UNIVERSITY OF GHANA

HOW DO MONETARY AND FISCAL POLICY SHOCKS EXPLAIN MACROECONOMIC FLUCTUATIONS IN AFRICA?

BY

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THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MPHIL FINANCE DEGREE

JULY 2015

DECLARATION

I, Foster Gyamfi Osei, an MPhil (Finance) student of the University of Ghana Business School do hereby declare that this thesis is the product of my own original research. I further declare that this piece of research or a part thereof has not been presented by anyone in this or any other University.

…… ……..

FOSTER GYAMFI OSEI **DATE**

(10245175)

CERTIFICATION

I hereby certify that this thesis was supervised in accordance with the procedures laid down by the University of Ghana.

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DEDICATION

I dedicate this study to the Almighty God.

ACKNOWLEDGEMENTS

I gratefully thank the Almighty God for His grace and blessings upon my life, without which I would not have been able to complete this work.

I would also like to singularly thank Dr. Godfred A. Bokpin, head of Finance Department, University of Ghana Business School for his advice, guidance, and critiques for the completion of this work. I also thank Dr. Lord Mensah, for his kindness and continued support were very instrumental in making this work successful. May the Almighty God bless you for all the help you have provided me in the course of study.

A warm, enduring heart-felt thank you to a wonderful friend, Irene Owusuaah Antwi. Your unwavering steadfastness and faithfulness to encourage and critique offered hope in the completion of this work. I also appreciate the support of my friends, Kwabena Asare, and Nana Kwasi Karikari,

ABSTRACT

This study examines the joint impact of fiscal and monetary policy shocks on some fundamental macroeconomic indicators in three emerging African economies: Ghana, Nigeria and South Africa. The study uses a vector autoregressive (VAR) method with recursive ordering to explain the relationships between the variables over the years 1970 to 2013. The macroeconomic variables considered include real GDP, Inflation and Trade. Granger causality tests are used to determine the causality behavior among the variables. Orthogonal impulse response functions (IRF) and forecast error variance decompositions are then constructed to identify the effects of both fiscal and monetary policy shocks on the macroeconomic variables.

The research finds that in general, the impacts of fiscal policy shocks are more pronounced and significant than monetary policy shocks. Over the period, the macroeconomic variables are seen to respond considerably to both contractionary and expansionary fiscal policy shocks. Thus fiscal policy shocks can stimulate economic activity significantly in these countries. The effects of the monetary policy shocks on the other hand are observed to be long term in nature. Contractionary monetary policy shocks are seen to generally reduce the levels of output, which conforms to literature.

Overall, our results provide a comprehensive and coherent picture of the joint effect of fiscal and monetary policy shocks on African economies.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Government is an important player in any economy, and its policies regarding taxes and spending affect disposable income, consumption, investment and private agents' decisions in general. Adequate knowledge of the influence of government on aggregate demand through its budget policies is useful for fiscal and monetary authorities, altogether. The Central Bank also attains its main objective of stabilizing inflation via the regulation of aggregate demand through adjusting the interest rate. Therefore, it should foresee the pressure put on aggregate demand by the government.

During the 2008-2009 financial crisis, many advanced countries around the world reduced their policy interest rates to historically low levels. The economic crisis affected the drivers of Africa's growth performance (macroeconomic variables). As the financial crisis deepened into a global economic recession, African economies experienced strong negative effects due to a contraction in global trade, including reduced demand for African commodity exports, tighter financing conditions overseas, and a drop in foreign direct investment and other capital inflows. Additional revenue streams such as tourism and remittances from African workers abroad fell, and foreign aid decreased. Export prices and volumes also declined.

According to World Bank, remittances to Sub-Saharan Africa dropped from 8 to 5 percent in 2009. Declines in remittances contributed to foreign exchange shortages and increased poverty, as some of the most vulnerable and poorest populations lost a significant source of income. In Mozambique, for example, FDI related to expansions of hydroelectric and

mining projects were delayed or suspended. The inflow of portfolio capital were affected. For example, Ghana and Kenya postponed sovereign bond issues worth about $800 million. The stocks of foreign exchange reserves were deteriorating. Fiscal balances deteriorated significantly as tax revenues, especially those tied to commodity sales, declined sharply. Rising demand for social spending compounded the stress on government budgets. With fewer resources, countries were unable to reach their development goals of reducing poverty and investing in infrastructure. According to African Development Bank (ADB), real GDP growth slowed to 4.6 percent in 2009 from 6.2 percent in 2007. For example, Southern Africa's growth rate slowed to 4.0 percent in 2009. Oil exporting countries like Angola's growth declined from 20.9 percent in 2007 to 7.6 percent in 2009. East Africa grew at 6 percent in 2009, down from 8.4 percent in 2007.

Most governments around the world put in place measures to stimulate their floundering economies by boosting employment and spending, while simultaneously trying to address underlying government debt problems. The fiscal stimulus packages implemented by the governments around the world after the financial crisis included different combinations of government spending, investment and tax cuts. The objective of fiscal policy is essentially to stimulate economic and social development by pursuing a policy stance that ensures a sense of balance between taxation, expenditure and borrowing that is consistent with sustainable growth. The extent to which fiscal policy engenders economic growth continues to attract theoretical and empirical debate especially in developing countries. The political debate around the implementation of such important measures was reflected in the revival of the academic research on the effectiveness of fiscal policy interventions.

Different competing economic theories provided different conclusions regarding the macroeconomic effects of fiscal policy. Perotti (2007), and Ramey (2008) disagree on the effects of government spending shocks on certain macroeconomic variables. The government spending shock identified by Perotti (2007) mainly affects medium frequency components of macroeconomic variables, whereas Ramey's (2008) shock equally affects all frequencies. However, many researchers have generally agreed on a consensus view with regards to the empirical effects of monetary policy shocks. Monetary policy became interesting in the field of academic and policy discussions on controlling elements of the business cycle. The monetary policy transmission mechanism gained the attention of policymakers and academicians because it revealed the process through which central bank actions affect the real economy and inflation.

Feldstein (2009) also indicated that fiscal policy has received new vigour at a time when monetary policy remains constrained by the zero lower bound on policy rates. Due to difficulties in accurately identifying fiscal policy shocks, there has been no consensus on the effects of fiscal policy shocks. Firstly, there is the difficulty of distinguishing movements in fiscal variables caused by fiscal policy shocks from those which are simply the automatic movements of fiscal variables in response to other shocks such as business cycle or monetary policy shocks. (Blanchard & Perotti, 2002; Mountford & Uhlig, 2009). Second, for governments (in Africa) striving to maintain the budget and public debt at a stable level, changes in public spending or taxes may then be of an anticipatory nature.

An expansionary fiscal policy leads to a contractionary monetary policy, and vice versa, implying there is some coordination between these macroeconomic policies. Monetary policy affects the trade balance through either the expenditure switching or the income

channel. The expenditure switching effect suggests that contractionary monetary policy leads to currency appreciation through capital inflows, which worsens the trade balance. An exchange rate appreciation makes the values of imported goods and services cheaper relative to exports. In contrast, the income effect shrinks real income and real imports, leading to a trade balance improvement. These opposing effects operate simultaneously, whenever the expenditure-switching effects dominate the income effects, the trade balance deteriorate and vice versa. Since both monetary and fiscal policy simultaneously affect fluctuations in macro-economic variables, it is important to qualitatively and quantitatively evaluate their joint impact in explaining these macroeconomic fluctuations.

1.2 Problem Statement

The importance of monetary and fiscal policy in sustaining economic growth during and after the financial crisis has become, a dominant area of study. The sustenance of economic growth and related areas have been well viewed separately from the fiscal viewpoint and the monetary viewpoint. Most existing empirical literature, though arguable, typically focuses either on monetary or fiscal policy and not the combination of these two policies to understand their impacts on macroeconomic variables, which form the canons of economic growth and sustainability. Studies such as Romer & Romer (1994), Christiano, et al. (2000, 2005) and Bernanke et al. (2005) complement on monetary policy shocks. These studies come to a consensus on the main macroeconomic effects of a monetary policy shock. Following an increase in the short term interest rate, real activity measures and monetary aggregates such as the M1 money supply decline, prices eventually go down and the exchange rate appreciates (Rossi & Zubairy, 2012).

Empirical literature of Ramey & Shapiro (1998), Fatás & Mihov (2001), Blanchard & Perotti (2002), Perotti (2004, 2007), Galí, Lopez-Salido, & Valles (2007), and Ramey (2011) also complement government spending shocks. Despite the different competing theories these studies agree that positive government spending shocks have persistent output effects, regardless of the chosen empirical methodology. A positive output response is consistent with both Keynesian and neoclassical theories.

However, there is no consensus on the effects of government spending shocks on macroeconomic variables. For example, different empirical studies have reported different impact of private consumption. Fatás & Mihov (2001), Blanchard & Perotti (2002) and Perotti (2004, 2007) report that private consumption significantly and persistently increase in response to a positive government spending shock. Edelberg et al. (1999) and Mountford & Uhlig (2009) provide evidence that the response of private consumption is close to zero and statistically insignificant over the entire impulse response horizon. Ramey (2011) finds evidence that private consumption persistently and significantly falls over short and long horizons in response to a positive government spending shock. With regards to the responses of the real wage and employment, Perotti (2007) provides evidence that the real wage persistently and significantly increases while employment does not react. Burnside et al. (2004) and Eichenbaum & Fisher (2005) show that the real wage and employment persistently and significantly falls and increases respectively.

These developments highlight the current gaps in the existing literature. First, though arguable, little study on combined effects of fiscal policy shocks and monetary policy shocks have been done in Africa, however, evidence of studies of either fiscal or monetary policy shock do exist. Examples of such studies for Africa include Aye et al (2012) who uses a VAR model to analyze the fiscal policy shocks and the dynamics of asset price for

the South African economy. The study uses sign restrictions to identify government revenue and government spending shocks, while controlling for generic business cycle and monetary policy shocks. In addition to examining the effects of anticipated and unanticipated revenue and spending shocks, it also analyses three types of fiscal policy scenarios: a deficit-financed spending increase, a balanced budget spending increase (financed with higher taxes), and a deficit-financed tax cut (revenue decreases but government spending stays unchanged).

Jooste, et al. (2013) analyzed the effect of aggregate government spending and taxes on output for South Africa using three types of a calibrated dynamic stochastic general equilibrium (DSGE) model and more data driven models such as a structural vector error correction model (SVECM) and a time-varying parameter VAR (TVP-VAR) to capture possible asymmetries and time variation of fiscal impulses.

In the US, Muscatelli et al. (2004), Mountford & Uhlig (2009) and Rossi & Zubairy (2011) use VAR models to analyse the impact of fiscal policy shocks. Mountford & Uhlig (2009) also use sign restrictions in a VAR model to analyze the impact of fiscal policy shocks, while controlling for a business cycle and monetary policy shock. Rossi & Zubairy (2011) use a VAR model to investigate the relative importance of fiscal and monetary policy shocks in explaining fluctuations in US macroeconomic variables by using historical counterfactual analyses. Fry-McKibbin & Zheng, (2012) use the FAVAR model to analyze how monetary and fiscal policy shocks explain fluctuations in US macroeconomic variables. Mélitz (2002) investigate the interaction between fiscal and monetary policies in OECD countries. His study showed that an expansionary fiscal policy also appears to lead

to a contractionary monetary policy, and vice versa, implying there is some coordination between macroeconomic policies.

Research, evidently has been conducted in other jurisdictions but concentrated on fiscal and monetary policy impacts separately. Research on the joint analysis of the two macroeconomic policy shocks have been in the US, but due to factors such regulatory framework, government structures, institutional policy framework differences etc., the findings of the study may not be applicable to Africa. Empirical study on the joint behaviour of monetary and fiscal policy shocks is not extensive in Africa. For the purposes of this study, a Vector Auto Regression (VAR) model will be used to identify an unanticipated increase in the short term interest rate, government spending, tax revenue and the debt-to-GDP ratio considering a large panel of selected African macroeconomic variables.

1.3 Research Objectives

Since little or no study to a large extent has been done on the joint analysis of monetary and fiscal policies in explaining macroeconomic fluctuations in Africa, this study seeks to fill the research gap. Therefore, the main objectives of this study are to:

- Investigate the joint behaviour of monetary and fiscal shocks in Africa via a VAR analysis.
- Evaluate the impact of the monetary and fiscal policy shocks on some macroeconomic variables.

1.4 Research Question

To be able to achieve the above objectives, the researcher will be guided by the following research questions.

1. How does the inclusion of fiscal policy variables affect our understanding of African monetary policy shocks and vice-versa?
2. How does the monetary and fiscal policy shocks affect some macroeconomic variables?

1.5 Scope and Limitation of Study

The study considers yearly macroeconomic variables from three countries in Africa; Ghana, Nigeria and South Africa, from 1970 to 2013 (44 years). This period covers a greater regime of structural financial changes that best account for both fiscal and monetary policy shocks and vicissitudes. The study sought to know the impacts of fiscal and monetary policy shocks on macroeconomic variables in Africa, over the above mentioned time period. The use of the methods to attain this objective influenced the study, as not all African countries could be included. Based on the researchers judgement and perception on the vibrant nature or otherwise of some economies, the three countries; Ghana, Nigeria and South Africa, were selected.

According to previous research, these countries are very active in policy regulations and have economic structures which are very typical of other if not most African countries. Due to trade, and other economic wealth, these selected countries are also connected to other economies, making it possible to generalize findings from these countries to the African continent as a whole. The main limitation of the study was the unavailability of data on some of the variables for some of the countries in some periods due to the

extended nature of the period understudied. Also, these developing countries are prone to sudden crises and marked gyrations in macroeconomic variables often make it difficult to discern any type of cycle or economic regularities.

1.6 Significance of Study

Following the recent global crisis of 2008, it became apparent that a crisis in a small financial market can lead to a big crisis in many economies. Some emerging economies continued to grow even though some advance economies were undergoing significant contractions. Developing countries implemented fiscal stimulus packages to help boost their economies. Existing empirical literature have been done in advanced economies. For example, Christiano, et al. (2000, 2005) and Bernanke et al. (2005) focus on monetary policy shocks. Ramey & Shapiro (1998), Fatás & Mihov (2001), Blanchard & Perotti (2002), Perotti (2004, 2007), Galí et al. (2007) and Ramey (2011) focus on government spending shocks. The above studies examine either fiscal policy shocks or monetary policy shocks in explaining macroeconomic fluctuations in the US. Most of the studies above considered the VAR model to analyse the impact of fiscal policy shocks. Omitting monetary policy variable in the vector autoregressive (VAR) may lead to incorrectly attributing fluctuations to fiscal shocks rather than to their true to cause, the monetary policy shocks (Rossi & Zubairy, 2011).

Literature examining policy that has been done Africa explain macroeconomic variables in specific economies. For example, Jooste et al. (2013) analyse the effect of aggregate government spending and taxes on output for South Africa. Ajilore & Ikhide (2013) researched on monetary policy shocks, output and prices in South Africa. Oseni (2013), empirically analysed fiscal policy shocks and current account dynamics in Nigeria.

Empirical literature examining the interaction of monetary and policy shocks in African economies are very few.

This research aims to examine the transmission mechanism of shocks, in view of the current gaps in the existing literature. The research analyses the interaction of monetary and fiscal policy shocks in explaining African countries macroeconomic fluctuations using a Vector Autoregressive (VAR) framework. The study is significant as it specifically serves as a springboard for further studies into the field of monetary and fiscal policy shocks in explaining macroeconomic variables in Africa.

1.7 Chapter Disposition

The study is composed into five chapters. Chapter one introduces the concepts of the study where the background to the study is given as well as the problem statement where the research gap is identified to provide justification for the studies; it also establishes the scope and nature of the research. Chapter two critically identifies and reviews literature on monetary and fiscal policy shocks and the interaction of the two in explaining macroeconomic fluctuations. It further highlight literature from different countries on the subject matter of the study. Chapter three presents the VAR model for analyzing monetary and fiscal policy shocks, discusses the identification of the model and briefly describe the African macroeconomic variables used in the empirical investigation. Chapter four analysed the findings which were exhibited in charts and graphs. Chapter five summarises the research, conclusions and recommendations based on the findings of the research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Two features of the macroeconomic policy response have received little modeling attention, despite being central to the predictions of the impacts of the policy actions. First, monetary and fiscal policy have reacted jointly in an effort to stimulate aggregate demand. A long line of research emphasizes that separating monetary and fiscal policies overlooks policy interactions that are important for determining equilibrium (Sims, 1988 & Leeper, 1991). Second, few economic observers expect that the then recession-fighting mix of macroeconomic policies would have persisted indefinitely; eventually, policies returned to ‘‘normal.’’ Because the impacts of current policies depend, in part, on expectations of possible future monetary–fiscal policy regimes, predictions need to condition on the current regime and incorporate prospective future regimes (Svensson & Williams, 2007 Bianchi , 2009, and Farmer et al. ,2009). Intertemporal aspects of monetary and fiscal policy interactions determine how any fiscal stimulus is expected to be financed, which theory suggests is a critical determinant of the efficacy of the stimulus (Davig & Leeper, 2011).

This chapter explains the concepts of fiscal and monetary policies; how they work in an economy. It will also explore existing literature about the research topic and explain the importance of the econometric model adopted for this study.

2.2 The Central Bank

Earlier established central banks had completely different role than monetary policy. Their main skill being to improve the government's ability to borrow money in times of war, many of them being established during some wars or immediately after their end

(Timberlake, 1993; Wilson 1957; Hamilton, 1945). The central banks' roles reflected the history, and were created to meet the needs of those times. Meanwhile, older functions such as monetary policy are different now, compared to beginning periods. Initially, the main functions of central banks' early forms were the issuing of banknotes and governments' bankers (these regnant banks became the classic choice for governments' banking activity), and later some central banks (e.g. in Austria, France, Portugal and Spain) were established to rebuild the monetary stability and the currencies' credibility, the primary motivation being survival, and not necessarily wider macroeconomic issues. In time these regnant banks became bankers of the banking system and for economic reasons they provided loans for bank customers to cover their lack of liquidity, turning into lenders of last resort, but also in banking system supervisors, different function from the current one only and for pursuing their own economic interest and not the protection of the system as a national goal (Criste & Lupu, 2014).

