| Period | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
| 1 | 0.049636 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.064523 | 92.53141 | 2.068349 | 3.291668 | 0.141294 | 0.329910 | 1.637371 |
| 3 | 0.079675 | 79.18581 | 1.409738 | 13.32514 | 0.150222 | 0.223841 | 5.705249 |
| 4 | 0.093552 | 71.36088 | 3.318895 | 11.05776 | 0.969200 | 2.039285 | 11.25399 |
| 5 | 0.117522 | 60.40868 | 8.938180 | 8.324494 | 2.417570 | 6.360095 | 13.55099 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | 0.146678 | 50.86933 | 14.35733 | 6.701431 | 4.006290 | 9.981221 | 14.08440 |
| 7 | 0.174159 | 44.23405 | 18.64147 | 6.024652 | 5.161651 | 11.66846 | 14.26971 |
| 8 | 0.197724 | 39.65144 | 21.70985 | 5.627893 | 5.985232 | 12.47931 | 14.54627 |
| 9 | 0.219406 | 36.10770 | 24.16293 | 5.200720 | 6.492894 | 13.11033 | 14.92542 |
| 10 | 0.241224 | 33.19601 | 26.18034 | 4.758564 | 6.884341 | 13.74707 | 15.23368 |

Variance Decomposition of TSE:

| Period | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.252124 | 14.71445 | 85.28555 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.343235 | 22.82641 | 56.05659 | 16.73029 | 0.712192 | 1.954882 | 1.719631 |
| 3 | 0.460735 | 22.23295 | 48.19063 | 12.77090 | 0.808184 | 5.477313 | 10.52002 |
| 4 | 0.564795 | 27.34850 | 40.12680 | 11.67051 | 0.777954 | 7.256096 | 12.82014 |
| 5 | 0.669925 | 33.77185 | 33.34465 | 11.55684 | 0.621339 | 8.391271 | 12.31405 |
| 6 | 0.768647 | 38.49951 | 28.33596 | 10.95911 | 0.472056 | 9.519146 | 12.21423 |
| 7 | 0.850474 | 42.27407 | 24.65260 | 12.04166 | 0.420683 | 9.084712 | 11.52628 |
| 8 | 0.908359 | 45.13699 | 21.94189 | 12.94177 | 0.504397 | 8.472931 | 11.00203 |
| 9 | 0.957479 | 47.40320 | 19.81221 | 13.56347 | 0.787912 | 7.852662 | 10.58054 |
| 10 | 1.003634 | 49.42848 | 18.03197 | 14.03538 | 1.083265 | 7.278069 | 10.14283 |

| Period | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.322798 | 7.204362 | 61.83235 | 30.96329 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 0.444561 | 21.88243 | 34.72149 | 41.08002 | 1.185723 | 0.654199 | 0.476139 |
| 3 | 0.550812 | 21.63176 | 34.90042 | 29.16657 | 1.022369 | 4.051753 | 9.227123 |

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4 | 0.655907 | 25.34327 | 32.21991 | 22.72364 | 1.532888 | 5.913434 | 12.26685 |
| 5 | 0.765524 | 30.94285 | 28.83412 | 19.39565 | 1.132479 | 7.519155 | 12.17575 |
| 6 | 0.881168 | 34.43311 | 26.14183 | 16.06962 | 1.025153 | 9.654233 | 12.67606 |
| 7 | 0.980873 | 37.30461 | 24.17573 | 15.43127 | 0.918096 | 9.817350 | 12.35294 |
| 8 | 1.049509 | 39.52465 | 22.49798 | 15.36422 | 0.820044 | 9.637771 | 12.15533 |
| 9 | 1.105878 | 41.32332 | 21.13667 | 15.26437 | 0.742516 | 9.395663 | 12.13746 |
| 10 | 1.157771 | 43.03908 | 19.84083 | 15.20138 | 0.682364 | 9.147806 | 12.08855 |

Variance Decomposition of TDE:

| Period | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 0.029960 | 19.53159 | 63.05973 | 14.40603 | 3.002646 | 0.000000 | 0.000000 |
| 2 | 0.038192 | 26.25944 | 48.42912 | 18.65034 | 1.860462 | 2.594463 | 2.206176 |
| 3 | 0.050188 | 29.02029 | 39.03053 | 16.99984 | 3.698638 | 3.986342 | 7.264356 |
| 4 | 0.059534 | 36.48567 | 30.34228 | 16.94386 | 3.016284 | 4.652568 | 8.559331 |
| 5 | 0.069829 | 43.53418 | 22.95292 | 17.03893 | 4.069822 | 4.566068 | 7.838077 |
| 6 | 0.078998 | 49.17959 | 18.00822 | 16.80002 | 4.313265 | 4.428277 | 7.270636 |
| 7 | 0.087793 | 52.40908 | 14.66475 | 17.78825 | 5.203266 | 3.671115 | 6.263544 |
| 8 | 0.095511 | 53.63641 | 13.28475 | 18.17935 | 6.386813 | 3.117004 | 5.395675 |
| 9 | 0.103244 | 53.52149 | 12.95322 | 18.13394 | 7.935733 | 2.810944 | 4.644671 |
| 10 | 0.111070 | 52.86823 | 13.38351 | 17.81194 | 9.251358 | 2.669292 | 4.015662 |

Variance Decomposition of INF:

| | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
|---|---|---|---|---|---|---|---|

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Period

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | 16.23785 | 9.505706 | 26.12894 | 20.14462 | 12.60546 | 31.61528 | 0.000000 |
| 2 | 22.85395 | 9.176883 | 36.64973 | 11.41512 | 14.61567 | 27.27194 | 0.870662 |
| 3 | 24.95383 | 8.995206 | 38.40423 | 10.63151 | 17.94640 | 23.06189 | 0.960759 |
| 4 | 26.31626 | 14.73427 | 36.59465 | 9.705363 | 16.93555 | 21.09716 | 0.933011 |
| 5 | 27.67576 | 16.61634 | 35.68787 | 10.49871 | 16.11689 | 19.40308 | 1.677109 |
| 6 | 29.63509 | 14.59669 | 37.20609 | 9.866211 | 15.74090 | 19.61984 | 2.970278 |
| 7 | 32.11191 | 12.53001 | 38.88455 | 8.515503 | 16.00050 | 20.29434 | 3.775100 |
| 8 | 34.18998 | 11.08198 | 40.53268 | 7.519101 | 16.38798 | 20.30239 | 4.175876 |
| 9 | 35.65364 | 10.24504 | 41.66608 | 6.926002 | 16.83877 | 19.89459 | 4.429520 |
| 10 | 36.78434 | 9.841357 | 42.41997 | 6.561592 | 17.07080 | 19.45239 | 4.653901 |