The central bank is the independent financial institution responsible for executing the monetary policy and supervising the smooth operation of the financial system. Some of the central banks in Africa include; central bank of Angola, Bank of Ghana, Bank of Botswana, central Bank of Djibouti, Reserve Bank of Malawi, South African Reserve Bank to mention a few. A central bank can only operate a truly independent monetary policy when the exchange rate is floating. If the exchange rate is pegged or managed in any way, the central bank will have to purchase or sell foreign exchange. These transactions in foreign exchange will have an effect on the monetary base analogous to open market purchases and sales of government debt; if the central bank buys foreign exchange, the monetary base expands, and vice versa. But even in the case of a pure floating exchange rate, central banks and monetary authorities can at best "lean against the

wind" in a world where capital is mobile. Accordingly, the management of the exchange rate will influence domestic monetary conditions. To maintain its monetary policy target, the central bank will have to sterilize or offset its foreign exchange operations. For example, if a central bank buys foreign exchange (to counteract appreciation of the exchange rate), base money will increase. Therefore, to sterilize that increase, the central bank must also sell government debt to contract the monetary base by an equal amount. It follows that turbulent activity in foreign exchange markets can cause a central bank to lose control of domestic monetary policy when it is also managing the exchange rate.

2.2.1 Monetary Policy

Monetary policy is the process by which the monetary authority of a country controls the supply of money, often targeting a rate of interest for the purpose of promoting economic growth and stability (Yeyati & Sturzenegger, 2010). The official goals usually include relatively stable prices and low unemployment. Monetary theory provides insight into how to craft optimal monetary policy. It is referred to as either being expansionary or contractionary. Expansionary monetary policy increases the total supply of money in the economy more rapidly than usual. Expansionary policy is traditionally used to try to combat unemployment in a recession by lowering interest rates in the hope that easy credit will entice businesses into expanding. Contractionary monetary policy on the other hand expands the money supply more slowly than usual or even shrinks it by raising interest rate. This policy is intended to slow inflation in order to avoid the resulting distortions and deterioration of asset values. Furthermore, monetary policies are described as follows: accommodative, if the interest rate set by the central monetary authority is intended to create economic growth; neutral, if it is intended neither to create growth nor combat inflation; or tight if intended to reduce inflation.

Monetary policy, to a great extent, is the management of expectations (Svensson, 2004). Monetary policy rests on the relationship between the rates of interest in an economy, that is, the price at which money can be borrowed, and the total supply of money. Monetary policy uses a variety of tools to control one or both of these, to influence outcomes like economic growth, inflation, exchange rates with other currencies and unemployment. Where there is a regulated system of issuing currency through banks which are tied to a central bank, the monetary authority has the ability to alter the money supply and thus influence the interest rate (to achieve policy goals). There are several monetary policy tools available to achieve these objectives: increasing interest rates by fiat (legally binding command or decision); reducing the monetary base; and increasing reserve requirements. All have the effect of contracting the money supply; and, if reversed, expand the money supply.

2.2.2 Monetary Policy Tools

Monetary policy tools are instruments that the central bank of a country adopts to control the supply of money in an economy. The primary monetary tools include;

- Open Market Operations
- The Discount Rate
- Reserve Requirement

2.2.2.1 Open Market Operation

Open market operations are essentially the buying and selling of government-issued securities (such as treasury bills, company bonds, or foreign currencies) by the central bank. It is the primary method by which monetary policy is formulated. The short-term purpose of these operations is to obtain a preferred amount of reserves held by the central

bank and/or to alter the price of money through the federal fund rate. Usually, the short term goal of open market operations is to achieve a specific short term interest rate target. When the central bank decides to buy government securities say, T-bills from the market, its aim is to increase liquidity in the market, or the supply of money, which in turn decreases the cost of borrowing, or the interest rate. On the other hand, a decision to sell T-bills to the market is a signal that the interest rate will be increased. This is because the action will take money out of the market (too much liquidity can result in inflation), therefore increasing the demand for money and its cost of borrowing.

2.2.2.2 The Discount Rate

The discount rate is essentially the interest rate that commercial banks and other depository institutions are charged to borrow from the central bank. Central banks normally commercial banks and other depository institutions are able to borrow reserves from the Central Bank to meet temporary shortages of liquidity caused by internal or external disruptions. This creates a stable financial environment where savings and investment can occur, allowing for the growth of the economy as a whole. The central bank can affect the economic environment, and thus unemployment and economic growth.

The central bank can affect the volume of discount loans by setting the discount rate: A higher discount rate makes discount borrowing less attractive to commercial banks and will therefore reduce the volume of discount loans. A lower discount rate makes discount borrowing more attractive to banks and will therefore increase the volume of discount loans. Discount lending is most important during financial panics: when depositors lose confidence in the financial system, they will rush to withdraw their money. This large deposit outflow puts the banking system in great need of reserves. It is therefore the role of

the central bank stands ready to supply these reserves by making discount loans. In such situations, the central acts as a lender of last resort. The volume of discount loans can be influenced by the central bank, but not completely controlled when used in normal times without any financial panic. The central bank cannot be sure how many banks will request discount loans at any given interest rate.

2.2.2.3 Reserve Requirements

The reserve requirement is the amount of money that a depository institution is obligated to keep with the central bank, in order to cover its liabilities against customer deposits. The Board of Governors decides the ratio of reserves that must be held against liabilities that fall under reserve regulations. Thus, the actual currency amount of reserves held in the vault is dependent on the amount of the depository institution's liabilities.

The monetary authority exerts regulatory control over commercial banks. Monetary policy can be implemented by changing the proportion of total assets that banks must hold in reserve with the central bank. Banks only maintain a small portion of their assets as cash available for immediate withdrawal; the rest is invested in illiquid assets like mortgages and loans. Central banks typically do not change the reserve requirements often as it can create volatile changes in the money supply and may disrupt the banking system. By affecting the money multiplier, changes in the required reserve ratio can lead to changes in the money supply.

Large changes in reserves must be approved by legislature and therefore cannot be made quickly and easily. Also, if a bank holds only a small amount of excess reserves and the required reserve ratio is increased, the bank will have to quickly acquire reserves by

borrowing, selling securities, or reducing its loans. Each of these three options is costly and disruptive. Hence, changes in reserve requirements can cause problems for banks by making liquidity management more difficult.

2.3 Monetary Policy Strategies

Developing countries may have problems establishing an effective operating monetary policy. The primary difficulty is that few developing countries have deep markets in government debt. The matter is further complicated by the difficulties in forecasting money demand and fiscal pressure to levy the inflation tax by expanding the monetary base rapidly. In general, the central banks in many developing countries have poor records in managing monetary policy. This is often because the monetary authority in a developing country is not independent of government, so good monetary policy takes a backseat to the political desires of the government or are used to pursue other non-monetary goals. For this and other reasons, developing countries that want to establish credible monetary policy may institute a currency board or adopt dollarization. Such forms of monetary institutions thus essentially tie the hands of the government from interference and, it is hoped, that such policies will import the monetary policy of the anchor nation.

Monetary policy is an important policy instrument to achieve targeted results. However, its analysis is complicated by confusion over the objectives of monetary policy. Announced objectives may vary based on established priorities. In a small open economy, monetary policy may be targeting a fixed exchange rate. Concerns, however, may arise about inflation which may warrant an inflation targeting strategy. Alternatively, the priorities of monetary policy may aim at stabilizing real output growth. In developing countries, the

analysis of monetary policy has been hampered by the lack of a clear announcement of the direction of monetary policy (Kandil, 2014).

In practice, to implement any type of monetary policy the main tool used is modifying the amount of base money in circulation. The monetary authority does this by buying or selling financial assets (usually government obligations). These open market operations change either the amount of money or its liquidity (if less liquid forms of money are bought or sold). The multiplier effect of fractional reserve banking amplifies the effects of these actions. Constant market transactions by the monetary authority modify the supply of currency and this impacts other market variables such as short term interest rates and the exchange rate. Expansionary monetary policy is one that seeks to increase the size of the money supply. Conversely, contractionary monetary policy seeks to reduce the size of the money supply. Monetary policy is controlled by either a central bank or a finance ministry in most countries. Neoclassical and Keynesian economics significantly differ on the effects and effectiveness of monetary policy on influencing the real economy; there is no clear consensus on how monetary policy affects real economic variables (aggregate output or income, employment). This will be explained in details later in the literature review. Both economic schools accept that monetary policy affects monetary variables (price levels, interest rates).

2.3.1 Inflation Targeting

The inflation targeting approach to monetary policy approach was pioneered in New Zealand. It has been used in Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, Hungary, New Zealand, Norway, Iceland, India, Philippines, Poland, Sweden, South Africa, Turkey, and the United Kingdom. According to Bernanke & Mishkin

(1997), the hallmark of inflation targeting is the announcement by the government, central bank or some combination of the two that in the future the central will strive to hold inflation at or near some numerically specified level. Initial announcements of inflation targeting generally allow for a gradual transition from the current level of inflation to a desired steady-state level, usually the level deemed consistent with price stability. To understand the essence of an inflation targeting strategy it is instructive to abstract at first from uncertainty and examine how a policymaker would pursue his long-run inflation objective, defined as a numerical target when faced with an initial inflation level that differs from this target in a deterministic setting. Inflation targets are more often than not specified ranges.

In its purest form, an inflation zone targeting strategy differentiates the required policy stance depending on whether the inflation rate deviates substantially from the target or is fairly close to it. When inflation deviates substantially from its target the policymaker takes action to bring inflation back closer to its target. However, when inflation is fairly close to target the policymaker does not actively pursue further improvements. This strategy implicitly defines an inaction zone for inflation. Inflation targets are more often than not specified ranges. An important aspect of any inflation targeting framework is the choice of a target range versus a point target for inflation (Orphanides & Wieland, 2000). For example, New Zealand, which became the first country to adopt a formal inflation targeting framework in 1990, stated the target as a range. Starting with a target range of 3-5%, the authorities defined a path toward price stability by successively reducing the range until reaching 0-2% in December 1993. The 0-2% target was intended as a true zone, with a hard' floor and ceiling (Nicholl & Archer, 1992).

The inflation target is achieved through periodic adjustments to the Central Bank interest rate target. The interest rate used is generally the interbank rate at which banks lend to each other overnight for cash flow purposes. The interest rate target is maintained for a specific duration using open market operations. Interest rates and the inflation are directly related and the likely moves of the central bank to raise or lower interest rates become more transparent under the policy of inflation targeting. If inflation rate is above the target, the central bank is likely to raise interest rates. However, if inflation appears to be below the target, the central bank is likely to lower interest rates. Under the policy, investors know what the central bank considers the target inflation rate to be and therefore may more easily factor in likely interest rate changes in their investment choices. This is viewed by inflation targeters as leading to increased economic stability.

Typically the duration that the interest rate target is kept constant will vary between months and years. This interest rate target is usually reviewed on a monthly or quarterly basis by a policy committee. Changes to the interest rate target are made in response to various market indicators in an attempt to forecast economic trends and in so doing keep the market on track towards achieving the defined inflation target. For example, one simple method of inflation targeting called the Taylor rules. Taylor rules are simple monetary policy rules that prescribe how a central bank should adjust its interest rate policy instrument in a systematic manner in response to developments in inflation and macroeconomic activity. The rule was proposed by John B. Taylor of Stanford University.

Ajilore & Ikhide (2013) tests the policy irrelevance proposition in the inflation targeting monetary policy environment in South Africa, as well as in the context of a dichotomy between anticipated and unanticipated policy shocks. Findings from estimates of monetary

policy reaction function confirmed that an open economy implicit Taylor rule characterised the monetary policy instrument in South Africa, providing evidence that suggests that the monetary policy has, indeed, been conducted systematically on the basis of information from past inflation and the output gap. While aggregates of evidence invalidates rational expectations' PIP proposition in South Africa, doubts exists about the capacity of inflation targeting monetary policy in curbing inflationary pressures in the economy. For policy, this study supports calls for supplementing the inflation targeting framework with targets for other real variables, such as output and employment.

Nonetheless, Bonga-Bonga & Kabundi (2009) concludes that inflation rate targeting as applied in South Africa does not help to curb inflation and credit demand by the private sector remains immune to central bank policy. The study then posits that like in the USA, a dual inflation and employment (real output) target may be an option to consider for monetary policy in a developing country such as South Africa.

2.3.2 Price Level Targeting

Svensson (1999), Woodford (1999), and Vestin (2006) find that for policy under discretion price level targeting is superior to inflation targeting in a closed economy because price level targeting produces a better output-inflation tradeoff than inflation targeting. In addition, from a theoretical perspective price-level targeting offers a better output-inflation variability tradeoff than inflation targeting in the forward looking New Keynesian Framework (Guender & Oh, 2006). Price level targeting is a monetary policy that is similar to inflation targeting except that CPI growth in one year over or under the long term price level target is offset in subsequent years such that a targeted price-level is reached over time, e.g. five years, giving more certainty about future price increases to

consumers. Under price-level targeting, the central bank announces a constant or slowly evolving target for the price level. The distinguishing feature of price level targeting is that the policymaker is obliged to offset past shocks to the price level to achieve the target level in every period. Implementing price level targeting causes high volatility in inflation in the short run but ensures a great deal of certainty about the behavior of the price level in the long run (Fischer, 1995).

Under inflation targeting what happened in the immediate past years is not taken into account or adjusted for in the current and future years. Inflation targeting is forward looking as its goal is to stabilize the growth rate in price. In contrast, price level targeting builds in a backward looking element because the target is the level of price. Uncertainty in price levels can create uncertainty around price and wage setting activity for firms and workers, and undermines any information that can be gained from relative prices, as it is more difficult for firms to determine if a change in the price of a good or service is because of inflation or other factors, such as an increase in the efficiency of factors of production, if inflation is high and volatile. An increase in inflation also leads to a decrease in the demand for money, as it reduces the incentive to hold money and increases transaction costs and shoe leather costs.

2.4 Fiscal Policy

In economics and political science, fiscal policy is the use of government revenue collection (taxation) and expenditure (spending) to influence the economy (Arthur & Sheffrin, 2003). Governments use fiscal policy to influence the level of aggregate demand in the economy to achieve economic objectives such as price stability, full employment, and economic growth. Keynesian economics suggests that decreasing government

spending and increasing taxes after the economic boom begins and increasing government spending and decreasing tax rates are the best ways to stimulate aggregate demand. Keynesians argue this policy be used in times of recession or low economic activity as an essential tool for building the framework for strong economic growth and working towards full employment.

Fiscal policy can also be used in order to either stimulate a sluggish economy or to slow down an economy that is growing at a rate that is getting out of control. One thing to remember concerning fiscal policy is that a recession is generally defined as a time period of at least two quarters of consecutive reduction in growth. It may take time to even recognize whether or not there is a recession. With fiscal policy, there are certain levels of lag time in which conditions will deteriorate before being recognized. At the same time, fiscal policy takes time to implement due to legislative and administrative processes, and those same policies will take time to show results after implementation. Consumers can also react to these policies positively or negatively. Most consumers would have a positive reaction per say to a policy that lowers taxes, while some will have an issue with a government spending more which will increase the burden of debt on nation's citizens.

2.4.1 How does the fiscal policy work?

When policymakers seek to influence the economy, they have two main tools at their disposal—monetary policy and fiscal policy. Central banks indirectly target activity by influencing the money supply through adjustments to interest rates, bank reserve requirements, and the sale of government securities and foreign exchange; governments influence the economy by changing the level and types of taxes, the extent and composition of spending, and the degree and form of borrowing. Governments directly and

indirectly influence the way resources are used in the economy. The basic equation of national income accounting helps show how this happens:

GDP = C + I + G + NX.

On the left side is gross domestic product (GDP)—the value of all final goods and services produced in the economy. On the right side are the sources of aggregate spending or demand—private consumption (C), private investment (I), purchases of goods and services by the government (G), and exports minus imports (net exports, NX). This equation makes it evident that governments affect economic activity (GDP), controlling G directly and influencing C, I, and NX indirectly, through changes in taxes, transfers, and spending. Fiscal policy that increases aggregate demand directly through an increase in government spending is typically called expansionary or "loose." By contrast, fiscal policy is often considered contractionary or "tight" if it reduces demand via lower spending.

Besides providing goods and services, fiscal policy objectives vary. In the short term, governments may focus on macroeconomic stabilization—for example, stimulating an ailing economy, combating rising inflation, or helping reduce external vulnerabilities. In the longer term, the aim may be to foster sustainable growth or reduce poverty with actions on the supply side to improve infrastructure or education. Although these objectives are broadly shared across countries, their relative importance differs depending on country circumstances.

In the short term, priorities may reflect the business cycle or response to a natural disaster—in the longer term, the drivers can be development levels, demographics, or resource endowments. The desire to reduce poverty might lead a low income country to tilt spending toward primary health care, whereas in an advanced economy, pension reforms

might target looming long-term costs related to an aging population. In an oil-producing country, fiscal policy might aim to moderate procyclical spending—moderating both bursts when oil prices rise and painful cuts when they drop.

Fiscal policy is a type of economical intervention where the government injects its policies into an economy in order to either expand the economy's growth or to contract it. By changing the levels of spending and taxation, a government can directly or indirectly affect the aggregate demand, which is the total amount of goods and services in an economy. Fiscal policy has an effect on each of these categories. There are two types of fiscal policy: Expansionary and Contractionary.

2.4.2 Expansionary Fiscal Policy

This type of fiscal policy results in increased government spending and/or lower taxes usually when the economy is in a recession. A recession is a significant decline in the activities across the economy for a period and it usually results in a recessionary gap – meaning that aggregate demand (i.e. GDP) is at a level lower than it would be in a full employment situation. In order to close this gap, a government will typically increase their spending which will directly increase the aggregate demand curve (since government spending creates demand for goods and services). At the same time, the government may choose to cut taxes, which will indirectly affect the aggregate demand curve by allowing for consumers to have more money at their disposal to consume and invest. The actions of this expansionary fiscal policy would result in a shift of the aggregate demand curve to the right, which would result closing the recessionary gap and helping an economy grow.

2.4.3 Contractionary Fiscal Policy

Contractionary fiscal policy is essentially the opposite of expansionary fiscal policy. When an economy is in a state where growth is at a rate that is getting out of control (causing inflation and asset bubbles), contractionary fiscal policy can be used to rein it in to a more sustainable level. If an economy is growing too fast or for example, if unemployment is too low, an inflationary gap will form. In order to eliminate this inflationary gap a government may reduce government spending and increase taxes. A decrease in spending by the government will directly decrease aggregate demand curve by reducing government demand for goods and services. Increases in tax levels will also slow growth, as consumers will have less money to consume and invest, thereby indirectly reducing the aggregate demand curve.

2.4.4 Fiscal measures for correcting excess and deficient demands

Fiscal policy is the policy under which the government of a country uses fiscal measures (or instruments) to correct excess demand and deficient demand and to achieve other desirable objectives. There are mainly three types of fiscal measures;

a. Taxes

b. Public expenditure

c. Public borrowing

2.4.4.1 Taxes

Excess of aggregate demand over aggregates supply is caused due to the excess amount of money income is the hands of the people in relation to the available output in the country. In order to correct such situation personal disposable incase should be reduced. Therefore, government should increase the rate of personal income tax, and corporate income tax so

that people will have less money in their hands and aggregates demand will fall. On the other hand, deficient demand is caused due to low level of personal disposable income. Therefore, government of a country should reduce the rate of direct taxes such as personal income tax, and corporate tax.

2.4.4.2 Public expenditure

Public expenditure is an important component of aggregate demand. Therefore, excess demand can be corrected by reducing government expenditure. Reduction in government expenditure also leads to a decline in the volume of national income due to the backward operation of investment multiplier. Reduction in national income leads to a decline in aggregate demand and fall in the price level. On the other hand, government should increase expenditure on public works programmes such as the construction of roads, expansion of railways, setting up of power projects, construction of irrigation projects, schools and colleges, hospitals and parks and so on. Besides, government should also enhance expenditure on social security measures, like old age pensions, unemployment allowances, sickness benefits etc. As a result, national income would rise due to the operation of multiplier and aggregate demand for goods would expand.

2.4.4.3 Public Borrowing

Like tax and public expenditure, public borrowing is also an important anti – inflationary instrument. Government of a country should resort to borrowing from the non-bank public to keep less money in their hands for correcting the state of excess demand and inflationary situation. On the other hand, to correct deficient demand, government should reduce borrowing from the general public so that purchasing power in the hands of the

people is not reduced. Rather, government should repay the past loans to the people to increase their disposable income.

Besides the above fiscal measures, government should resort to deficit financing to correct deficient demand. Deficit financing is a technique of financing a deficit budget by (i) printing notes, and (ii) borrowing from the central bank or drawing down the cash balances on part of the government from the central bank. In any case, deficit financing makes an addition to the total money supply of the country and can correct deficient demand. However, deficit financing beyond a limit may produce inflationary situation in a country. Therefore, deficit financing must be kept within a limit and should be used with caution and care. However, fiscal measures alone cannot eliminate the situations of excess demand and deficient demand.

2.5 IS-LM Model

The IS/LM model is a macroeconomic tool that demonstrates the relationship between interest rates and real output in the goods and services market and the money market. The intersection of the IS and LM curves is the "General Equilibrium" where there is simultaneous equilibrium in both markets (Gordon 2009). IS/LM stands for Investment Saving / Liquidity preference Money supply.

This model has two schedules that reflect the equilibrium in two markets: goods and money. In other words, one schedule represents the market in which the supply of goods is equal to the demand of goods, and the other schedule represents the market in which the supply of money is equal to the demand of money.

2.6 Empirical Reviews

The empirical literature has generally agreed on a consensus view with regards to the empirical effects of monetary policy shocks. However, due to difficulties in accurately identifying fiscal policy shocks, there has been no consensus on the effects of fiscal policy shocks. First, there is the difficulty in identifying whether movements in fiscal variables are due to fiscal policy shocks or are automatic stabilising movements in response to other shocks (Blanchard & Perotti, 2002; Mountford & Uhlig, 2009). Second, for governments striving to maintain the budget and public debt at a stable level, changes in public spending or taxes may then be of an anticipatory nature. Extensive research have been done in this area in the US and other European economies but little has been in Africa. Most of the existing empirical literature typically focuses either on monetary or fiscal policy and not the combination.

2.6.1 Effects of Monetary Policy Shocks

In recent years there has been a great deal of work on developing monetary models of business cycles. There have been many empirical studies in measuring of exogenous shocks to monetary policy. The works of Bernanke et al. (2005), Christiano et al. (2000, 2005) and Romer & Romer (1994), inarguably provide explanations on monetary policy shocks. These studies come to a consensus on the main macroeconomic effects of a monetary policy shock. Following an increase in the short term interest rate, real activity measures and monetary aggregates such as the M1 money supply decline, prices eventually go down and the exchange rate appreciates. However, the little studies done in Africa state otherwise.

What happens after an exogenous shock to monetary policy? Christiano et al (2000) argued that this question lies at the center of a particular approach to assessing the empirical plausibility of structural economic models that can be used to think about systematic changes in monetary policy institutions and rules. They therefore, provided three economic interpretation to the policy shocks. The first is that, the stochastic error term reflects exogenous shocks to the preferences of the monetary authority perhaps due to stochastic shifts in the relative weight given to unemployment and inflation. These shifts could reflect shocks to the preferences of the members of the Federal Open Market Committee (FOMC) or to the weights by which their views are aggregated. A change in weights may reflect shifts in the political power of individual committee members or in the factions that they represent.

A second source of exogenous variation in policy can arise because of the strategic considerations developed in Ball (1995) and Chari et al. (1997). These authors argue that the Fed's desire to avoid the social costs of disappointing private agents' expectations can give rise to an exogenous source of variation in policy like that captured by the error term. Specifically shocks to private agents' expectations about fed policy can be self-fulfilling and lead to exogenous variations in monetary policy. The third source of exogenous variation in Fed policy could reflect various technical factors. For one set of possibilities, see Hamilton (1997). Another set of possibilities, stressed by Bernanke and Mihov (1995), focuses on the measurement error in the preliminary data available to the FOMC at the time it makes its decision. Their literature could not yet converged on a particular set of assumptions for identifying the effects of an exogenous shock to monetary policy. Notwithstanding that, their study agreed about the qualitative effects of a monetary policy shock in the sense that inference is robust across a large subset of the identification

schemes that have been considered in the literature. They documented the nature of this agreement as it pertains to key economic aggregates.

Romer & Romer (2004), on the other hand developed a new measure of U.S. monetary policy shocks for the period 1969–1996 that is relatively free of endogenous and anticipatory movements. Their study used quantitative and narrative records to infer the Federal Reserve's intentions for the federal funds rate around FOMC meetings. This series was regressed on the Federal Reserve's internal forecasts to derive a measure free of systematic responses to information about future developments. Estimates using the new measure indicated that policy had large, relatively rapid, and statistically significant effects on both output and inflation. The effects are substantially stronger and quicker than those obtained using conventional indicators.

The use of inappropriate measure distorts a relationship between monetary policy and other economic variables that actually exists, or create the appearance of a relationship where there is no true causal link. For this reason their study derived a new measure of monetary policy shocks that is free from some key deficiencies of previous measures. Their new measure yields estimates of the impact of monetary policy on both real and nominal variables that are stronger and faster than those obtained using conventional indicators. The likelihood of endogenous movements and the money supply, for example, tends to rise in good times because the money multiplier rises are few of the many flaws of the conventional measures. In determining how monetary policy affects the economy is critically important both for distinguishing between competing theories of fluctuations and for conducting policy. To derive more accurate estimates of the effects of policy, their proposed and implemented a new method for isolating monetary policy shocks. They

considered only changes in the federal funds rate that are the result of deliberate decisions by the Federal Reserve made at meetings for which there is a forecast prepared by the staff. We then remove the portions of these moves in the intended funds rate that represent the Federal Reserve's usual response to the forecasts. The resulting series should be largely free of interest rate movements that are either endogenous responses to economic developments or attempts by policy makers to counteract likely future developments. The movements in output and inflation in the wake of the new measure of monetary shocks should therefore reflect the impact of monetary policy, and no other factors.

Their estimates of the effects of policy using the new shock series indicated that monetary policy has large and statistically significant effects on real output. Qualitatively, their findings are very consistent with textbook views of the effects of monetary policy. Contractionary monetary policy reduces both output and inflation. Both effects occur with a lag, with output moving before inflation. Quantitatively, the results suggested that the lags in the output effects are fairly short, while the lags in the inflation effects are harder to determine. More importantly, the results indicate that the impacts of monetary policy on both output and inflation are large.

Contrary to Romer & Romer (2004), Bonga-Bonga & Kabundi (2009), in assessing the effectiveness of the monetary policy in South Africa, made use of the structural vector error correction model (SVECM) to characterize the dynamics of inflation to monetary policy shocks. They found that the impulse response function obtained from the SVECM showed that while positive shocks to monetary policy decrease output, they do not decrease credit demand and inflation in South Africa.

Monetary policy shock is, as expected, growth dampening while both anticipated and unanticipated shocks increase rather than moderate prices, raising doubts about inflation being a monetary phenomenon in South Africa (Ajilore & Ikhide, 2013). There seem to be different findings to the effects of monetary policy shocks in Africa. While the finding from the studies in the US were quite similar, that of Africa is different. Gumata et al. (2013) investigated the different channels of transmission of monetary policy shock in South Africa. The benefit of their framework was its ability to handle different channels of transmission of monetary policy simultaneously, instead of using different models. Their model included five channels of transmission namely; credit, interest rate, asset prices, exchange rate, and expectations. Their findings showed that all channels seem potent, but their magnitudes and importance differ. They indicated that the interest rate channel is the most important transmitter of the shock, followed by the exchange rate, expectation, and credit channels. The asset price channel was somewhat weak. They also found the short- and long-term interest rates react quickly upon impact and are forcefully transmitted to real and nominal variables. GDP, consumption expenditure and investment drop and recover slowly. Similarly, prices declined, but the impact was not permanent.

The adoption of the small scale VAR could not provide better results as some data will be missing and the possibility that the model could not capture or produce the required results. A data-rich environment and also better econometric model (FAVAR) could solve the puzzling results observed in most small-scale VAR models (Fry-McKibbin & Zheng, (2012), Bernanke et al, (2005). Furthermore, asset price prices, both stock prices and house prices, were affected by contractionary monetary policy. Although their study did not comprehensively address the risk-taking channel of monetary policy, the results showed that the ratio of deposits to liability show an important decline right after the shock;

consequently, financial institutions record a rise of non-performing loans (NPLs). In addition, financial intermediaries deleverage quickly following an increase in short-term rates. The ratio of total equity and liabilities to total liabilities shrunk, indicating the negative effects of monetary policy on the size of the balance sheet of banks. This implies that a contractionary monetary policy reduces risk-taking behaviour of banks, which is common in lower interest rate regimes.

Ncube & Ndou (2013) compared the effects of one standard deviation contractionary monetary policy and exchange rate appreciation shocks on the South African trade balance using recursive and sign-restriction VAR approaches found that the contractionary monetary policy shocks affect the trade balance through the expenditure switching channel rather than the income channel. The study further stressed that monetary policy shocks worsen the trade balance through the imports rather than the exports component. Contractionary monetary policy shock again worsens the trade balance at the peak. They reported that the trade-weighted exchange rate appreciation shocks worsened the trade balance as percentage of GDP for longer periods than contractionary monetary policy shocks. The contractionary monetary policy operated through the expenditure-switching channel rather than the income channel in the short run to lower the net trade balance.

Monetary policy is an important policy instrument to achieve targeted results. However, its analysis complicated, by confusion over the objectives of monetary policy. Considering the above empirical literature it seems there are different effects of monetary policy shocks with respect to a particular economy. Announced objectives may vary based on established priorities. In a small open economy, monetary policy may be targeting a fixed exchange rate. Concerns, however, may arise about inflation which may warrant an inflation

targeting strategy. Alternatively, the priorities of monetary policy may aim at stabilizing real output growth. In developing countries, the analysis of monetary policy has been hampered by the lack of a clear announcement of the direction of monetary policy.

Kandil (2014) used annual data for a sample of developing countries and the time-series evidence indicated the allocation of monetary policy shocks, both expansionary and contractionary, between price inflation and output growth. Subsequently, cross-country regressions evaluate factors that underlie the difference in these allocations and their implications. The real effects of monetary shocks increase as the elasticity of aggregate demand increases with respect to monetary shocks. Nonetheless, capacity constraints hamper the output adjustment to monetary shocks and increase price inflation. Across countries, trend output growth increases with the output response to monetary shocks. Consistent with the stabilizing function of monetary policy, the variability of output growth decreases in the face of monetary fluctuations across countries. In contrast, monetary fluctuations increase the trend and variability of price inflation across countries.

2.6.2 Effects of Fiscal Policy Shocks

Fiscal policy has been used extensively for a long time to stabilize the economy and to foster more efficient, fairer and equitable societies. This is among the reasons why there exists a long tradition in the analysis of fiscal policy in Africa. Issues of fiscal stimulus, a growing debt-to-GDP ratio and the fiscal deficit have brought much attention in recent years. The latest developments (in the US and developed economies) in the analysis of fiscal policy include Ramey (2011), Galí et al. (2007), Perotti (2005, 2007), Blanchard & Perotti (2002), Fatás & Mihov (2001), and Ramey & Shapiro (1998) focus on government spending shocks. A positive output response is consistent with both Keynesian and

neoclassical theories. However, there is no consensus on the effects of government. In the case of neoclassical theories, a positive output response occurs only if the increase in government spending is financed by non-distortionary taxes spending shocks on macroeconomic variables (Fry-McKibbin & Zheng, 2012). With regards to the responses of the real wage and employment, Perotti (2007) provides evidence that the real wage persistently and significantly increases while employment does not react. Burnside et al. (2004) and Eichenbaum & Fisher (2005) however show that the real wage and employment persistently and significantly falls and increases respectively.

Different empirical studies have reported different impact of private consumption. Perotti (2005, 2007), studied the effects of fiscal policy on GDP, inflation and interest rates in 5 OECD countries using a structural VAR approach. They found that there is no evidence that tax cuts work faster or more effectively than spending increases. The effects of government spending shocks and tax cuts on GDP and its components have become substantially weaker over time; in the post-1980 period these effects are mostly negative, particularly on private investment. Only in the post-1980 period is there evidence of positive effects of government spending on long interest rates. Blanchard & Perotti (2002) and Fatás & Mihov (2001), report that private consumption significantly and persistently increase in response to a positive government spending shock. Comparing the dynamic impact of fiscal policy on macroeconomic variables, implied by a large class of general equilibrium models with the empirical results from an identified VAR. Fatas & Mihov (2001) explained that positive innovations in government spending are followed by strong and persistent increases in consumption and employment. They compared their findings to several variations of a standard real business cycle model and concluded that increases in government spending are expansionary with a multiplier larger than one. That is to say,

output increases more than one-to-one. This increase is largely driven by increases in private consumption. They however reported that investment does not react significantly to increases in government spending. Edelberg et al. (1999) and Mountford & Uhlig (2009) also provide evidence that the response of private consumption is close to zero and statistically insignificant over the entire impulse response horizon. Mountford and Uhlig (2009) presented a new approach for distinguishing the effects of fiscal policy shocks by adapting the method of Uhlig (2005). This method used only the information in the macroeconomic time series of the VAR together with minimal assumptions to identify fiscal policy shocks. The study analyzed three types of policy scenarios: a deficit financed spending increase, a balanced budget spending increase (financed with higher taxes) and a deficit financed tax cut, in which revenues increase but government spending stays unchanged. They found that a deficit spending scenario stimulates the economy but only weakly compared to that for a deficit financed tax cut. However both types of spending scenario had the effect of crowding out investment.

Ramey (2011) finds evidence that private consumption persistently and significantly falls over short and long horizons in response to a positive government spending shock. The study explored one possible explanation for the dramatically different results between standard VAR methods and the narrative approach for identifying shocks to government spending. It was shown that the narrative approach shocks appeared to capture the timing of the news about future increases in government spending much better. In fact, these shocks Granger-cause the VAR shocks. The theoretical results showed how timing can account for all of the difference in the results across the two methods (see also Perotti, 2004). Because the VAR approach captures the shocks too late, it misses the initial decline in consumption and real wages that occurs as soon as the news is learned. It was further

shown that delaying the timing on the Ramey-Shapiro dates replicates the VAR results. The study used a new series of narrative-based shocks that are richer and more frequent than the original series. When these shocks were used in a VAR, they led to declines in consumption and real wages. After exploring the above literature it is interesting to note that these studies agree that positive government spending shocks have persistent output effects, regardless of the chosen empirical methodology.

Fiscal policy has contributed significantly in stimulating demand during the recent 2008/09 fiscal crisis. Other studies conducted in Africa provide different results with respect the explanation of the effects of fiscal policy shock in an economy. An extensive research done by Ocran (2010**)** estimated 5 VAR models in an effort to investigate the effects of fiscal policy via government expenditures increases, tax revenue and budget increases on the South African economy. Structural VARs based on the Blanchard-Quard decomposition identification scheme were used in the empirical analysis. The results suggest that the fiscal policy instruments have varied effects on output and interest rates. The effect of the fiscal policy on output appears to be quite modest but persistent; however, the response from interest rate is temporary and substantial most cases. While shocks from the various fiscal policy variables considered in the study gave mixed results, there appear to be a common strand running through the analyses of the responses elicited from output. Fiscal policy shocks via government investment expenditure, government consumption expenditure, tax revenue or budget deficit have a modest but persistent effect on real output. Nonetheless, the direction of impact was positive for shocks from tax revenues and budget deficit but negative for innovations originating from government investment and consumption expenditures. The outcome due to shocks from tax revenue is consistent with the findings of Mirdala (2009), which examined the real output response to

shocks from tax revenue in a number of transition economies. Interestingly, the study observed a negative effect on output when the tax revenue innovations were considered within a system of endogenous variables that includes government consumption expenditure but negative when they had investment expenditure instead. The key policy implication of the study was that the impact of fiscal policy tools, such as government expenditures via gross fixed capital formation and consumption expenditures, are at best modest.