Variance Decomposition of EXG:

| Period | S.E. | GDP | TSE | TISE | TDE | INF | EXG |
|---|---|---|---|---|---|---|---|
| 1 | 14.63239 | 0.001940 | 23.12297 | 0.103379 | 8.016015 | 15.37978 | 53.37591 |
| 2 | 21.02392 | 2.630494 | 32.72543 | 0.243211 | 15.08340 | 12.91037 | 36.40709 |
| 3 | 27.64183 | 6.339035 | 34.66558 | 0.207024 | 14.40977 | 18.18031 | 26.19827 |
| 4 | 36.66767 | 7.564681 | 37.10372 | 0.119653 | 13.90060 | 20.62171 | 20.68964 |
| 5 | 43.21879 | 7.367035 | 39.23571 | 0.501868 | 15.23708 | 19.58603 | 18.07228 |
| 6 | 47.64454 | 6.580264 | 41.07807 | 0.511034 | 15.76357 | 18.94679 | 17.12027 |
| 7 | 52.03374 | 5.797789 | 42.42126 | 0.428595 | 15.88181 | 18.67589 | 16.79465 |
| 8 | 56.73715 | 5.283212 | 43.41672 | 0.363267 | 15.91048 | 18.60385 | 16.42247 |
| 9 | 61.69029 | 4.977724 | 44.14555 | 0.311581 | 15.85966 | 18.73091 | 15.97457 |
| 10 | 66.71367 | 4.759265 | 44.75976 | 0.275072 | 15.81046 | 18.84159 | 15.55386 |

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Cholesky Ordering: GDP TSE TISE TDE INF EXG