Aye et al (2012), in addition to examining the effects of anticipated and unanticipated revenue and spending shocks, also analysed three types of fiscal policy scenarios: a deficit-financed spending increase, a balanced budget spending increase (financed with higher taxes), and a deficit-financed tax cut (revenue decreases but government spending stays unchanged). Using South African quarterly data from 1966:Q1 to 2011:Q2, they showed that a deficit spending shock does not affect house prices, but temporarily exerts a positive effect on stock prices. With a deficit-financed tax cut shock, house prices increase persistently while stock prices increase quickly, but only temporarily. A balanced budget shock permanently decreases house prices and temporarily reduces stock prices.

The size of fiscal multipliers is sensitive to many factors; the methodology, the identifying restrictions, structural changes in fiscal policy and the effectiveness of fiscal policy implementation. Jooste et al (2013) therefore analysed the effect of aggregate government spending and taxes on output for South Africa using three types of a calibrated dynamic stochastic general equilibrium (DSGE) model and more data driven models such as a structural vector error correction model (SVECM) and a time-varying parameter VAR (TVP-VAR) to capture possible asymmetries and time variation of fiscal impulses. Their

study was the first one to analyze fiscal policy in a macroeconomic environment for the South African economy using different methodologies. They showed that fiscal policy has been effective in stimulating both output and consumption. A closed economy typically yields larger multipliers which are in line with empirical findings, whereas an open economy reduces the multiplier.

However, that this is not the case with Shoag (2010); a closed economy with endogenous labour has the multiplier reduced. However, for South Africa, the multiplier is larger than one in countercyclical policy periods, indicating effective expenditure outcomes. The multiplier becomes less effective in periods where fiscal policy is procyclical. It clearly matters how liquid households are; the more they are able to save additional income, the lower the impact of a government shock to the economy. The time varying impulse responses show that government shocks have been effective in stimulating demand, however, persistent increases seem to reduce the effectiveness of spending. The impulse responses indicate first, that increases in government expenditure have a positive impact, albeit (at times) less than unity, on GDP in the short run; second, over the long run, the impact of government expenditure on GDP is insignificant; and third, increases in taxes decreases GDP over the short run, while having negligible effects over longer horizons.

2.6.3 The joint behaviour of monetary and fiscal policies

Much of the literature on fiscal-monetary policy behaviour has focused on whether monetary and fiscal policy operate as strategic complements or substitutes. Dixit and Lambertini (2000, 2001) examined the interdependence between the fiscal authority and the central bank in a model where the latter has only partial control over inflation, which is also directly affected by the fiscal policy stance. They show that in equilibrium the two

policy rules are complements when fiscal expansions have non-Keynesian (contractionary) effects on output and inflation.

Buti, Roeger & Veld (2001) suggest that the specific form of interdependence between fiscal and monetary policies, i.e. the alternative between strategic substitutability and complementarity, should not necessarily be interpreted in terms of conflict or cooperation, and might be shock-dependent. In their model supply shocks unambiguously induce conflicting policies, whereas the opposite holds true for demand shocks. Muscatelli et al. (2001) examined the interaction between fiscal and monetary policy instruments using conventional VAR and Bayesian VAR models for several G7 economies, and showed that the fiscal shocks identified in the VAR have a significant impact (Mountford & Uhlig, 2009). They found that the result of strategic substitutability does not hold uniformly for all countries. Moreover, they report strong evidence that the linkage between fiscal and monetary policy has shifted post-1980, when fiscal and monetary policies became much more complementary. The main problem with this empirical literature is that without a structural model it is difficult to interpret the empirical correlations between the two policy variables. In the work of Melitz (1997, 2000) and Wyplosz (1999) one cannot tell whether the correlation between the policy instruments over the cycle derives from systematic policy responses or from responses to structural or policy shocks. In the VARs estimated by Muscatelli et al. (2001) the focus is on the reaction of policy instruments to other policy shocks, but it is notoriously difficult to interpret implicit policy reaction functions in VARs especially if the true underlying structural model is forward-looking. More recently, Muscatelli et al. (2003) examine the interaction of monetary and fiscal policies using an estimated New Keynesian dynamic general equilibrium model for the US. In contrast to earlier work they show that the strategic complementarity or substitutability of fiscal and

monetary policy depends crucially on the types of shocks hitting the economy, and on the assumptions made about the underlying structural model.

Von Hagen et al. (2001) found that the interdependence between the two policymakers is asymmetric: looser fiscal stances match monetary contractions, whereas monetary policies broadly accommodate fiscal expansions. Muscatelli et al. (2004) further examined the interaction of fiscal and monetary policies by estimating a New-Keynesian dynamic general equilibrium model. The authors found that fiscal and monetary policies tend to work together in the case of output shocks, while they are used as substitutes following inflation shocks or shocks to either policy instrument. Mélitz (2002) uses two-stage-least squares and three-stage-least-squares and pooled data for 15 members of the European Union except Luxembourg and five other OECD countries to investigate the interaction between fiscal and monetary policies. The author finds that fiscal policy responds to the ratio of public debt to output in a stabilizing manner. An expansionary fiscal policy also appears to lead to a contractionary monetary policy, and vice versa, implying there is some coordination between macroeconomic policies.

2.7 Empirical Methodology

Empirical studies investigated the fiscal and monetary policy shocks using small-scale VAR or structural VAR models. They proposed various approaches to identifying these shocks. The first approach is an "event-based" approach introduced by Ramey & Shapiro (1998). This approach uses dummy variables to capture the effects of large unexpected increases in government spending. For example, one can use a dummy variable to trace the impact of the Reagan fiscal expansion period on output. This approach is not feasible if the

fiscal policy shocks the econometrician wants to investigate is anticipated or influenced by other shocks occurring at the same time.

The second approach identifies fiscal policy shocks by taking into account the long decision and implementation lags in fiscal policy and information about the elasticity of fiscal variables to economic activity. This approach is developed by Blanchard & Perotti (2002), and has been implemented in various studies such as Rossi & Zubairy (2012) Chung & Leeper (2007) and Favero & Giavazzi (2007). Perotti (2004) extended this approach to investigate the impact of fiscal policy shocks on inflation and interest rates in OECD countries.

The third approach relies on recursive ordering to identify fiscal or monetary policy shocks. In Fatás & Mihov (2001), government spending is ordered first on the assumption that other variables such as output cannot affect government spending contemporaneously. However, in Favero (2002), government spending is ordered last on the assumption that government spending can affect output contemporaneously. Bernanke et al. (2005) also uses a recursive ordering where the policy interest rate is ordered last to identify the monetary policy shock.

The fourth approach focuses on using sign restrictions on the impulse responses to identify fiscal policy shocks. This approach is first introduced by Uhlig (2005) and applied to fiscal policy analysis by studies such as Mountford & Uhlig (2009) and Dungey & Fry (2009). Also, Muscatelli et al. (2004), and Rossi & Zubairy (2011) use VAR models with sign restrictions to analyse the impact of fiscal policy shocks while controlling for a business cycle and monetary policy shock.

The last approach uses cointegrating relationships in VAR models to identify fiscal policy shocks. The use of such a framework implies that steady state relationships such as fiscal policy rules can be identified.

This study considers the third approach by investigating monetary and fiscal shocks in Africa simultaneously under a VAR framework with recursive ordering. Modelling fiscal and monetary policy reactions simultaneously allows for more precision of the effects of each policy and their reciprocal implications.

The next chapter presents the methodology and model specification of the VAR structure to be used to achieve the objectives of the study. It also discusses the various variables of interest, and gives the various methods to be used to identify the fiscal and monetary policy shocks.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents a description of the various methods and techniques which will be employed to achieve the study objectives. The chapter commences with a specification of the model for the study and then discusses the variables specified in the model. The sample and scope of the research are also explained, and then the data analysis tools to be used are specified.

3.2 Model Specification

This study seeks to examine the monetary and fiscal policy shocks on some macroeconomic variables in some selected countries in Africa over the period 1970 to 2013 using a vector autoregressive (VAR) framework. Sims (1980) introduced the VAR model as a technique that could be used by macroeconomists to characterize the joint dynamic behavior of a collection of variables without requiring strong restrictions of the kind needed to identify underlying structural parameters. As discussed in the introduction, an extensive literature has employed VARs to study the dynamic effects of innovations to monetary and fiscal policy on a variety of economic variables.

The VAR model has proven to be especially useful for describing the dynamic behavior of economic and financial time series and for forecasting a set of linear dynamic equations where each variable is specified as a function of an equal number of lags of itself and all other variables in system. In addition to data description and forecasting, the VAR model is also used for structural inference and policy analysis.

Algebraically, a VAR is a model in which k variables are specified as linear functions of p of their own lags, p lags of the other k - 1 variables, and possibly additional exogenous variables. This study however does not consider any exogenous variables. Thus, a p-order VAR model, written as VAR (p) can be expressed as;

$y_t = v + A_1 y_{t-1} + A_2 y_{t-2} + A_3 y_{t-3} + \cdots + A_p y_{t-p} + u_t$, $t \in \{0, \infty\}$, where;

$y_t = (y_{1t}, \ldots, y_{kt})'$ is a $k \times 1$ random vector of the dependent variables,

A_1 through A_p are $k \times k$ matrices of parameters,

v is a $k \times 1$ vector of coefficients, and

u_t is assumed to be white noise.

Thus, a vector autoregression is a system in which each variable is expressed as a function of own lags as well as lags of each of the other variables and the error terms are the surprise movements in the variables after taking past values into account.

3.3 Test for stationarity

However, it is worth mentioning that a test for variable stationarity will be performed before this. This study will employ the Philips-Perron (PP) and the Augmented Dickey Fuller (ADF) tests to determine the stationarity of the variables. Variables which are found not stationary at levels will be transformed by differencing to ensure stationarity.

3.4 Test for cointegration

This test is used in the study to determine if there may be a long run relationship between the variables under consideration. The popular Johansen cointegration test and the autoregressive distributed lag method will be used to test for this long run relationship. If such a long run relationship exists between the variables, a vector error correction model (VECM) will be adopted instead of the VAR model.

3.4.1 Determination of Lag Length

The determination of an appropriate lag length is often a trade-off between getting as precise a model as possible and autocorrelation of the error terms leading to apparently significant and inefficient estimates, if the lag length is too short. The common approach for selecting the lag length is the information criterion approach, primarily, the Akaike and Bayesian (Schwartz) information criteria (AIC and BIC) and the Hannan and Quinn information criterion (HQIC) lag-order selection. Thus, the lag length with the smallest AIC, BIC or HQIC values are considered optimal.

3.5 Identification of the VAR

The variables to be used in this study are as follows: government expenditure (Exp_t), net taxes (T_t), central bank rate (r_t), real GDP (GDP_t), CPI inflation (inf_t), and trade (Tr_t) and money supply ($M2_t$). These can be expressed in the VAR framework as the following set of equations;

$$Exp_t = \alpha_1 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$T_t = \alpha_2 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$R_t = \alpha_3 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$GDP_t = \alpha_4 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$Inf_t = \alpha_5 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$Tr_t = \alpha_6 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

$$M2_t = \alpha_7 + \sum_{j=1}^{k} B_{1j} Exp_{t-j} + \sum_{j=1}^{k} B_{2j} T_{t-j} + \sum_{j=1}^{k} B_{3j} R_{t-j} + \sum_{j=1}^{k} B_{4j} GDP_{t-j} + \sum_{j=1}^{k} B_{5j} Inf_{t-j} + \sum_{j=1}^{k} B_{6j} Tr_{t-j} + \sum_{j=1}^{k} B_{7j} M2_{t-j} + \varepsilon_t$$

These equations can be expressed in matrix form as;

$$\begin{bmatrix} Exp_t \\ T_t \\ R_t \\ GDP_t \\ Inf_t \\ Tr_t \\ M2_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \\ \alpha_6 \\ \alpha_7 \end{bmatrix} + \sum_{j=1}^{k} \begin{bmatrix} \beta_{1j}\ \beta_{2j} \cdots \beta_7 \\ \beta_{1j}\ \beta_{2j} \cdots \beta_7 \\ \vdots \\ \beta_{1j} \beta_{2j} \cdots \beta_7 \end{bmatrix} \begin{bmatrix} Exp_{t-j} \\ T_{t-j} \\ R_{t-j} \\ GDP_{t-j} \\ Inf_{t-j} \\ Tr_{t-j} \\ M2_{t-j} \end{bmatrix} + \varepsilon_t$$

3.5.1 Recursive VAR

This study employs a recursive VAR approach in properly identifying the fiscal and monetary policy shocks. A recursive VAR tries to identify the structure of the model by constructing the error terms in each regression to be uncorrelated with the error term in the preceding equation. This is done by adding carefully-selected contemporaneous values as regressors before estimating the equations. The recursive VAR amounts to estimating the reduced form, then computing the Cholesky factorization of the reduced form VAR covariance matrix (Lutkepohl, 1993).This procedure involves a recursive ordering of the variables in the VAR model.

The recursive ordering of the variables has implications on the variables in the VAR in the first period following the shock. This ordering strategy was extended from VAR systems with only two variables, to systems with more than two variables. The most popular use of this strategy was by Sims (1980). Sims (1980)'s VAR system involved six variables which was ordered as money supply, real output, unemployment, wages, prices, and imports. By this arrangement, Sims (1980) was able to impose an array of identifying restrictions about the contemporaneous effects of shocks on the variables of the system. Since the money supply was first, it meant that it could affect the rest of the variables in the system within

the current period. The next variable in the order was real output, which indicated that the shock to output can affect the rest of the variables except money immediately, because money lies above it on the list. The last variable in the order, imports, was assumed to have no contemporaneous effect on any of the other variables of the system.

Similarly, the variables used in this study are ordered from first to last as follows; government expenditure (Exp_t), net taxes (T_t), real GDP (GDP_t), CPI inflation (inf_t), trade (Tr_t), money supply ($M2_t$), and central bank rate (r_t). This implies that it is possible to have a contemporaneous taxation increase in response to a government expenditure shock. Ordering real GDP, inflation, trade and money supply after the fiscal variables captures the contemporaneous effects of public spending and tax changes on those macroeconomic variables. The study uses the central bank rate as the proxy for the monetary policy instrument and the government expenditure and taxes as proxies for the fiscal policy instruments. The monetary policy is ordered last since the central bank reaction function shows that the interest rate is set as a function of the output gap and inflation. The government expenditure and taxes as defined in this study are net of interest payments and are therefore not sensitive to interest rate changes.

Theil (1971) defined a system of this form as a recursive model, and Wold (1960) further advocated these types of models where the researcher specifies the instantaneous "causal" ordering of the variables, hence usually referred to as Wold-causality.

Interpretations of results obtained from a VAR model are usually difficult to make especially when the impacts of shocks in the system are of major interest. Two most popular approaches in VAR used to capture and explain these shocks are impulse response

functions (IRF's) and forecast error variance decomposition. These are therefore discussed below.

3.6 Impulse response functions (IRF)

Impulse-response functions (IRFs) measure the dynamic marginal effects of each shock on all of the variables over time (Phillips, 1998). In studying the impacts of shocks in a VAR system, interest is often in obtaining the impulse response functions. Jin Lung (2006) indicated that impulse responses measures the responses of current and future values of the variables under consideration to a unit increase in the current value of one of the VAR errors, assuming that this error returns to zero in subsequent periods and that all other errors are equal to zero. If the variables have different scales, it is sometimes useful to consider innovations of one standard deviation rather than unit shocks. It therefore identifies the effects of an exogenous shock on the whole process over time making it possible to detect the dynamic relationships between the variables over time.

Kilian (2001) asserted that the implied thought experiment of changing one error while holding the others constant makes most sense when the errors are uncorrelated across equations, so impulse responses are typically calculated for recursive and structural VARs. The impulse response function is usually depicted in graphical form to obtain a visual representation of the dynamic relationships within the system. This plot presents the response of an endogenous variable over time to a unit shock in another variable. If the impulse and response variables are the same, the plot of the impulse response function then shows how persistent shocks to the variable behaves.

It is worth mentioning that the main assumption up to this point was that the error terms of the different equations are uncorrelated. This assumption is however usually deviated from in practice. Hence to control for this correlation between error terms, most researchers utilize an orthogonal form of the impulse response sequence (Bernanke et al., 2005; Christiano, et al., 2000; Rossi, & Zubairy, 2011). This approach involves a modification of the original moving-average (MA) construction to make the residuals orthogonal to each other, and thus uncorrelated. This MA representation is referred to as the Cholesky decomposition. Thus, the study employs the Cholesky decomposition in imposing a recursive causal structure from the variables arranged from the top to the bottom.

3.7 Forecast error variance decomposition

In addition to the impulse response functions, the study employs a forecast error variance decomposition method in examining the shocks on the VAR system. This technique is an alternative to the impulse response function used in analyzing the dynamic structure of a VAR model. Similar to the impulse response function (IRF), this method is also based on a vector moving average model and orthogonal error terms. However, the approach is different to the IRF in the sense that the task of variance decomposition is to achieve information about the forecast ability of the VAR model. Thus, while impulse response functions trace the effects of a shock to one endogenous variable on to the other variables in the VAR, variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR model. In this vein, the variance decomposition provides information about the relative importance of each random innovation in affecting the variables in the VAR. Hence, this study determines the fraction of the forecasting error of a variable, at a given horizon, that is attributable to a particular shock thereby examining

how important each of the shocks is as a component of the overall (unpredictable) variance of each of the variables over time.

3.8 Data

The data on all three countries considered in this study was obtained from the World Bank World Development Index (WDI) and the International Monetary Fund (IMF) Africa database. These sources are updated constantly and are used by most researchers hence data obtained from them are considered legitimate. Also, the central bank websites of each country were explored to fill in the blanks for the periods for which data was unavailable in the earlier sources mentioned. The same or equivalent variables were collected for all the countries so that comparisons can be made between them. Logarithmic transformations of all the variables was performed in this study to make the variance of the series more homogeneous throughout the sample and thus increasing the precision in forecasting (Lütkepohl & Xu, 2009).

3.8.1 Definition of Variables

The study follows Blanchard & Perotti (2002) in the definition of the two variables used as proxies for the fiscal policy instruments. Thus total government expenditure is computed as total government consumption plus total government investment. Net Taxes representing government revenues is computed as total government tax revenues minus transfers. In addition, the CPI Inflation is measured by the change in the gross domestic product (GDP) deflator. The real GDP refers to the value of all goods and services produced in a given year in a country, adjusted for the effects of inflation. Money Supply (M2) is the broad money stock in the country defined as the amount of money in circulation plus money in accounts in banks. Trade serves as a measure to determine the

level of openness of the economy. It is computed as the ratio of total import plus export to GDP. Finally, the central bank rate also sometimes known as the base rate denotes the interest rate at which central banks advance short term loans to commercial banks in the country. Thus, it is the lending rate of the central bank to the commercial bank. It serves as an effective monetary policy mechanism since it influences the rates at which commercial banks lend to their customers thereby regulating the amount of money in the system.

3.8.2 Estimation

An important feature of the VAR model is that no current variables appear on the right-hand side of any of the equations. This indicates that it is entirely plausible though not always certain that the regressors in the model are weakly exogenous and thus if all the variables in the model are stationary and ergodic, ordinary least squares (OLS) can produce asymptotically desirable estimates. However, correlations between the error terms of the equations usually means more efficiency may be gained by using the system of seemingly unrelated regressions (SUR) estimator rather than estimating the equations individually by OLS. Nevertheless, since the VAR system is such that all the regressors of all the equations are identical, the SUR and OLS will lead to similar estimates.

This study contributes to literature on fiscal and monetary policy shocks in the African subregion. It explores a vector autoregressive model with both monetary and fiscal policy shocks in an African context. Most studies in this regard have been conducted in developed countries in the west, hence findings here can be compared to those other studies.

The next chapter presents a descriptive report of the data used in the research, stationarity and cointegration tests, and then the various VAR models are run to obtain the IRF's and estimates of the forecast error variance decompositions for various periods.

CHAPTER FOUR

ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter discusses the data, analysis and findings of the study. The chapter endeavours to empirically examine the behaviour of macroeconomic fluctuations as a result of monetary and fiscal policy shocks in the African continent. The study seeks to achieve this by selecting three vibrant economies from which inferences will be drawn. This chapter begins with the analysis of the descriptive statistics and follows with relevant statistical analysis of the data and variables used in the study. The relationships between the variables are included while discussing the empirical findings of the econometric models stated in chapter three. In this chapter, robustness checks with other estimations techniques are made on the empirical estimations to check for the consistency of the empirical findings when alternative estimation techniques are used.

This choice implies that the second step in the estimation procedure involves the estimation of a standard VAR with ten endogenous variables. The VAR system consists of these ten endogenous variables, has four lags and no constant or a time trend. The choice of four lags implies a large number of free parameters in the VAR system to be estimated using 154 observations. The VAR system uses the natural logarithm for all variables except the CPI inflation rate and interest rate, where the level is used. The use of four lags is common in fiscal VAR and SVAR models, as in Blanchard & Perotti (2002) and Perotti (2004). This also ensures that the dynamics of the VAR is adequately captured.

4.2 ANALYSIS OF THE GHANAIAN DATA AND RESULTS

4.2.1 Descriptive Statistics for the Ghanaian Economy

This section presents the descriptive statistics of the data from Ghana on the macroeconomic variables and the fiscal and monetary variables. The descriptive statistics includes the measures of central tendency and dispersion. It also considers the normality and the level of skewness of the data. Lastly, the number of observations are considered.

Table 4.1 Descriptive Statistics of the Data for Ghana

	LOGExp	LOGGDP	LOGInf	LOGM2	LOGRate	LOGTaxes	LOGTRADE
Mean	19.10487	22.62528	3.226919	3.087739	2.918268	19.54180	3.837108
Median	19.47513	22.44339	3.316306	3.125025	2.944439	19.57077	3.826918
Maximum	25.21151	24.56293	4.812682	3.529539	3.806662	21.99776	4.754008
Minimum	12.34156	21.47118	1.070984	2.425244	1.704748	15.77770	1.843773
Std. Dev.	4.125905	0.828968	0.685121	0.299786	0.532709	1.477278	0.693362
Skewness	-0.195483	0.973636	-0.439588	-0.467328	-0.519188	-0.868777	-0.868854
Kurtosis	1.778086	3.065058	4.486271	2.262924	2.867300	3.401879	3.319064
Jarque-Bera	3.017533	6.959521	5.466907	2.597578	2.009030	5.831106	5.722624
Probability	0.221183	0.030815	0.064994	0.272862	0.366222	0.054174	0.057194
Sum	840.6143	995.5123	141.9844	135.8605	128.4038	859.8391	168.8327
Sum Sq. Dev.	731.9931	29.54906	20.18378	3.864482	12.20247	93.84104	20.67226
Observations	44	44	44	44	44	44	44

Source: Computation from Research Data, 2015.

Table 4.1 show the descriptive statistics of the variable that are concerned to affect the macroeconomic fluctuation in Ghana as used by the other countries in this study. From the table above, it is seen from the observations that the data is balanced and there is no account of missing values in the data. In all seven variables are used in this study for which the use of the VAR will cause the creation of lags. The variables of concern can also be seen as within expected ranges. Again, the data for the study can be seen as normally distributed. The Jarque Bera test has a null hypotheses that the data is normally distributed.

From the probabilities, the tests fail to reject the null hypotheses, which means they are normally distributed. This does have a great effect on the outcome of results.

4.2.2 Unit Root Tests

The unit root tests is used here to see the stationarity levels of the data to be used in the analysis. In finding whether fiscal and monetary policy shocks explain macroeconomic fluctuations in Africa, the study assumes that there is a unit effect that exists in the data sets. This could affect the results of the analysis by giving biased and spurious coefficients in the results. However, instead of including unit dummies to fix this problem, the unit variance is included in the error term and the appropriate assumptions are subsequently made about the error term (Stock & Watson, 1995). The study then considers the use of two different unit test techniques. The Augmented Dicker Fuller unit root test is used as well as the Philips Peron unit root test to back the claims of stationarity. This test is conducted for all the three countries, used in the study i.e. Ghana, Nigeria and South Africa, to create uniformity and aid in the assistance of the empirical findings of the research.

Table 4.2 Unit root tests (Ghana)

Variables	Levels		1st Differences	
	ADF	PP	ADF	PP
LOGM2	0.678	0.6257	0.0000**	0.0000**
LOGGDP	0.9945	0.9932	0.0000**	0.0000**
LOGInf	0.0001**	0.0001**	-	-
LOGTaxes	0.5994	0.6301	0.0000**	0.0000**
LOGTrade	0.8298	0.7372	0.0003**	0.0005**
LOGExp	0.6665	0.7087	0.0000**	0.0000**
LOGRate	0.1397	0.1405	0.0000**	0.0000**

***** denote significance at 5% levels***

The table above presents the unit root tests for the variables used in the study. This represents the macroeconomic variables as well as fiscal and monetary policy variables for Ghana. From the table, it is clearly seen that all the variables but the log of inflation were not stationary with their raw data, that is, at levels with the use of the Augmented Dicker Fuller unit root test as well as the Philips Peron unit root test. The table therefore presents the stationarity of the data at first differences. From this we could see that all the variables are deemed stationary and are significant at 5% significant levels.

4.2.3 Johansens Test for Cointegration

The cointegration tests are used to check for the existence of a long run dynamic relationship among the variables. Johansen's test for cointegration helps achieve this objective and as well find out if the variables are integrated in the same order. The test tries to see the inter-temporal interaction between fiscal and monetary policies, separately with the macro economic variables. This test is conducted for all three countries used in the study for which findings will be generalized on the whole of the African continent.

Table 4.3 Johansen cointegration test on variables in Ghana

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.822139	163.6424	125.6154	0.0000
At most 1 *	0.614199	96.29903	95.75366	0.0458
At most 2	0.471142	59.15413	69.81889	0.2623
At most 3	0.40087	34.30978	47.85613	0.485
At most 4	0.208466	14.33096	29.79707	0.8215
At most 5	0.125107	5.213452	15.49471	0.7858
At most 6	2.50E-05	0.000973	3.841466	0.9754

**denotes rejection of the hypothesis at the 0.05 level*

Johansen's approach derives two likelihood estimators for the cointegration rank which are the trace test and a maximum eigen value test. The cointegration rank (R) can be formally tested with the trace and the maximum Eigen value statistics. The trace statistic either rejects the null hypothesis of no co-integration among the variables or does not reject the null hypothesis that there is at least one co-integration relation between the variables. The null hypothesis of the Johansen cointegration test is that there exist no cointegration between the variables. The Johansen cointegration tests estimated from table 4.3 above indicates that there exists long run relationship between the variables of fiscal and monetary policies and the macroeconomic variables. The test rejects the null hypothesis of no existence of long run relationships and indicates that there are two cointegrating equations.

4.2.4 Lag Selection for Vector Error Correction Model (Ghana)

Table 4.4 Lag selection

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	49.6207		49		2.50E-10	-2.24319	-2.13587	-1.94153
1	84.9846	70.728	49	0.023	5.40E-10	-1.52551	-0.66688	0.887779
2	124.887	79.805	49	0.004	1.10E-09	-1.0467	0.563232	3.47821
3	185.587	121.4	49	0	1.40E-09	-1.66249	0.698735	4.97404
4	320.337	269.5	49	0	1.40E-10	-6.17564	-3.06312	2.57251
5	3773.78	6906.9*	49	0	1.2e-84*	-185.357*	-181.493*	-174.497*

The selection of the number of lags adequate for the estimation was done primarily with the use of the Akaike Information Criteria (AIC) and supported with the Schwarz information criterion (SC) and the Hannan-Quinn information criterion (HQIC). The lag selection criteria all mostly specify that the inclusion of five lags would generate best error

coefficients for the model specification which includes the lags of the dependent variable as well as the lags of the endogenous variable.

4.2.5 Granger Causality between Macroeconomic Variables and Fiscal and Monetary Policies in Ghana.

The concept of Granger causality stems from the theory that a variable being an independent variable can cause an effect on the dependent variable and vice versa. By this, the Vector Error Correction (VEC) Granger causality Wald test is used.

Table 4.5 Granger Causality Walt test (VEC Granger Causality) (Ghana)

Equation	Excluded	chi2	df	Prob > chi2
(D)LOGM2	(D)LOGGDP	6.489	4	0.1650
(D)LOGM2	LOGInf	7.0614	4	0.1330
(D)LOGM2	(D)LOGTaxes	2.6123	4	0.6250
(D)LOGM2	(D)LOGTrade	15.828	4	0.0030
(D)LOGM2	(D)LOGExp1	15.554	4	0.0040
(D)LOGM2	(D)LOGRate	15.492	4	0.0040
(D)LOGM2	ALL	86.685	24	0.0000
(D)LOGGDP	(D)LOGM2	26.019	4	0.0000
(D)LOGGDP	LOGInf	3.1681	4	0.5300
(D)LOGGDP	(D)LOGTaxes	6.5892	4	0.1590
(D)LOGGDP	(D)LOGTrade	4.2389	4	0.3750
(D)LOGGDP	(D)LOGExp1	12.809	4	0.0120
(D)LOGGDP	(D)LOGRate	23.551	4	0.0000
(D)LOGGDP	ALL	59.864	24	0.0000
LOGInf	(D)LOGM2	6.7089	4	0.1520
LOGInf	(D)LOGGDP	8.6509	4	0.0700
LOGInf	(D)LOGTaxes	1.1407	4	0.8880
LOGInf	(D)LOGTrade	3.9097	4	0.4180
LOGInf	(D)LOGExp1	6.5056	4	0.1640
LOGInf	(D)LOGRate	10.875	4	0.0280
LOGInf	ALL	36.773	24	0.0460
(D)LOGTaxes	(D)LOGM2	2.8875	4	0.5770
(D)LOGTaxes	(D)LOGGDP	8.23	4	0.0840
(D)LOGTaxes	LOGInf	5.0832	4	0.2790
(D)LOGTaxes	(D)LOGTrade	6.6855	4	0.1530
(D)LOGTaxes	(D)LOGExp1	7.2335	4	0.1240
(D)LOGTaxes	(D)LOGRate	11.198	4	0.0240

(D)LOGTaxes	ALL	65.367	24	0.0000
(D)LOGTrade	(D)LOGM2	17.049	4	0.0020
(D)LOGTrade	(D)LOGGDP	16.668	4	0.0020
(D)LOGTrade	LOGInf	17.633	4	0.0010
(D)LOGTrade	(D)LOGTaxes	10.948	4	0.0270
(D)LOGTrade	(D)LOGExp1	12.346	4	0.0150
(D)LOGTrade	(D)LOGRate	7.7429	4	0.1010
(D)LOGTrade	ALL	57.164	24	0.0000
(D)LOGExp1	(D)LOGM2	3.3094	4	0.5070
(D)LOGExp1	(D)LOGGDP	5.5142	4	0.2380
(D)LOGExp1	LOGInf	2.2877	4	0.6830
(D)LOGExp1	(D)LOGTaxes	3.8174	4	0.4310
(D)LOGExp1	(D)LOGTrade	4.1946	4	0.3800
(D)LOGExp1	(D)LOGRate	7.1665	4	0.1270
(D)LOGExp1	ALL	40.514	24	0.0190
(D)LOGRate	(D)LOGM2	55.288	4	0.0000
(D)LOGRate	(D)LOGGDP	8.7168	4	0.0690
(D)LOGRate	LOGInf	23.145	4	0.0000
(D)LOGRate	(D)LOGTaxes	5.0609	4	0.2810
(D)LOGRate	(D)LOGTrade	9.3137	4	0.0540
(D)LOGRate	(D)LOGExp1	3.7178	4	0.4460
(D)LOGRate	ALL	98.137	24	0.0000

The table above presents the Granger causality between the various macroeconomic variables and fiscal and monetary policies. All the variables with the exception of inflation were used at their levels of first differencing. This was to account for the stationarity levels computed earlier with the use of the Augmented Dicker Fuller (ADF) and the Philips Peron (PP) tests. The use of (D) before the variables indicates the first differences.

The Granger causality can be seen as pairwise since it considers the relationship between two variables at a time. From the table, the variables in the first column labelled Equation is sought to whether granger cause the variables in the second column or not. The null hypothesis for Granger causality is that the first column variables do no granger cause the latter.

From the table above, the log of M2, seen as money supply is seen not to granger cause Gross Domestic Product (LODGDP), Inflation (Inf) and Taxes (LOGTaxes) since the p values of these variables are greater than the critical level of 5%. However, money supply (LOGM2) is seen to granger cause trade, exports, and interest rates because the null hypothesis of granger causality is rejected at 5% significance levels.

Gross domestic product, from the table is seen to granger cause money supply, exports and interest rates and the combined effect on all their variables having their p values less than 5% significant levels. Inflation on the other hand is seen from the table above to only granger cause interest rate and has a combined effect on all the variables at a p value of 0.0460. All the other variables are not granger caused by inflation, evidently looking at the p values which have p values greater than 5%. Likewise, taxes are seen from the table to granger cause only interest rates with a p value of 0.0240. From this, the null hypothesis of no granger causality is rejected.

The log of trade, which represents the levels of trade in Ghana under the years of study is seen to directly granger cause money supply, GDP, inflation, taxes and exports. These are all seen to be at highly significant levels. In the case of exports, none of the other variables is seen to have any significance. They all fail to reject the null hypothesis that exports do not granger cause any of the other variables used in the study. Last but not the least, interest rates shows strong causality tendencies with money supply and inflation with the other variables being insignificant.

FIGURE 4.1 IMPULSE RESPONSE FUNCTIONS (GHANA)

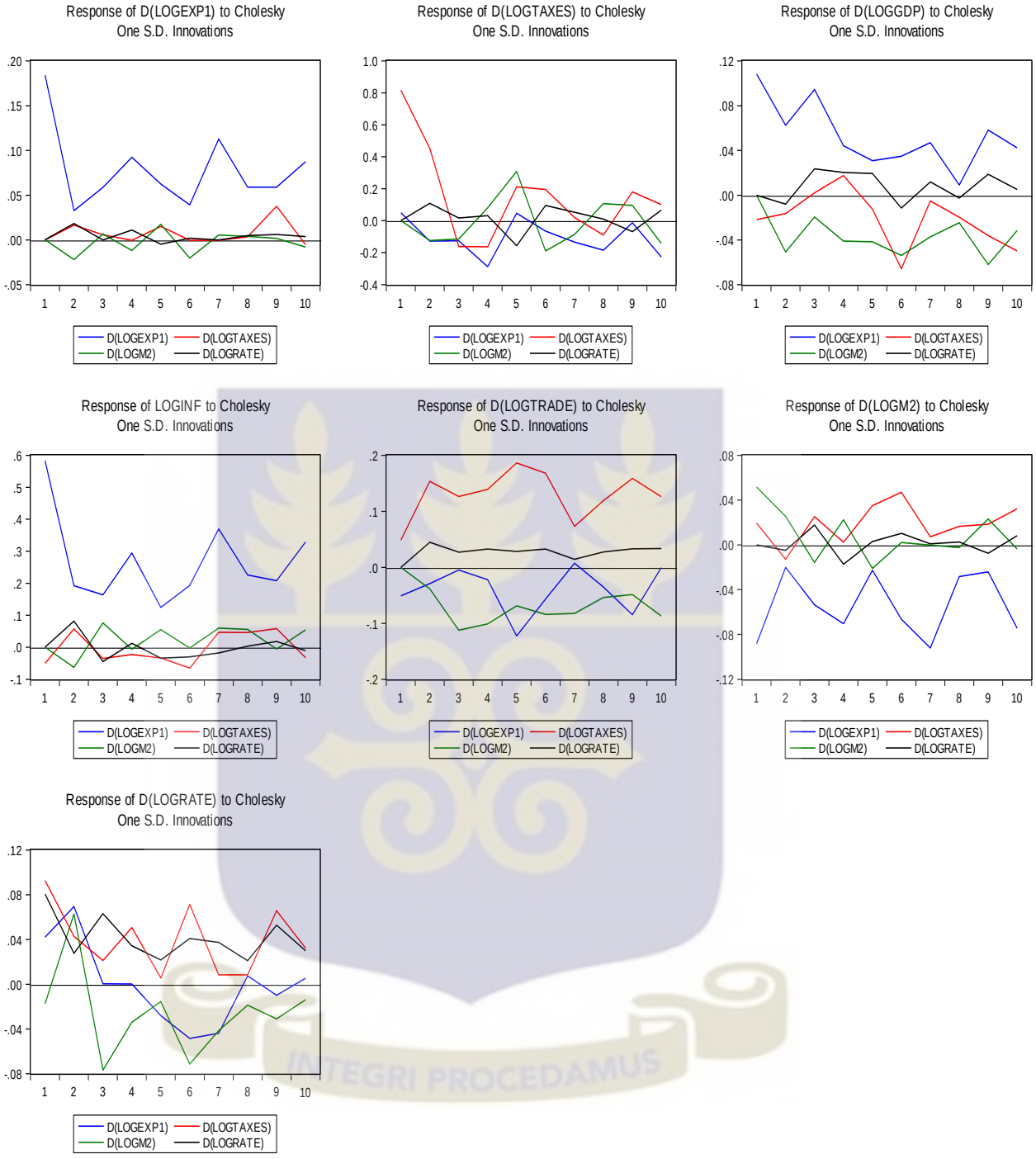


Figure 4.1 presents a set of plots of orthogonal impulse response functions capturing the responses of the endogenous variables considered in this study, to a one-time or one-standard deviation shock in their disturbances. Thus, they indicate how each variable reacts to a one-time increase in the innovations to other variables or themselves after a certain period, holding everything else constant. It is worth noting that all the variables are

in logarithmic format, and are all entered in the model at first differences, except Inflation which was stationary at levels and hence entered as such. Furthermore, special emphasis is made on the responses of the macro-economic factors to impulses in the fiscal and monetary policy instruments, since this is the main aim of the study. As already indicated, two fiscal policy shocks are identified, a "government expenditure shock" and a "government revenue (taxes) shock". Also, two monetary shocks are identified in the system; "a central bank's lending rate shock" and "a money supply shock". The monetary policy shocks have been constructed to be orthogonal to the fiscal policy shocks such that it accounts for the unanticipated yearly change in the endogenous variables due to monetary policy shocks which are not accounted for by the systematic responses over the year to fiscal policy shocks. Although this restriction may cause some minor biases in the results, it allows for easier interpretations of the responses of the variables to the shocks.