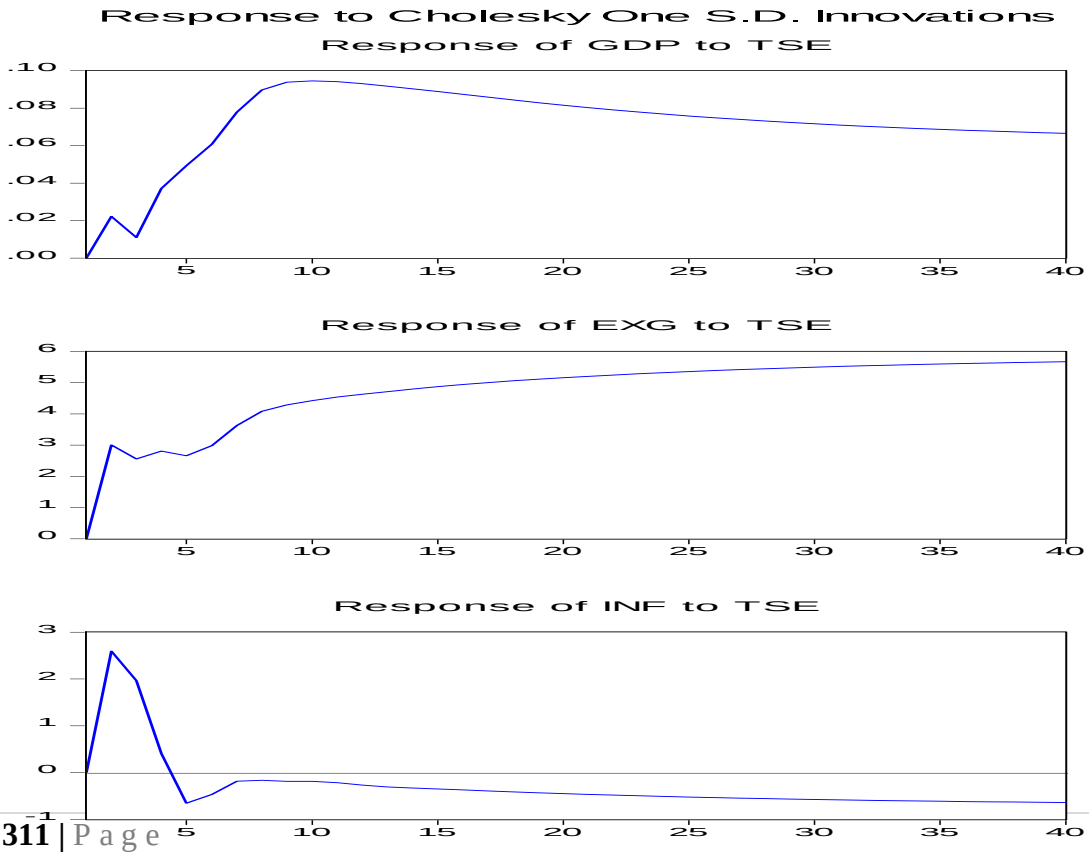
Full sample

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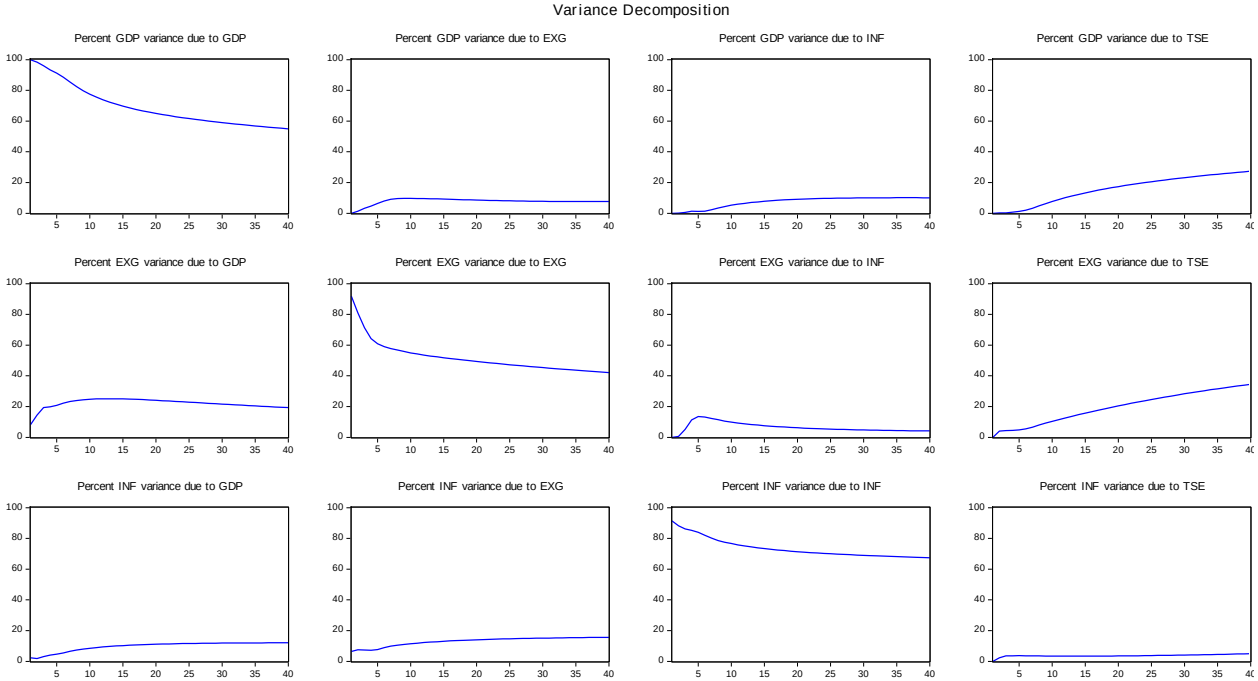


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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:34
Sample (adjusted): 1964 2012
Included observations: 45 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 |
|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 |
| TSE(-1) | -0.270804 | -25.94831 | 3.130478 |
| | (0.23342) | (7.36335) | (3.27134) |
| | [-1.16016] | [-3.52398] | [ 0.95694] |
| C | -9.301644 | 180.7975 | -44.51194 |

| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TSE) |
|---|---|---|---|---|
| CointEq1 | -0.185998 | -1.877958 | 2.947115 | -0.043566 |
| | (0.07345) | (2.43935) | (2.97244) | (0.06463) |
| | [-2.53219] | [-0.76986] | [ 0.99148] | [-0.67409] |
| CointEq2 | -0.006374 | -0.305566 | -0.126696 | 0.002022 |
| | (0.00294) | (0.09757) | (0.11890) | (0.00259) |
| | [-2.16944] | [-3.13163] | [-1.06558] | [ 0.78228] |
| CointEq3 | -0.005039 | -0.441009 | -0.653137 | 0.006858 |
| | (0.00571) | (0.18963) | (0.23108) | (0.00502) |
| | [-0.88240] | [-2.32557] | [-2.82649] | [ 1.36502] |
| D(GDP(-1)) | 0.033906 | -6.015538 | -6.093600 | -0.174268 |
| | (0.16191) | (5.37708) | (6.55218) | (0.14246) |
| | [ 0.20941] | [-1.11874] | [-0.93001] | [-1.22324] |
| D(GDP(-2)) | -0.107892 | -2.371815 | 4.518547 | -0.116546 |
| | (0.16875) | (5.60420) | (6.82893) | (0.14848) |
| | [-0.63935] | [-0.42322] | [ 0.66168] | [-0.78491] |
| D(EXG(-1)) | 0.000581 | 0.009980 | -0.008722 | 0.000918 |
| | (0.00450) | (0.14944) | (0.18210) | (0.00396) |
| | [ 0.12920] | [ 0.06678] | [-0.04790] | [ 0.23177] |
| D(EXG(-2)) | 0.000931 | 0.070726 | 0.143514 | 0.003213 |
| | (0.00438) | (0.14544) | (0.17722) | (0.00385) |
| | [ 0.21248] | [ 0.48629] | [ 0.80979] | [ 0.83391] |
| D(INF(-1)) | 0.004277 | 0.375437 | 0.406661 | -0.002629 |
| | (0.00483) | (0.16040) | (0.19546) | (0.00425) |
| | [ 0.88540] | [ 2.34057] | [ 2.08054] | [-0.61862] |
| D(INF(-2)) | 0.002132 | 0.114106 | -0.083578 | -0.002485 |
| | (0.00496) | (0.16466) | (0.20065) | (0.00436) |

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**SABITU, ABUBAKAR**
**M.SC/SOC-SCI//3836/11-12.**

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Pre-sample

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:35
Sample (adjusted): 1964 2006
Included observations: 39 after adjustments
Standard errors in ( ) & t-statistics in [ ]

| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 |
|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 |
| TSE(-1) | 0.033322 | -41.32589 | 8.614082 |
| | (0.46630) | (17.3293) | (7.14070) |
| | [ 0.07146] | [-2.38474] | [ 1.20634] |
| C | -11.59440 | 297.8321 | -86.44283 |

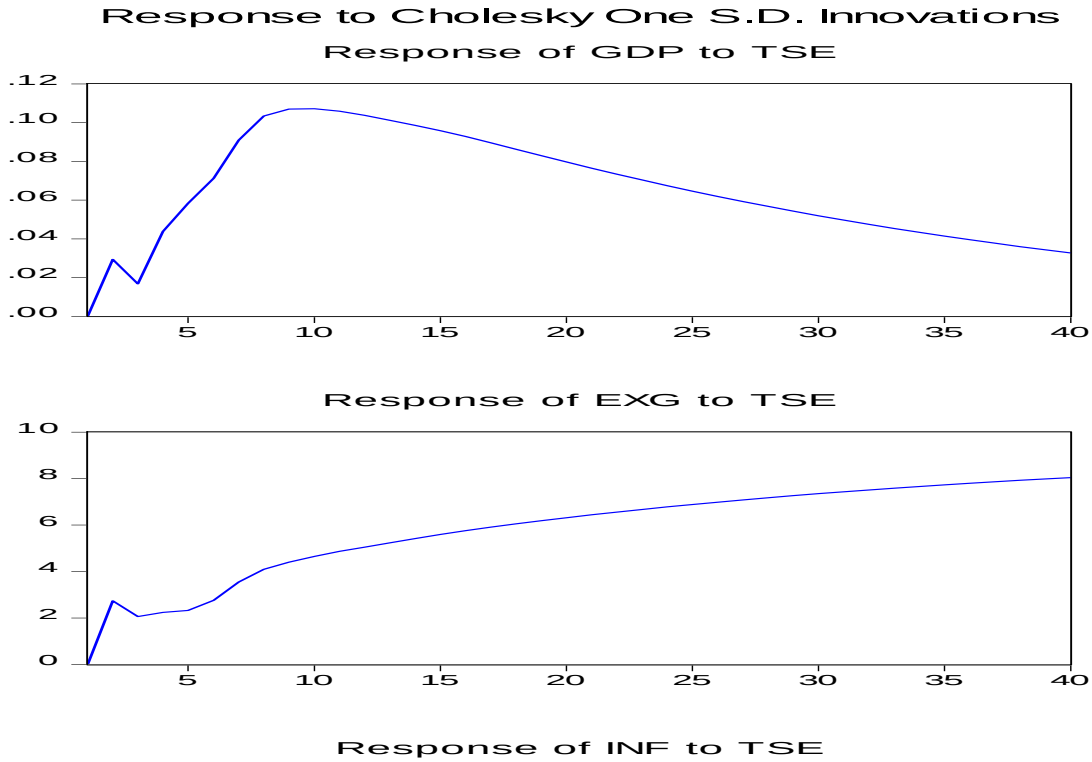
| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TSE) |
|---|---|---|---|---|
| CointEq1 | -0.188012 | -1.884503 | 2.948097 | -0.050538 |
| | (0.08179) | (2.52102) | (3.27535) | (0.06976) |
| | [-2.29864] | [-0.74751] | [ 0.90009] | [-0.72446] |
| CointEq2 | -0.006569 | -0.251083 | -0.148324 | 0.002261 |
| | (0.00305) | (0.09399) | (0.12212) | (0.00260) |
| | [-2.15415] | [-2.67128] | [-1.21460] | [ 0.86923] |
| CointEq3 | -0.006077 | -0.425409 | -0.658515 | 0.007936 |
| | (0.00651) | (0.20062) | (0.26065) | (0.00555) |
| | [-0.93364] | [-2.12045] | [-2.52642] | [ 1.42953] |
| D(GDP(-1)) | 0.021531 | -5.441585 | -6.429275 | -0.160592 |
| | (0.17945) | (5.53100) | (7.18596) | (0.15305) |
| | [ 0.11999] | [-0.98383] | [-0.89470] | [-1.04927] |
| D(GDP(-2)) | -0.114570 | -2.272659 | 4.896697 | -0.098293 |
| | (0.18697) | (5.76284) | (7.48717) | (0.15947) |
| | [-0.61277] | [-0.39436] | [ 0.65401] | [-0.61639] |
| D(EXG(-1)) | -0.000594 | -0.008694 | -0.042047 | 0.001279 |
| | (0.00554) | (0.17065) | (0.22171) | (0.00472) |
| | [-0.10732] | [-0.05095] | [-0.18965] | [ 0.27089] |
| D(EXG(-2)) | 0.000311 | 0.026012 | 0.217914 | 0.005963 |
| | (0.00540) | (0.16639) | (0.21617) | (0.00460) |
| | [ 0.05756] | [ 0.15634] | [ 1.00806] | [ 1.29522] |
| D(INF(-1)) | 0.005122 | 0.336447 | 0.427794 | -0.003136 |
| | (0.00551) | (0.16996) | (0.22081) | (0.00470) |
| | [ 0.92894] | [ 1.97961] | [ 1.93739] | [-0.66690] |
| D(INF(-2)) | 0.002708 | 0.092451 | -0.089728 | -0.003105 |
| | (0.00559) | (0.17242) | (0.22400) | (0.00477) |

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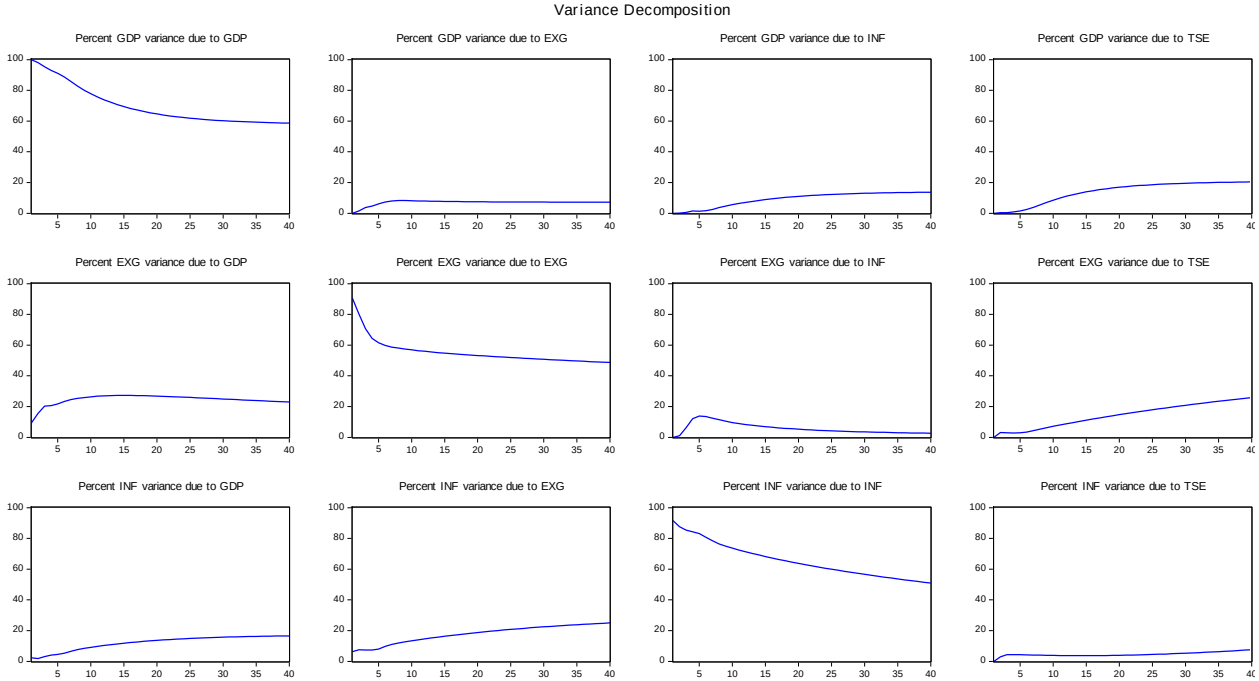