From Figure 4.2.5, Ghana's GDP responds positive to only government spending shock in the first and second years. All other shocks are seen to affect GDP negatively. This positive response of GDP to government spending shock continues throughout the ten-year period although the effect falls as the years go by. It is further observed that the GDP only responds positively to the tax shock in the fourth year but the response remains negative for the rest of the period, reaching its lowest point in the sixth year. In response to shocks to the monetary policy instruments, GDP maintains a negative relationship with money supply shock for the rest of the period. Response to central bank lending shock is negative in the sixth and eighth period, but positive for the other years.

The response of inflation to government spending shock is generally positive all throughout the ten-year period and its quite high in the first and second years in immediate

response to the shock. The response of inflation to tax shock is observed to fluctuate over the period. It starts with a negative response in the first period and becomes positive in the next period. It then maintains a negative response from the third to the sixth period and rises to positive from the seventh to the ninth period, then drops back negative in the tenth period. It is further evident that the response of Inflation to the monetary policy shocks also fluctuate over the ten-year period. The response to the money supply shock is negative in the first year but becomes positive in the second year. It then drops and sustains a negative response from the third to sixth year. It becomes positive from the seventh to ninth year and then drops back negative in the tenth year.

Trade is observed to respond positively to shocks to tax and central bank lending over the ten-year period. It however responds negatively to government spending and money supply shocks over the period.

In addition, it can be seen that government spending responds positively to shocks in itself and then fluctuates to shocks to the other variables. The response of tax is also observed to fluctuate to shocks in itself and all the other variables. Money supply responds negatively to a shock in the government spending all over the period, but the response fluctuates to shocks to all the other variables. The central bank lending responds positively to shocks to itself and taxes. It however fluctuates to the government spending and money supply shocks.

4.2.6 Forecast Error Variance Decomposition (Ghana)

The tables below display the results of the fractions of the forecast error variance of the real variables of interest attributable to the respective orthogonal shocks.

Table 4.6 Forecast Error Variance Decomposition of GDP

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGRATE	LOGM2	LOGTAXES	LOGTRADE
1	0.184046	34.92798	27.19908	0.000000	20.67154	15.78381	1.417596	0.000000
2	0.200586	31.75274	21.24476	2.276237	20.30295	22.87110	1.527303	0.024911
3	0.212201	38.41181	21.58818	3.847442	16.11647	18.56368	1.182935	0.289482
4	0.24552	36.94232	21.37332	5.664585	14.45047	19.80336	1.478048	0.287901
5	0.255975	32.27587	24.21985	6.296562	12.18738	22.81357	1.428343	0.778432
6	0.260417	27.21920	22.03598	6.703457	12.93416	24.97778	5.290536	0.838879
7	0.289184	26.22564	23.37955	9.372679	11.96655	23.49166	4.756351	0.807564
8	0.298063	23.27605	24.44292	10.72288	14.56107	21.75630	4.502293	0.738484
9	0.310343	22.35587	24.75559	12.21244	12.63459	22.41760	4.746542	0.87737
10	0.327199	21.44303	25.19850	11.50455	11.79606	23.16943	5.816534	1.071897

Results of the forecast error variance decomposition for Ghana's GDP are expressed in table 4.6. The results indicate that both fiscal and monetary policy shocks are significant in contributing to the GDP forecast error variance over the period. Fiscal policy shocks explains about 36% of the forecast error variance in the short run with government spending shock accounting for a majority of it. The monetary policy shocks also account for about 36% of the forecast error variance in the short run. In the long run however, the effect government spending and central bank lending rate shock diminish with the influence of tax shock increasing. The money supply shock is however stable over the period. Consequently, the fiscal policy shocks contribute about 27% of the forecast error variance, and the monetary policy shocks explain about 34%. Thus, the monetary policy shocks become more significant in explaining the GDP forecast error variance in the long run compared to fiscal policy shocks.

Table 4.7 Forecast Error Variance Decomposition of Inflation

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGRATE	LOGM2	LOGTAXES	LOGTRADE
1	0.183078	82.67030	1.352162	9.383076	0.111868	5.868425	0.614166	0.000000
2	0.221619	62.95829	3.947655	9.481238	16.39483	5.733793	0.973036	0.511154
3	0.252556	58.44868	5.627188	13.70372	15.34020	4.980766	1.017027	0.882423
4	0.267524	55.98776	7.830528	14.83223	15.22636	4.508867	0.861629	0.752622
5	0.291305	52.62106	9.439097	18.10682	14.01066	4.237308	0.899410	0.685641
6	0.324146	52.73820	10.36946	17.77482	13.22947	3.986864	1.255632	0.645557
7	0.342683	53.63020	9.72026	18.62028	12.58765	3.362962	1.193748	0.884908
8	0.364235	51.79792	10.36387	20.62437	12.02321	3.173296	1.220135	0.79719
9	0.391529	48.72998	11.31735	21.76316	12.57484	3.581175	1.298919	0.734569
10	0.410057	48.96672	11.44574	22.10830	12.34539	3.199257	1.202946	0.731656

Table 4.7 shows the decomposition of the forecast error variance of Ghana's inflation to various shocks. It is clear that in the first period, government spending shocks contribute a majority (83%) of the inflation forecast error variance. Thus in the short run, fiscal policy shocks explain a majority of the fluctuations in Ghana's inflation rate. The monetary policy shocks explain about only 6% in the first period. However in the ensuing years, the influence of the fiscal policy shocks diminish quite noticeably, and the effect of the monetary policy shocks increase. Eventually, the fiscal policy shocks contribute to about 50% of the inflation forecast error variance, and the monetary policy shocks contribute over 16%. It is worth mentioning that the influence on past inflation shocks increase rapidly from the first year and eventually reach over 22% in the tenth year.

Table 4.8 Forecast Error Variance Decomposition of Trade

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGRATE	LOGM2	LOGTAXES	LOGTRADE
1	0.640765	5.123771	7.956050	21.39893	8.532859	35.23562	4.572394	17.18038
2	0.773291	3.393934	4.051736	27.93267	4.274800	22.50545	25.22164	12.61977
3	0.830606	2.577889	3.072624	30.73806	4.146521	19.14098	30.79859	9.525328
4	0.935603	2.306503	2.632004	26.42747	7.919427	17.56906	35.40199	7.743558
5	0.980244	8.324179	2.380223	21.07086	5.972957	13.85319	41.79003	6.608562
6	1.014708	8.171156	2.040434	21.59854	5.077672	11.74209	45.41583	5.954275
7	1.12562	7.761873	1.939177	23.30835	5.026339	11.42564	44.89263	5.645999
8	1.187505	7.587034	1.796354	23.74064	4.835208	10.58476	46.12804	5.327968
9	1.260038	8.826616	1.615602	22.22304	4.331604	9.468565	48.37355	5.161024
10	1.341956	8.213905	1.600044	22.58797	4.337722	9.08843	49.23643	4.935497

Table 4.8 presents the results of the variance decomposition of the forecast errors of Ghana's trade. It can be observed that the effect on past trade shocks is quite pronounced in the short-term but eventually dies away in the long run. Also, the monetary policy shocks contribute a majority (34%) of the trade forecast error variance compared to the 12% contributed by the fiscal policy shocks. It is further observed that the influence of government spending shocks eventually disappear in the long run, but the influence of tax shock become more dominant in the long run contributing about 49% of the trade forecast error variance. The effect of the money supply shock on the other hand decreases over the period and eventually becomes relatively insignificant. The influence of the shock to the central bank lending rate also diminishes marginally over the period and is also quite insignificant. Hence in the long run, the fiscal policy shocks contribute more to the trade forecast error variance decomposition compared to the monetary policy shocks.

4.3 ANALYSIS OF THE NIGERIAN DATA AND RESULTS

4.3.1 Descriptive Statistics for the Nigerian Economy

This section presents the descriptive statistics of the data from Nigeria on the macroeconomic variables and the fiscal and monetary variables. The descriptive statistics includes the measures of central tendency and dispersion.

Table 4.9 Descriptive Statistics of the Data for Nigeria

	LOGExp	LOGGDP	LOGInf	LOGM2	LOGRate	LOGTaxes	LOGTrade
Mean	27.06295	24.53512	2.486935	3.099216	2.613426	20.25489	4.004000
Median	26.79580	24.29745	2.648460	3.088930	2.824123	20.33119	4.172523
Maximum	31.30371	26.32236	4.426317	3.705624	3.454738	22.08434	4.578016
Minimum	22.94388	22.94049	0.298647	2.306779	1.791759	18.30651	2.976580
Std. Dev.	2.773901	0.875225	1.118759	0.363644	0.481855	1.062154	0.416817
Skewness	0.100325	0.637111	-0.388874	-0.415091	-0.354221	-0.291312	-0.776467
Kurtosis	1.543774	2.603508	2.183857	2.508132	1.706676	2.320123	2.543838
Jarque-Bera	3.961569	3.264885	2.330131	1.707080	3.986721	1.469751	4.802761
Probability	0.137961	0.195452	0.311902	0.425905	0.136237	0.479565	0.090593
Sum	1190.770	1079.545	109.4251	136.3655	114.9907	891.2151	176.1760
Sum Sq. Dev.	330.8646	32.93879	53.81970	5.686181	9.983930	48.51132	7.470673
Observations	44	44	44	44	44	44	44

Table 4.9 also shows the descriptive statistics of the variable that are concerned to affect the macroeconomic fluctuation in Nigeria as other countries in this study. From the table above, it is seen from the observations that the data is balanced and there is no account of missing values in the data. The variables of concern can also be seen as within expected ranges. Again, the data for the study can be seen as normally distributed. The Jarque Bera test, as in the case of Ghana, from the probabilities, fail to reject the null hypotheses, which means they are normally distributed.

Table 4.10 Unit root tests (Nigeria)

Variable	Levels		1st Differences	
	ADF	PP	ADF	PP
LOGM2	0.4428	0.3574	0.0001**	0.0001**
LOGGDP	0.9469	0.9166	0.0000**	0.0000**
LOGInf	0.0000**	0.0000**	-	-
LOGTaxes	0.8551	0.8495	0.0001**	0.0002**
LOGTrade	0.1171	0.1189	0.0000**	0.0000**
LOGExp	0.9613	0.9524	0.0009**	0.0011**
LOGRate	0.5844	0.5702	0.0000**	0.0000**

***denotes significance levels at 5%*

The table above presents the unit root tests for the variables used in the study. This represents the macroeconomic variables as well as fiscal and monetary policy variables for Nigeria. From the table, it is clearly seen that all the variables but the log of inflation were not stationary with their raw data, that is, at levels with the use of the Augmented Dicker Fuller unit root test as well as the Philips Peron unit root test. The table therefore presents the stationarity of the data at first differences. From this we could see that all the variables are deemed stationary and are significant at 5% significant levels.

Table 4.11 Johansen's Cointegration Test (Nigeria)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.824096	206.2385	125.6154	0.0000
At most 1 *	0.766524	138.4636	95.75366	0.0000
At most 2 *	0.636561	81.73123	69.81889	0.0042
At most 3	0.398003	42.25759	47.85613	0.1516
At most 4	0.255291	22.46497	29.79707	0.2734
At most 5	0.207753	10.96924	15.49471	0.2134

**denotes rejection of the null hypothesis at the 0.05 level*

The Johansen cointegration tests estimated from table 4.11 above indicates that there exist long run relationship between the variables of fiscal and monetary policies and the macroeconomic variables. The null hypothesis of the Johansen cointegration test is that there exist no cointegration between the variables. From the trace statistic values, the p values in the table above were less than the 5% critical values with the hypothesis that none of the variables was cointegrated which suggests that we accept the null hypothesis of no existence of long run relationships.

4.2.2 Lag Selection for Vector Error Correction Model (Nigeria)

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	84.3532		49		4.00E-11	-4.07122	-3.96E+00	-3.76956*
1	116.975	65.244	49	0.060	1.00E-10	-3.20923	-2.3506	-0.795943
2	162.473	90.996	49	0.000	1.60E-10	-3.02491	-1.41498	1.5
3	225.217	125.49	49	0.000	1.70E-10	-3.74825	-1.38702	2.88828
4	347.165	243.9*	49	0.000	3.50E-11	-7.58763*	-4.4751*	1.16053
5			49		-1.2e-87*			

Table 4.12 Lag selection

As same as the test for Ghana in table 4.5 above, the selection of the number of lags adequate for the vector error correction model estimation for the Nigerian economy was done primarily with the use of the Akaike Information Criteria (AIC) and supported with the Schwarz information criterion (SBIC) and the Hannan-Quinn information criterion (HQIC). The lag selection criteria all mostly specify that the inclusion of five lags would generate best error coefficients for the model specification which includes the lags of the dependent variable as well as the lags of the endogenous variable.

4.3.3 Granger Causality between Macroeconomic Variables and Fiscal and Monetary Policies in Nigeria.

Granger causality from the table below can be seen as pairwise since it considers the relationship between two variables at a time. From the table below, the variables in the first column labelled Equation is sought to whether granger cause the variables in the second column or not. The null hypothesis for Granger causality is that the first column variables do no granger cause the latter.

Table 4.13 Granger Causality Walt test (VEC Granger Causality) (Nigeria)

Equation	Excluded	Chi-sq	df	Prob.
D(LOGEXP,2)	D(LOGGDP,2)	3.788506	3	0.2852
	D(LOGINF)	5.112998	3	0.1637
	D(LOGM2,2)	7.756946	3	0.0513
	D(LOGRATE,2)	10.46723	3	0.015
	D(LOGTAXES,2)	4.183439	3	0.2423
	D(LOGTRADE,2)	12.01233	3	0.0073
	All	37.81207	18	0.0041
D(LOGGDP,2)	D(LOGEXP,2)	5.022286	3	0.1702
	D(LOGINF)	2.241398	3	0.5238
	D(LOGM2,2)	1.069326	3	0.7845
	D(LOGRATE,2)	0.146175	3	0.9858
	D(LOGTAXES,2)	1.339647	3	0.7197
	D(LOGTRADE,2)	3.312597	3	0.3459
	All	11.748	18	0.86
D(LOGINF)	D(LOGEXP,2)	6.11636	3	0.1061
	D(LOGGDP,2)	3.771503	3	0.2872
	D(LOGM2,2)	11.17771	3	0.0108
	D(LOGRATE,2)	8.376689	3	0.0388
	D(LOGTAXES,2)	0.161145	3	0.9836
	D(LOGTRADE,2)	9.954394	3	0.019
	All	27.8057	18	0.0651
D(LOGM2,2)	D(LOGEXP,2)	21.43771	3	0.0001
	D(LOGGDP,2)	26.26276	3	0.0000
	D(LOGINF)	17.48689	3	0.0006
	D(LOGRATE,2)	12.03447	3	0.0073
	D(LOGTAXES,2)	3.697327	3	0.2961
	D(LOGTRADE,2)	12.58264	3	0.0056
	All	89.86263	18	0.0000
D(LOGRATE,2)	D(LOGEXP,2)	1.815213	3	0.6116
	D(LOGGDP,2)	0.650346	3	0.8848
	D(LOGINF)	1.756843	3	0.6244
	D(LOGM2,2)	0.904049	3	0.8245
	D(LOGTAXES,2)	1.38853	3	0.7082
	D(LOGTRADE,2)	6.216824	3	0.1015

	All	26.99672	18	0.0791
D(LOGTAXES,2)	D(LOGEXP,2)	13.936	3	0.0030
	D(LOGGDP,2)	3.252408	3	0.3543
	D(LOGINF)	2.698965	3	0.4404
	D(LOGM2,2)	7.295843	3	0.0630
	D(LOGRATE,2)	9.377813	3	0.0247
	D(LOGTRADE,2)	14.52598	3	0.0023
	All	58.54549	18	0.0000 we
D(LOGTRADE,2)	D(LOGEXP,2)	4.506382	3	0.2117
	D(LOGGDP,2)	4.272606	3	0.2335
	D(LOGINF)	0.231131	3	0.9724
	D(LOGM2,2)	2.640804	3	0.4504
	D(LOGRATE,2)	1.516324	3	0.6785
	D(LOGTAXES,2)	3.953985	3	0.2665
	All	15.08206	18	0.6563

From the table above, exports in Nigeria is seen to granger cause interest rates and trade with p values less than the 5% significant levels, with all the other variables not significant. Gross domestic product from the granger causality test does not cause any of the variables as seen from the p values. The null hypothesis of no existence of granger causality is then not rejected.