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Second Model

Sub sample

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:37
Sample (adjusted): 1983 2006
Included observations: 24 after adjustments
Standard errors in ( ) & t-statistics in [ ]

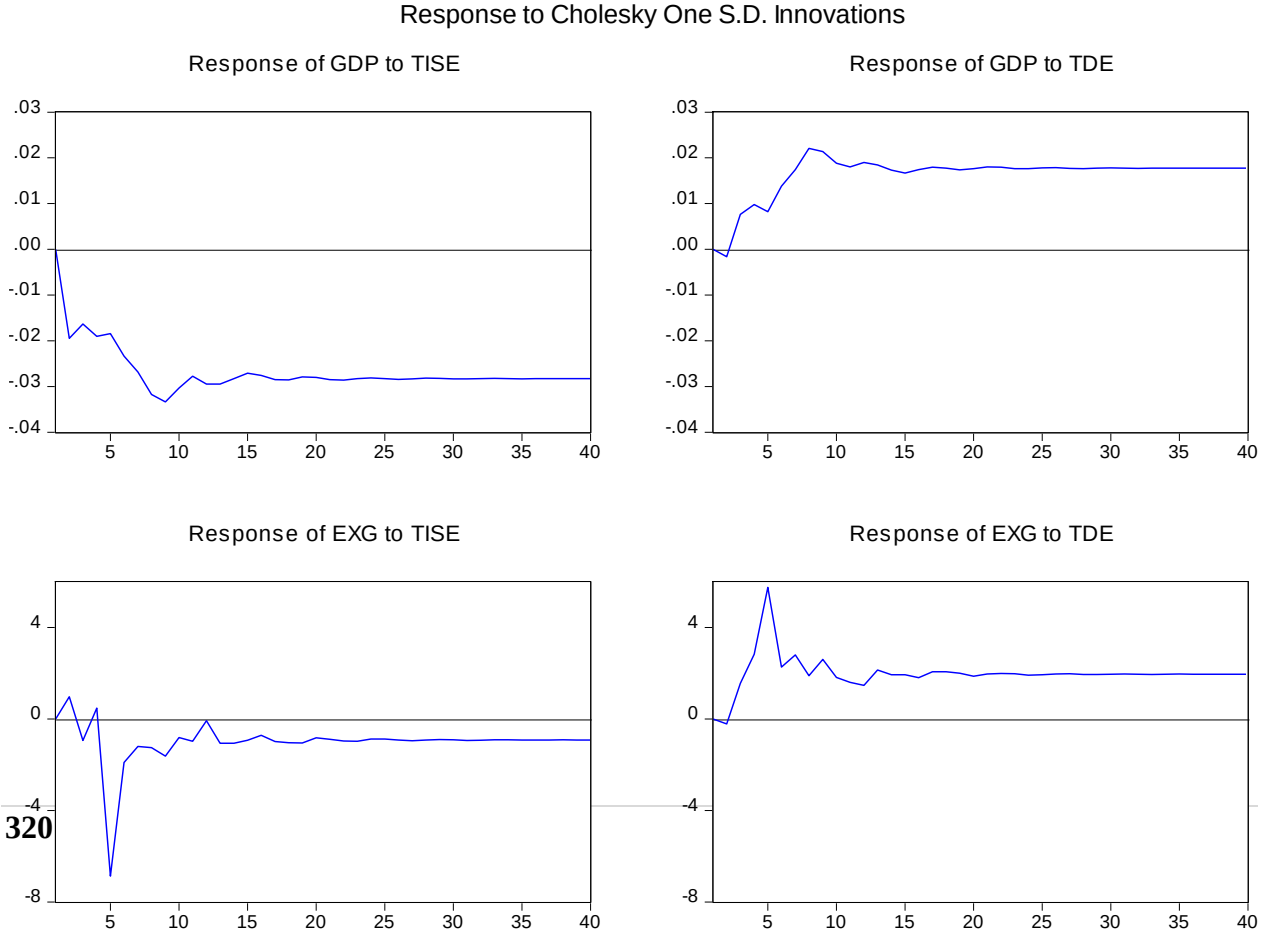
| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 | | |
|---|---|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 | | |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 | | |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 | | |
| TISE(-1) | -0.615703<br>(0.08296)<br>[-7.42127] | -40.84731<br>(5.94554)<br>[-6.87024] | 32.29848<br>(10.6815)<br>[ 3.02377] | | |
| TDE(-1) | 4.536826<br>(0.79875)<br>[ 5.67990] | 190.2408<br>(57.2413)<br>[ 3.32349] | -333.0965<br>(102.838)<br>[-3.23905] | | |
| C | -17.18607 | -111.8299 | 422.9172 | | |
| **Error Correction:** | **D(GDP)** | **D(EXG)** | **D(INF)** | **D(TISE)** | **D(TDE)** |
| CointEq1 | 0.201552<br>(0.13369)<br>[ 1.50757] | -21.93641<br>(32.9633)<br>[-0.66548] | -70.36551<br>(70.3047)<br>[-1.00087] | 4.231698<br>(0.96670)<br>[ 4.37749] | 0.193974<br>(0.11502)<br>[ 1.68645] |
| CointEq2 | 0.002105<br>(0.00086)<br>[ 2.43667] | -1.005435<br>(0.21300)<br>[-4.72025] | -0.089834<br>(0.45430)<br>[-0.19774] | 0.008879<br>(0.00625)<br>[ 1.42139] | -0.000617<br>(0.00074)<br>[-0.83045] |
| CointEq3 | -0.001182<br>(0.00098)<br>[-1.20938] | -0.625261<br>(0.24093)<br>[-2.59524] | 0.280781<br>(0.51385)<br>[ 0.54642] | -0.013129<br>(0.00707)<br>[-1.85825] | 0.000681<br>(0.00084)<br>[ 0.80968] |
| D(GDP(-1)) | -0.063902<br>(0.28839)<br>[-0.22158] | 166.5195<br>(71.1055)<br>[ 2.34186] | 44.61909<br>(151.655)<br>[ 0.29421] | -2.190143<br>(2.08527)<br>[-1.05029] | 0.074100<br>(0.24811)<br>[ 0.29866] |
| D(GDP(-2)) | -0.090500<br>(0.03207)<br>[-2.82205] | 8.652817<br>(7.90685)<br>[ 1.09434] | 21.05670<br>(16.8639)<br>[ 1.24863] | -0.346149<br>(0.23188)<br>[-1.49280] | -0.007838<br>(0.02759)<br>[-0.28409] |
| D(EXG(-1)) | -0.001529<br>(0.00101)<br>[-1.50781] | 0.351765<br>(0.25007)<br>[ 1.40664] | 0.238360<br>(0.53336)<br>[ 0.44690] | -0.012770<br>(0.00733)<br>[-1.74125] | 0.000859<br>(0.00087)<br>[ 0.98435] |
| D(EXG(-2)) | -0.001297<br>(0.00088)<br>[-1.46852] | 0.233714<br>(0.21784)<br>[ 1.07289] | 0.483600<br>(0.46461)<br>[ 1.04088] | -0.007565<br>(0.00639)<br>[-1.18420] | 0.000692<br>(0.00076)<br>[ 0.91078] |
| D(INF(-1)) | 0.000894<br>(0.00065)<br>[ 1.37377] | 0.621987<br>(0.16044)<br>[ 3.87687] | 0.212416<br>(0.34218)<br>[ 0.62077] | 0.004185<br>(0.00470)<br>[ 0.88951] | -0.000283<br>(0.00056)<br>[-0.50591] |
| D(INF(-2)) | 0.001088<br>(0.00096)<br>[ 1.13037] | 0.178944<br>(0.23733)<br>[ 0.75398] | -0.780933<br>(0.50619)<br>[-1.54277] | 0.010804<br>(0.00696)<br>[ 1.55233] | -0.000371<br>(0.00083)<br>[-0.44795] |
| D(TISE(-1)) | 0.178581<br>(0.07674)<br>[ 2.32703] | -29.72731<br>(18.9214)<br>[-1.57109] | -10.95928<br>(40.3559)<br>[-0.27157] | 1.111784<br>(0.55490)<br>[ 2.00358] | 0.031923<br>(0.06602)<br>[ 0.48352] |
| D(TISE(-2)) | 0.080697<br>(0.04810)<br>[ 1.67773] | -25.59106<br>(11.8600)<br>[-2.15788] | -12.83153<br>(25.2951)<br>[-0.50732] | 0.437146<br>(0.34781)<br>[ 1.25682] | -0.008243<br>(0.04138)<br>[-0.19919] |