Inflation, from the table is seen to granger cause money supply as well as trade and interest rates which can be deemed as a true representation of the economic activities in Nigeria. Money supply granger causes exports, gross domestic product, inflation, interest rates and levels of trade in the Nigerian economy. Interest rates are seen to not granger cause any of the other variables used in the study since none of the estimations have their p values to be less than the 5% significant level. Taxes on the other hand is seen to granger cause exports,

interest rates and trade whereas trade does not granger cause any of the other variables considered in the study of the Nigerian economy.

From table 4.13 above, it is clearly seen that the existence of a short run granger causality os not strongly supported by the p values. That does not discredit the fact of the existence of a long run relationship between the variables used in trying to assess the nexus between fiscal and monetary policy shocks and macroeconomic fluctuations in Africa.

FIGURE 4.2 IMPULSE RESPONSE FUNCTION (NIGERIA)

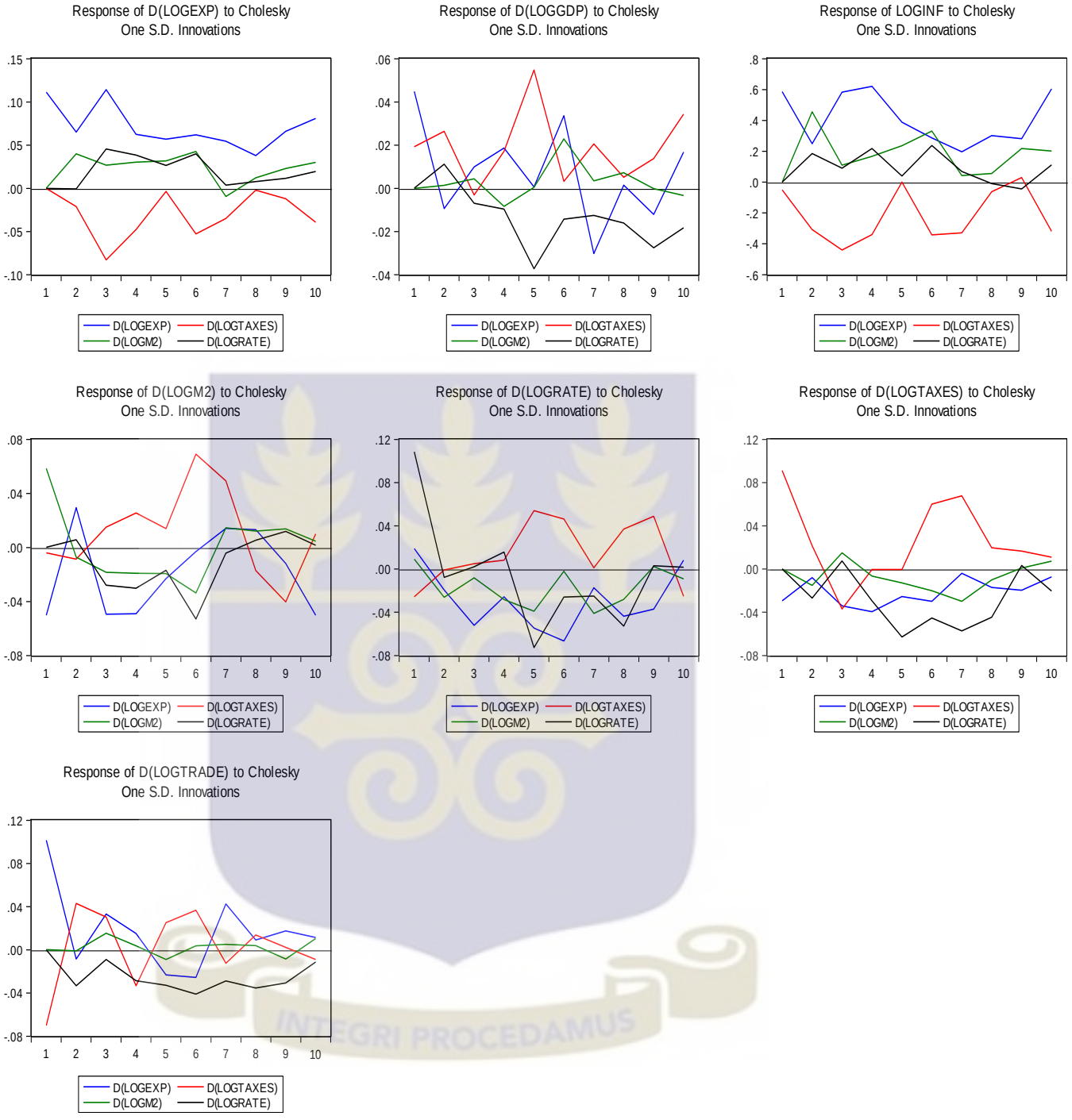


Figure 4.2 presents a set of plots of orthogonal impulse response functions capturing the responses of the endogenous variables for the Nigerian economy, to a one-time or one-standard deviation shock in their disturbances. It can be seen that the responses to the real variables of interest are as follows:

In the first year, GDP responds positively to both fiscal and monetary policy shocks, but falls to attain a negative response in the second year to the government expenditure shock, and in the third year to the taxes shock. However, it still responded positively to the monetary policy shocks during these periods. It is further observed that the GDP maintains a general positive response to taxation shocks for the rest of the next eight years, responding particularly highly in the fifth year. Also, it has a positive response to the shock in government expenditure for the remaining years except from the seventh to the ninth year. In response to the monetary policy instruments for the subsequent years, the GDP is seen to sustain a continuous negative response to the shock in the central bank lending rate for the remaining eight years, but has a positive response to the money supply shock from the fifth to the ninth year.

Inflation is observed to respond negatively to the tax shock for the entire ten year period. It only responds negatively to the central bank lending rate shock in the eighth to ninth year but stays positive for the rest of the years. It can be also be seen that the Inflation responds positively to the government expenditure and money supply shocks for the entire period.

Similar to the response of GDP, trade maintains a general negative response to shocks in the central bank lending rate over the entire period. It also appears to not to respond to the money supply shock till the third year where it sustains a positive response till the fourth year. It then has a negative response to the money supply shock in the fifth and ninth year but experiences a positive response for all other remaining years. The response of trade seems to be fairly opposite for shocks to the two fiscal policy instruments. It responds positively to the government expenditure shock in the first period but negatively to the tax shock, and the same effect occurs during the fourth, seventh, and tenth years. In the second

to third year however, response to both shocks are positive, and response to the tax shock is positive in the fifth to sixth year, but negative to the government expenditure shock for the same period.

Also, government spending is seen to respond positively to shocks to itself and the monetary policy instruments. However, it responds negatively to tax shocks all over the period. The response of money supply fluctuates over the entire period to shocks to itself and all the other variables. Likewise, the central bank lending rate response fluctuates to its own shock, and is generally negative to money supply and government spending shocks. Furthermore, the response of the bank rate to tax shock rises from negative in the beginning years to a more general positive response for the rest of the period, then drops in the last year.

4.3.4 Forecast Error Variance Decomposition (Nigeria)

Table 4.14 Forecast Error Variance Decomposition (FEVD) of GDP

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.135566	2.229499	80.48644	0.000000	0.051602	17.224	0.008457	0.000000
2	0.173361	2.121139	79.70971	3.784601	0.038964	13.55567	0.342272	0.447636
3	0.204418	1.859016	78.64316	3.39662	0.059707	14.3351	0.887775	0.818626
4	0.212132	1.649782	78.28136	3.166979	0.068336	13.82906	1.075337	1.929153
5	0.225179	1.768795	75.6979	3.16859	0.110382	15.40403	2.034103	1.816199
6	0.235501	1.800501	75.1324	2.701627	0.587028	14.84456	2.078643	2.855249
7	0.242564	3.157343	74.28506	2.588998	0.629431	14.57552	2.017787	2.745854
8	0.249907	3.260071	73.893	2.532164	0.728089	14.38477	2.447472	2.754433
9	0.267579	3.453512	73.45304	2.325875	0.668685	15.11445	2.447578	2.536854
10	0.281452	3.362331	74.11131	2.252722	0.654142	14.84973	2.332414	2.437346

Table 4.14 presents the results of the FEVD of the Nigerian GDP over a period of ten years to shocks in the variables. It shows that influence on past GDP shocks dominates in the short run and continues, although diminishing marginally, over the entire period. Also, it can be observed that fiscal policy shocks become stronger in the long run by but are virtually insignificant in explaining the nation's GDP forecast error variance. The monetary policy shocks on the other hand are quite moderate but quite significant explaining the GDP. The central bank lending rate alone contributes to about 17% of the forecast error variance in the first period, and about 15% in the long run.

Table 4.15 Forecast Error Variance Decomposition (FEVD) of Inflation

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.230942	53.79565	17.52984	27.31462	0.038941	0.859541	0.461404	0.000000
2	0.274197	41.14287	11.59206	33.08746	10.30983	1.577759	0.891353	1.398661
3	0.29449	41.90568	11.9461	26.06835	8.317821	1.649704	6.851798	3.260554
4	0.31344	42.85995	9.83852	20.99362	7.384453	2.338416	10.86203	5.723015
5	0.325855	42.5231	14.40143	17.9896	6.869363	4.348633	9.182886	4.684983
6	0.353119	39.54371	13.70151	19.22777	8.415907	4.465468	10.16166	4.48399
7	0.361054	36.80162	12.75748	19.32163	8.258169	4.688214	13.82556	4.347332
8	0.367351	38.08909	12.1623	18.66156	8.238975	4.656496	14.0554	4.136188
9	0.383322	40.42479	12.31571	17.57402	8.229899	4.790289	12.8665	3.798795
10	0.393331	41.75032	11.82796	16.78498	7.826546	4.424417	13.09638	4.289398

The results of the FEVD for the Nigerian Inflation rate in Table 4.15 show that fiscal policy shocks are very significant with the government spending and taxes together explaining about 54% of the Inflation forecast error variance in the first period. Although

the influence of government spending shocks diminish gradually in the short run, tax shock increase gradually, and in the long run, the fiscal policy shock explains about 54% of the inflation forecast variance. The monetary policy shocks on the other hand are quite insignificant in the first period but increase quite rapidly, and explain about 12% of the inflation forecast error variance in the long run.

It is further observed that the inflation responds to shocks on its past values but this effect diminishes marginally in the long run. It also responds to shocks in the GDP and trade over the years.

Table 4.16 Forecast Error Variance Decomposition of Trade

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.931958	7.039643	23.93433	2.831798	0.009405	1.024836	38.76873	26.39126
2	1.163533	6.609597	24.81411	10.48786	0.137988	5.908598	30.90715	21.13469
3	1.311056	8.241577	23.28202	11.4492	1.200935	5.437218	27.83781	22.55125
4	1.462947	7.272029	19.82059	10.33885	1.261232	4.566585	32.01282	24.72789
5	1.617799	9.366411	20.04741	10.60054	1.485046	4.996979	30.32294	23.18067
6	1.705656	10.09537	19.14309	12.2238	1.887380	4.914324	29.08833	22.64771
7	1.769209	9.756096	17.13790	11.68835	1.803519	4.484179	30.92215	24.20780
8	1.819803	9.533710	16.82535	11.69728	2.215142	4.371200	31.14585	24.21148
9	1.903686	9.013832	17.22635	11.9797	2.135940	4.355802	30.92693	24.36145
10	2.051761	8.843511	16.70061	12.30888	2.191045	4.120651	31.53351	24.30179

Table 4.16 presents the results of the fractions of the forecast error variance of the Nigeria's trade to the various shocks. The results show that the effects of the shocks in past trade values contributes significantly in the first period and remain stable over the entire ten-year period. The fiscal policy shocks are found to be quite significant over the period, contributing to over 45% of the trade forecast error variance in the short run and about 50% in the long run. The monetary policy shocks are however not significant in the short

run but increase and stabilises in the long run, eventually contributing to about 6% of the trade forecast error variance.

4.4 ANALYSIS OF THE SOUTH AFRICAN DATA AND RESULTS

4.4.1 Descriptive Statistics for the South African Economy

The descriptive statistics on the South African data on the macroeconomic variables and the fiscal and monetary variables is presented in this section. The descriptive statistics includes the measures of central tendency and dispersion as well as normalities of the data.

Table 4.17 Descriptive Statistics of the Data for South Africa

	LOGExp	LOGGDP	LOGInf	LOGM2	LOGRate	LOGTaxes	LOGTrade
Mean	26.32405	25.38446	2.313910	4.092646	2.608958	22.86323	3.959983
Median	26.54309	25.50532	2.335367	4.063708	2.630805	23.05801	3.974693
Maximum	28.90283	26.71923	3.215455	4.440662	3.106080	24.45093	4.315132
Minimum	23.30673	23.60848	1.454648	3.847196	2.079442	20.80097	3.654429
Std. Dev.	1.727047	0.822266	0.411202	0.154492	0.308032	1.025983	0.140856
Skewness	-0.209200	-0.385777	-0.002983	0.852648	-0.050845	-0.403874	-0.137942
Kurtosis	1.779398	2.562700	2.133607	2.743373	1.811133	2.339065	2.977264
Jarque-Bera	3.052369	1.441965	1.376234	5.452130	2.610199	1.997037	0.140485
Probability	0.217363	0.486274	0.502521	0.065476	0.271146	0.368425	0.932168
Sum	1158.258	1116.916	101.8120	180.0764	114.7941	1005.982	174.2392
Sum Sq. Dev.	128.2557	29.07325	7.270740	1.026317	4.079999	45.26357	0.853141
Observations	44	44	44	44	44	44	44

Table 4.17 shows the descriptive statistics of the variable that are concerned to affect the macroeconomic fluctuation in South Africa as other countries in this study. From the table above, it is clearly seen from the observations that the data is balanced and there is no

account of missing values in the data. Again, the data for the study can be seen as normally distributed. The Jarque- Bera test, as in the case of Ghana, from the probabilities, fail to reject the null hypotheses, which means they are normally distributed.

Table 4.18 Unit root tests (South Africa)

Variable	Levels		1st Differences	
	ADF	PP	ADF	PP
LOGM2	0.9465	0.9090	0.0000**	0.0000**
LOGGDP	0.4538	0.4649	0.0001**	0.0001**
LOGInf	0.0447**	0.0362**	-	-
LOGTaxes	0.5623	0.5845	0.0001**	0.0002**
LOGTrade	0.2977	0.2829	0.0000**	0.0000**
LOGExp	0.2977	0.1720	0.0004**	0.0005**
LOGRate	0.2892	0.2714	0.0000**	0.0000**

The table above presents the unit root tests for the variables used in the study for South Africa. The table indicates the stationarity levels of all the variables which represents the macroeconomic variables as well as fiscal and monetary policy variables for South Africa. From the table, it is clearly seen that all the variables but the log of inflation were not stationary with their raw data, that is, at levels I (0) with the use of the Augmented Dicker Fuller unit root test as well as the Philips Peron unit root test. The table therefore presents the stationarity of the data at first differences that is I (1). From this we could see that all the variables are deemed stationary and are significant at 5% significant levels.

Table 4.19 Johansen's test for Cointegration (South Africa)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.963754	265.7693	125.6154	0.0000
At most 1 *	0.793163	136.3895	95.75366	0.0000
At most 2 *	0.592649	74.93225	69.81889	0.0184
At most 3	0.310543	39.90713	47.85613	0.2259
At most 4	0.289047	25.40496	29.79707	0.1475
At most 5	0.251818	12.10014	15.49471	0.1522
At most 6	0.01995	0.785909	3.841466	0.3753

The Johansen cointegration tests estimated from table 4.19 above specifies that a long run relationship exists between the variables of fiscal and monetary policies and the macroeconomic variables. The null hypothesis of the Johansen cointegration test as already specified is that there exist no cointegration between the variables.

From the table above, the p values were less than the 5% critical values with the number of cointegrations hypothesized as none, at most one and at most two which suggests that we fail to accept the null hypothesis of no existence of long run relationships. This indicates that the existence of a long run relationship is dominant in the variables of concern which supports the choice of techniques for the analysis.

4.4.2 Lag selection-order criteria (South Africa)

Table 4.20 Lag selection

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	276.929		49		2.30E-15	-13.8425	-13.7354	-13.5439*
1	345.678	137.5	49	0.000	8.70E-16	-14.8553	-13.9982	-12.4666
2	381.419	71.482	49	0.020	2.20E-15	-14.1753	-12.5684	-9.69652
3	448.133	133.43	49	0.000	1.90E-15	-15.0838	-12.7269	-8.51483
4	557.457	218.65*	49	0.000	6.1e-16*	-18.1773*	-15.0705*	-9.51821

The selection of the number of lags adequate for the vector error correction model estimation for the South African economy was done primarily with the use of the Akaike Information Criteria (AIC) and supported with the Schwarz information criterion (SBIC) and the Hannan-Quinn information criterion (HQIC). The lag selection criteria all mostly specify that the inclusion of four lags would generate best error coefficients for the model specification which includes the lags of the dependent variable as well as the lags of the endogenous variable.