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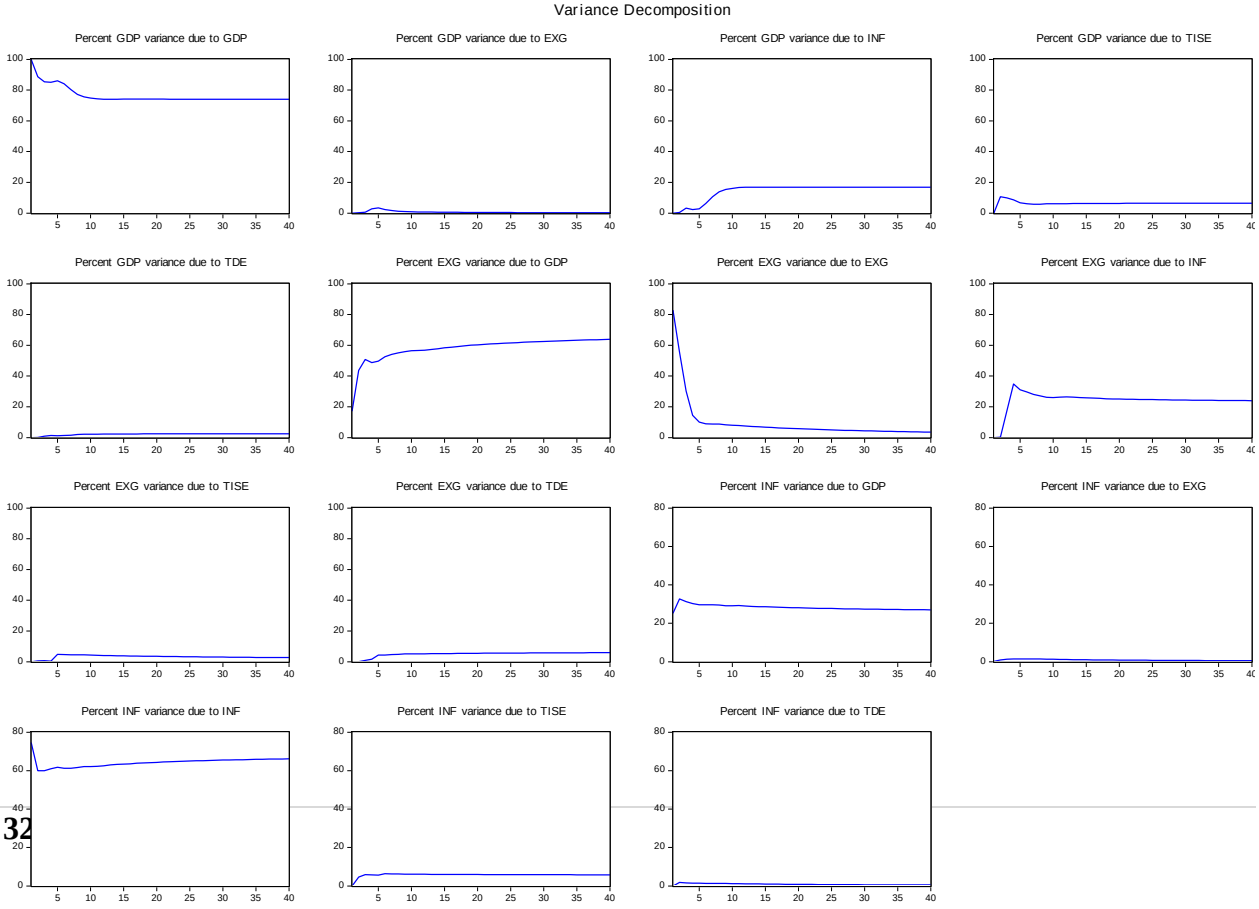


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Full-sample

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Vector Error Correction Estimates
Date: 08/30/16 Time: 15:39
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments
Standard errors in ( ) & t-statistics in [ ]

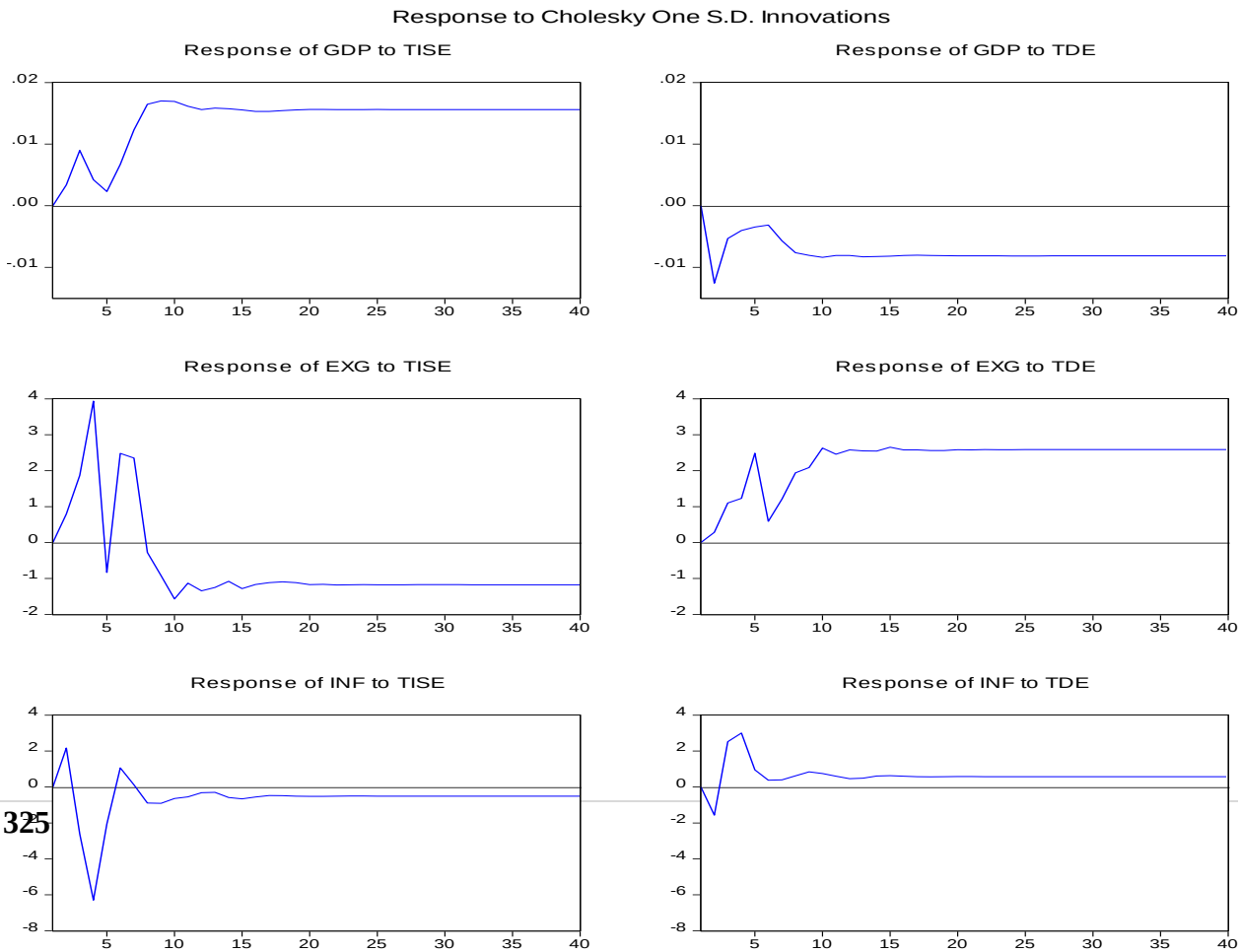
| Cointegrating Eq: | CointEq1 | CointEq2 | CointEq3 | | |
|---|---|---|---|---|---|
| GDP(-1) | 1.000000 | 0.000000 | 0.000000 | | |
| EXG(-1) | 0.000000 | 1.000000 | 0.000000 | | |
| INF(-1) | 0.000000 | 0.000000 | 1.000000 | | |
| TISE(-1) | -0.424713 | -16.83066 | 6.186065 | | |
| | (0.03209) | (5.49884) | (6.42087) | | |
| | [-13.2351] | [-3.06077] | [ 0.96343] | | |
| TDE(-1) | 2.636217 | -49.06180 | -62.40731 | | |
| | (0.34692) | (59.4470) | (69.4150) | | |
| | [ 7.59893] | [-0.82530] | [-0.89905] | | |
| C | -14.68293 | 201.5854 | 60.44091 | | |
| Error Correction: | D(GDP) | D(EXG) | D(INF) | D(TISE) | D(TDE) |
| CointEq1 | -0.041027 | -48.04349 | 50.45624 | 3.736171 | 0.243206 |
| | (0.17202) | (38.0062) | (71.5253) | (1.49511) | (0.12179) |
| | [-0.23850] | [-1.26410] | [ 0.70543] | [ 2.49892] | [ 1.99700] |
| CointEq2 | 0.000756 | -0.928970 | 0.184532 | -0.005697 | -0.000645 |
| | (0.00067) | (0.14824) | (0.27898) | (0.00583) | (0.00048) |
| | [ 1.12704] | [-6.26660] | [ 0.66145] | [-0.97696] | [-1.35722] |
| CointEq3 | 0.000255 | -0.585780 | -0.431726 | -0.008918 | 0.000227 |
| | (0.00100) | (0.22008) | (0.41417) | (0.00866) | (0.00071) |
| | [ 0.25601] | [-2.66168] | [-1.04238] | [-1.03006] | [ 0.32148] |
| D(GDP(-1)) | 0.429110 | 190.0017 | -146.7642 | 0.814627 | -0.018525 |
| | (0.26512) | (58.5736) | (110.232) | (2.30421) | (0.18769) |
| | [ 1.61857] | [ 3.24381] | [-1.33141] | [ 0.35354] | [-0.09870] |
| D(GDP(-2)) | -0.048065 | 9.897895 | 4.112222 | -0.119550 | -0.016239 |
| | (0.03002) | (6.63234) | (12.4816) | (0.26091) | (0.02125) |
| | [-1.60114] | [ 1.49237] | [ 0.32946] | [-0.45821] | [-0.76409] |
| D(EXG(-1)) | 0.000163 | 0.249202 | -0.161909 | 0.003312 | 0.000651 |
| | (0.00068) | (0.14919) | (0.28076) | (0.00587) | (0.00048) |
| | [ 0.24184] | [ 1.67042] | [-0.57668] | [ 0.56428] | [ 1.36144] |
| D(EXG(-2)) | 7.80E-05 | 0.134683 | 0.086878 | 0.005150 | 0.000453 |
| | (0.00058) | (0.12919) | (0.24312) | (0.00508) | (0.00041) |
| | [ 0.13338] | [ 1.04255] | [ 0.35735] | [ 1.01332] | [ 1.09450] |
| D(INF(-1)) | 0.000741 | 0.624290 | 0.368425 | 0.006245 | -0.000152 |
| | (0.00066) | (0.14652) | (0.27574) | (0.00576) | (0.00047) |
| | [ 1.11797] | [ 4.26081] | [ 1.33614] | [ 1.08353] | [-0.32415] |
| D(INF(-2)) | -0.000102 | 0.145124 | -0.208310 | 0.006368 | -1.50E-06 |
| | (0.00094) | (0.20767) | (0.39081) | (0.00817) | (0.00067) |
| | [-0.10874] | [ 0.69884] | [-0.53302] | [ 0.77946] | [-0.00226] |
| D(TISE(-1)) | 0.024858 | -29.45378 | 38.44154 | 0.027411 | 0.040388 |
| | (0.05981) | (13.2151) | (24.8701) | (0.51987) | (0.04235) |
| | [ 0.41559] | [-2.22879] | [ 1.54570] | [ 0.05273] | [ 0.95376] |

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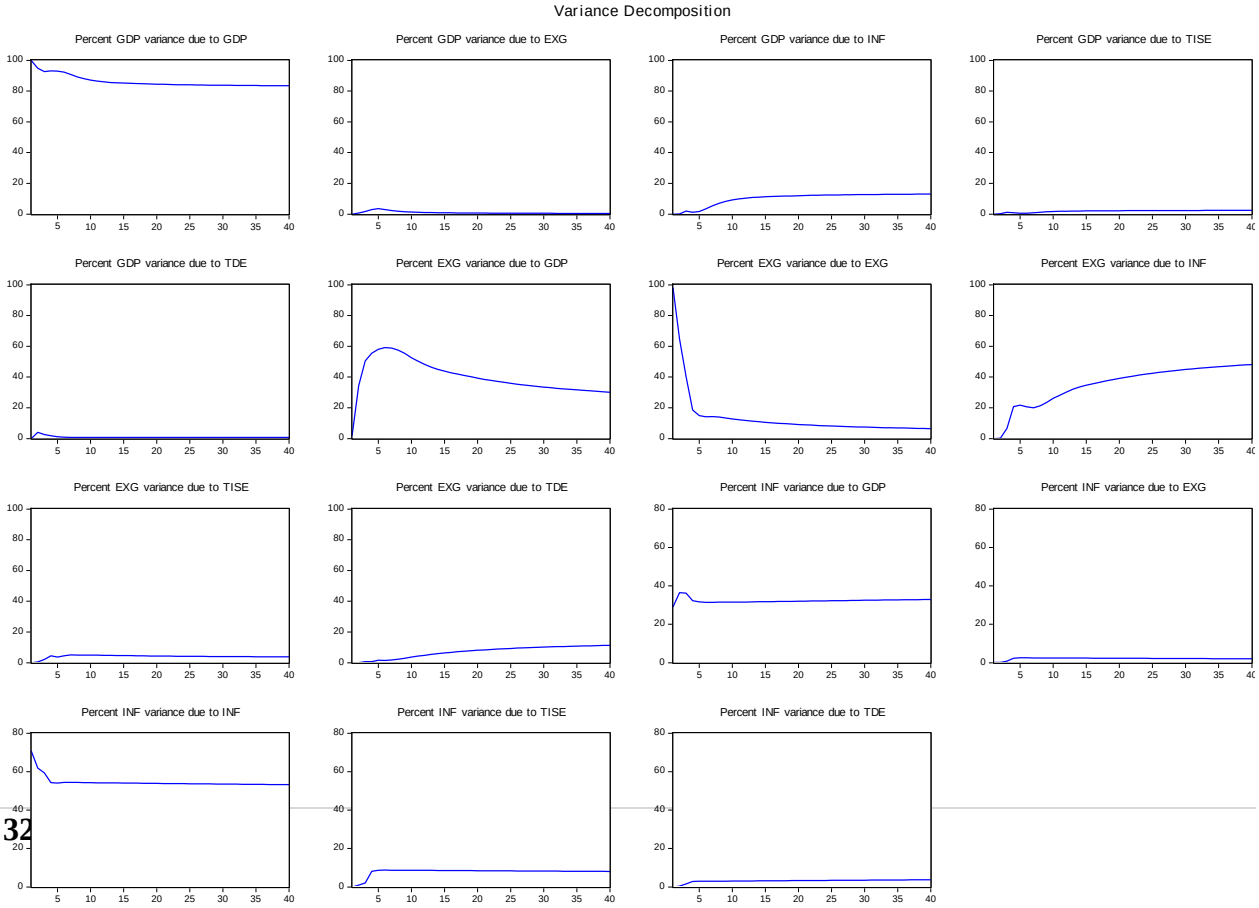


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Model I: **Vector Error Correction Model Estimates**

| | Constant | TSE | EXG | INF |
|---|---|---|---|---|
| Pre-Sample | 0.18(2.02) | -0.11(-0.47) | -0.0005(-0.10) | 0.005(0.92) |
| Full Sample | 0.17(2.18) | -0.11(-0.58) | 0.0005(0.12) | 0.004(0.88) |

Model II: **Vector Error Correction Model Estimates**

| | Constant | TDE | TISE | EXG | INF |
|---|---|---|---|---|---|
| Pre-Sample | 0.06(3.02) | 0.08(1.67) | 0.17(2.32) | -0.001(-1.50) | 0.0008(1.37) |
| Full Sample | 0.02(1.86) | -0.48(-0.76) | 0.024(0.41) | 0.0001(0.24) | 0.0007(1.11) |