Table 4.21 Granger Causality Walt test (VEC Granger Causality) (South Africa)

Equation	Excluded	Chi-sq	df	Prob.
D(LOGEXP,2)	D(LOGGDP,2)	2.138484	3	0.5442
	D(LOGINF)	3.881934	3	0.2745
	D(LOGM2,2)	23.23414	3	0
	D(LOGRATE,2)	2.391129	3	0.4953
	D(LOGTAXES,2)	5.128596	3	0.1626
	D(LOGTRADE,2)	2.738749	3	0.4337
	All	82.98597	18	0
D(LOGGDP,2)	D(LOGEXP,2)	1.251824	3	0.7406
	D(LOGINF)	5.690683	3	0.1277

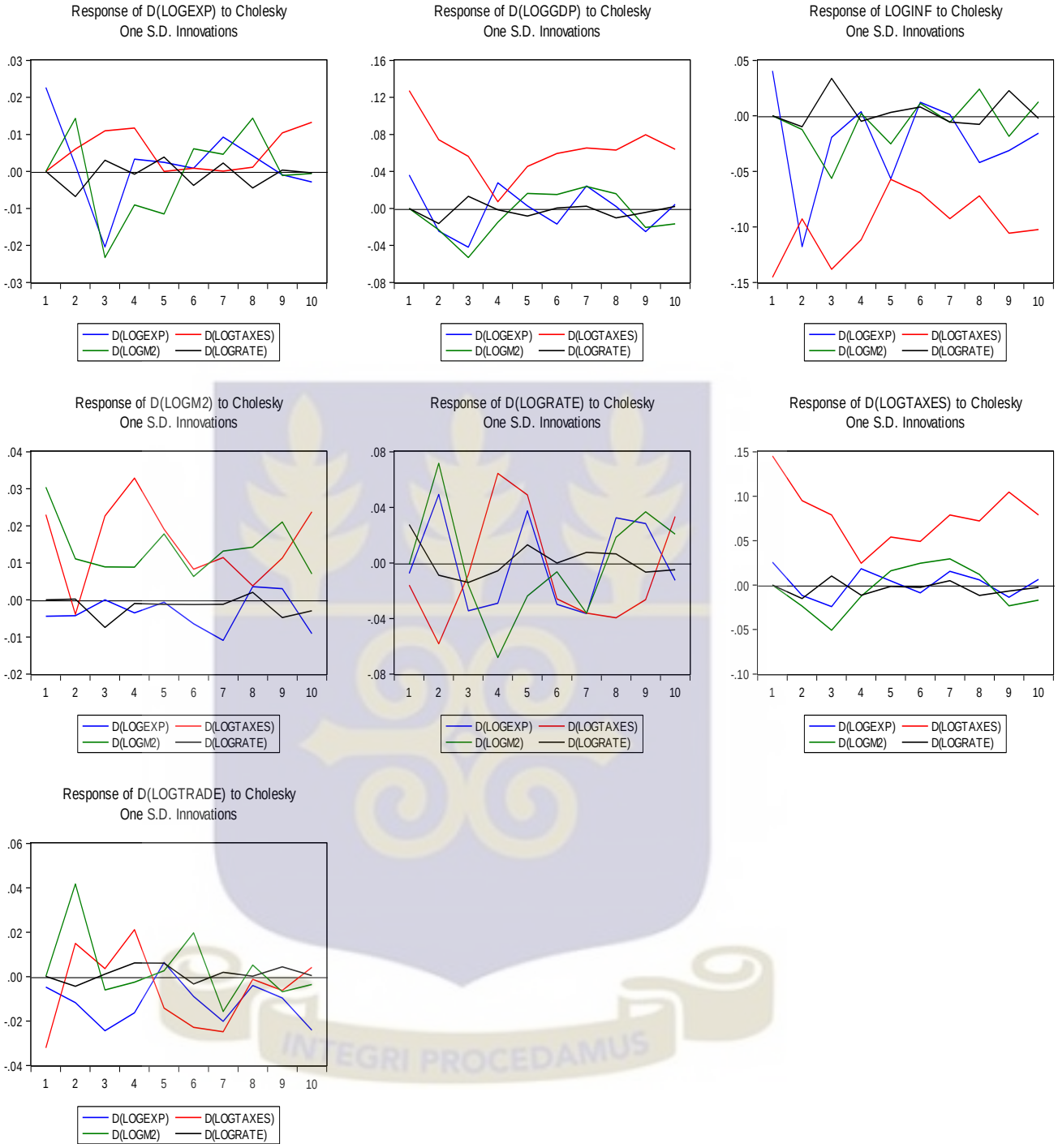
	D(LOGM2,2)	4.806539	3	0.1865
	D(LOGRATE,2)	1.628597	3	0.6529
	D(LOGTAXES,2)	1.583671	3	0.6631
	D(LOGTRADE,2)	1.913532	3	0.5905
	All	17.95551	18	0.4586
D(LOGINF)	D(LOGEXP,2)	1.675469	3	0.6424
	D(LOGGDP,2)	6.944136	3	0.0737
	D(LOGM2,2)	2.71231	3	0.4381
	D(LOGRATE,2)	1.855571	3	0.6029
	D(LOGTAXES,2)	14.62314	3	0.0022
	D(LOGTRADE,2)	1.906541	3	0.592
	All	27.13126	18	0.0766
D(LOGM2,2)	D(LOGEXP,2)	2.050831	3	0.5619
	D(LOGGDP,2)	0.997398	3	0.8019
	D(LOGINF)	1.068815	3	0.7846
	D(LOGRATE,2)	6.048341	3	0.1093
	D(LOGTAXES,2)	1.457817	3	0.692
	D(LOGTRADE,2)	1.204635	3	0.7519
	All	21.07339	18	0.2757
D(LOGRATE,2)	D(LOGEXP,2)	4.986905	3	0.1728
	D(LOGGDP,2)	18.92399	3	0.0003
	D(LOGINF)	6.316607	3	0.0972
	D(LOGM2,2)	58.19078	3	0.0000
	D(LOGTAXES,2)	6.540657	3	0.0881
	D(LOGTRADE,2)	13.85508	3	0.0031
	All	139.7938	18	0.0000
D(LOGTAXES,2)	D(LOGEXP,2)	2.624418	3	0.4532
	D(LOGGDP,2)	1.765556	3	0.6225
	D(LOGINF)	6.378986	3	0.0946
	D(LOGM2,2)	3.971288	3	0.2646
	D(LOGRATE,2)	4.009021	3	0.2605
	D(LOGTRADE,2)	5.209955	3	0.1571
	All	20.35602	18	0.3131
D(LOGTRADE,2)	D(LOGEXP,2)	6.002873	3	0.1115
	D(LOGGDP,2)	2.864183	3	0.413
	D(LOGINF)	3.657758	3	0.3009
	D(LOGM2,2)	5.294746	3	0.1514
	D(LOGRATE,2)	2.380952	3	0.4972
	D(LOGTAXES,2)	1.919624	3	0.5893
	All	18.48599	18	0.4241

The granger causality tests used in the study is to assess how the variables of fiscal and monetary may have a reverse causation on the macroeconomic variables and vice versa. From the table above, data from South Africa indicates that exports only granger causes money supply and no other variable used in the study. It is also seen that the gross domestic product of South Africa, over the years under study, does not granger cause any of the variables used in the test. With the significant level of 5%, inflation is seen to only granger cause taxes, with a p value of 0.0022.

Inflation does not granger cause exports, GDP, money supply interest rates and trade but it is seen to granger cause taxes in the context of the south African economy. Money supply (M2) is seen not to granger cause any of the variables as the test proves to accept the null hypotheses of no existence of granger causality.

Interest rates on the contrary, is seen to granger cause GDP, money supply and trade at highly significant levels. From the above table, taxes and trade does not granger cause any of the variables in the study of the South African economy.

FIGURE 4.3 IMPULSE RESPONSE FUNCTIONS (SOUTH AFRICA)



From Figure 4.3, it can be observed that South-Africa's GDP responds positively to a tax shock for the entire period. This positive response is high in the short run, falls during the fourth year, and then rises for the rest of the period. The response of GDP to shocks in the other variables fluctuate over the ten-year period. It can be seen that the response to a

government spending shock is positive in the first year, then maintains a zigzag pattern across the horizontal axis for the rest of the period. The GDP is also observed to respond in a similar fashion to a shock to the central bank lending rate. In this case however, the response is not very strong since the curve lies very close to the horizontal axis, and in the sixth to seventh year, there is evidently no response. Finally, GDP responds negatively to a money supply shock in the first to fourth year, positively from the fifth to eighth year, and then falls back negative again for the last two years.

The response of inflation to fiscal policy shocks is observed to be significantly negative over the period. Government spending shock is seen to influence inflation positively in the first year but becomes negative in the second year and maintain that response for the rest of the period. The response of Inflation to a shock in tax is negative all throughout the ten-year period. With regards to the monetary policy shocks, South-Africa's inflation responds in an oscillating manner over the years. Both money supply and central bank lending rate shocks begin with negative influences on Inflation. From the third year going, the response of inflation to money supply and lending rate shocks was contrasting. This means that during the periods where the response is positive to a money supply shock, it is negative to a central bank lending rate shock.

Figure 4.3 further show that trade responds negatively to government spending over the entire period except during the fifth period when it rises to positive. Its response to the other shocks fluctuate around the horizontal axis over the entire period. Thus the response of trade to the monetary policy shocks is not in one constant direction but moves from positive to negative and vice-versa over the years. It also responds in similar fashion to the tax shock.

In addition, government spending is observed to fluctuate in response to shocks to itself and the monetary policy instruments. It does not respond to a tax shock during the fifth to eighth year but responds positively to it for all other periods. The money supply responds positively to shocks to itself and to tax shock over the entire period. It also responds negatively to government spending and central bank lending rate shocks for most of the ten-year period. Furthermore, the central bank lending rate is seen to fluctuate significantly to shocks to itself and all the other variables over the ten-year period. Finally, the tax responds positively to its own shocks over the entire period but fluctuates to shocks to all the other variables.

4.4.3 Forecast Error Variance Decomposition (South Africa)

Table 4.22 Forecast Error Variance Decomposition of GDP

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.030030	1.930503	4.126245	0.000000	0.03488	10.31001	83.59836	0.000000
2	0.036800	11.29705	3.088416	0.789187	1.217459	10.01926	72.42507	1.163557
3	0.048515	28.04095	1.969816	1.207640	4.134077	9.598622	54.12085	0.928041
4	0.057450	27.45734	2.063356	2.395084	3.957209	11.61431	51.63419	0.878518
5	0.061067	27.52948	2.194606	2.354440	3.898538	11.36190	51.78740	0.873641
6	0.062853	29.16331	2.030807	2.168423	3.631689	11.14732	51.01577	0.842686
7	0.065314	27.31187	1.903979	2.101418	3.456182	10.51826	53.87558	0.832716
8	0.066878	26.15703	1.923707	2.395636	3.417745	10.93281	54.39281	0.780265
9	0.068027	26.75828	2.307572	2.158096	3.458573	9.925863	53.75659	1.635031
10	0.070291	26.26107	2.171132	2.258268	3.411813	9.579201	54.69807	1.620448

The results of the GDP forecast error variance decomposition displayed in Table 4.22 shows that the influence of tax shock dominates in the short run explaining about 84% of the forecast error variance of GDP in the first year and 72% in the second year. It reduces in the third year but stabilises for the remainder of the years. The government expenditure

behaves quite contrary by increasing significantly in the second and third year before stabilising from there. The influence of the joint influence of the shocks to the fiscal policy instruments are therefore more prominent over all the years. Comparatively, the monetary policy shocks are insignificant in contributing to the GDP forecast error variance over the entire ten year period, reaching a maximum of about 15% in the fourth to sixth years.

Table 4.23 Forecast Error Variance Decomposition of Inflation

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.138373	8.521456	0.911034	40.39915	3.510717	1.354260	45.30339	0.000000
2	0.172841	16.90219	0.631153	26.60188	2.707673	5.884086	44.02088	3.252136
3	0.217090	10.96337	4.792954	19.35357	5.661527	16.20819	39.75317	3.267222
4	0.223187	8.929355	6.150406	20.00116	4.707764	18.31907	38.93619	2.956062
5	0.227839	10.90774	7.539642	17.90251	5.257899	18.71954	36.84788	2.824782
6	0.237506	9.923963	7.441617	19.44391	4.725897	20.22292	35.31337	2.928332
7	0.245712	9.322617	7.030103	19.13873	4.574038	19.67267	37.00910	3.252744
8	0.253876	9.110043	6.924694	19.11473	4.445253	19.17098	38.16993	3.064369
9	0.267889	8.192955	6.209981	18.58702	4.440219	20.82817	39.04535	2.696306
10	0.277639	7.570808	6.925844	18.26324	4.117297	20.99669	39.44040	2.685714

Table 4.23 presents the results of the forecast error variance decomposition of South Africa's inflation due to the various shocks. The results indicate that the past inflation shocks are quite influential in the short run but diminishes over the years. The fiscal policy shocks contribute more significantly to the inflation forecast error variance decomposition in the short run, contributing over 53% in the first year and over 60% in the second year. The influence of the fiscal policy shocks however diminish gradually to reach 46% in the tenth year. Monetary policy shocks on the other hand are quite insignificant in the short run but its effects increase as the years go by, to reach over 24% in the tenth year. Thus, the influence of the monetary policy shock contributes significantly to the South Africa

inflation forecast error variance in the long run. But still remains less significant compared to the fiscal policy shocks.

Table 4.24 Forecast Error Variance Decomposition of Trade

Period	S.E.	LOGEXP	LOGGDP	LOGINF	LOGM2	LOGRATE	LOGTAXES	LOGTRADE
1	0.206900	11.42211	13.21201	0.332219	7.327725	18.84516	13.76914	35.09164
2	0.260558	17.67965	11.90677	1.182957	13.38611	14.99583	10.83598	30.01271
3	0.339535	16.14724	13.73914	4.004746	12.11706	12.71037	9.168146	32.11331
4	0.376323	14.44198	13.65476	4.878837	13.48887	11.65452	11.28778	30.59326
5	0.399799	19.70170	14.14248	4.389887	15.07042	10.08170	9.623301	26.99051
6	0.421799	20.99280	15.47409	3.639086	16.98464	8.688017	9.960871	24.26049
7	0.436247	19.14464	17.81272	4.342845	14.80394	7.080128	9.378206	27.43752
8	0.450736	21.10377	16.83551	4.679600	15.28175	6.678256	8.812013	26.60910
9	0.480994	22.30240	16.98606	4.664384	14.85271	6.368635	8.404849	26.42097
10	0.502376	21.53697	17.18487	4.602654	15.48417	6.149446	8.174760	26.86713

The forecast error variance decomposition of South Africa's trade is presented in Table 4.24. It is observed that the contribution of fiscal policy shocks to the trade forecast error variance is similar to that of the monetary policy shocks in the short run. In the first and second years, the fiscal policy shocks accounted for over 25% and 27% respectively of the trade forecast error variance, whiles monetary policy shocks accounted for over 25% and 28% respectively. The contribution of the monetary policy shocks reduces gradually till it eventually reaches about 22% in the tenth year. The influence of the fiscal policy shocks however increase till it gets to about 30% in the tenth year. Hence, the fiscal policy shocks are more influential to the trade forecast error variance compared to the monetary policy shocks. Furthermore, the contribution of the past trade shocks is very dominant in the short run but diminishes in the long run, although remaining significant.

4.5 Discussion of Results

The study sought to find out whether monetary and fiscal policy shocks had an impact on macroeconomic fluctuations in Africa. The study is not the first of its kind in this recent times, however, it is one of its kind in the African context and to seek a combined effect of both monetary and fiscal policy shocks on fluctuations of macroeconomic variables. Again the study used a time series analysis approach for the period of 44 years on three economically vibrant economies in Africa.

The concept of the effectiveness of the fiscal and monetary policies on macroeconomic variables of the economies of consideration is very evident from the above analysis. As per the analysis, both policies have long term impacts as well as short term effects despite its reducing effect. The use of the VAR model as well as the use of the forecast error variance decomposition reflects major fluctuations in macroeconomic variables as a result in changes in monetary as well as fiscal policies.

From previous literature, we understand that monetary policy can be manipulated to promote growth in the economy and to also reduce inflation. This concept is seen to be very evident in our empirical analysis as the impact of monetary policy tools positively and negatively affect growth and inflation respectively. The effect of the policies reduces with the passage of time but the study elaborates the long term effect on the economy.

According to literature, when inflation strays significantly from target set by policy makers, actions are taken to bring inflation back closer to its target. Nevertheless, when inflation is fairly close to target, policymakers seldom actively pursue further improvements. Inflation targets are rarely manipulated looking at the computations of the

analysis, however, its long run effect in the macroeconomic shocks are inevitable despite a relatively low effect in the short run.

From the analysis, it is clearly seen that governments use fiscal policy to influence the level of aggregate demand in the economy to achieve economic objectives such as price stability, full employment, and economic growth. Though the transmission mechanism may not be clearly cut in some countries as in other countries, all the three countries used in the study indicate from the various FEVD tables that inflation which is a major macroeconomic variable is seen to be greatly influenced by government expenditure as well taxes. The effect of the fiscal policies is seen to reduce over time indicating a diminishing effect with passage of time across all countries. This control of inflation from fiscal policies does improve economic output and stability.

The fluctuations in the levels of trade among the countries used in the study can be well explained the levels of money supply, taxes as well as government spending. Government being the largest contributor to developments in the countries under study. This can then be said as the result of major fiscal policy dynamics that exist. The contribution of inflation to the fluctuation in the levels of trade can then be as a result of rippling effects from both fiscal and monetary policy controls implemented by governments and the central banks.

Another inference drawn from the FEVD tables considering all the three sets of analysis indicates that the application of monetary policies and its effect on macroeconomic fluctuations is not profound. The contributions of monetary policies by the central has less impact compared to the fiscal policies. The use of monetary policies for economic control

is quite restricted to some levels. The implementations done by the central banks is done systematically to avoid a breakdown of aspects of the economy. This fall in line with the Taylor rules which are simple monetary policy rules that prescribe how a central bank should adjust its interest rate policy instrument in a systematic manner in response to developments in inflation and macroeconomic activity.

The concerns with the duration until the full impact fiscal policies are considered. According to past literature, both theoretically and empirically proven, there are certain levels of lag time in which conditions will deteriorate before being recognized. The nature of fiscal policy seldom allows for quick realization of its impacts. It is known to take time to implement due to factors such as bureaucratic legislative and administrative processes. The results of these and those same policies will take time to show results after implementation.

Besides providing goods and services, fiscal policy objectives vary. In the short term, governments may focus on macroeconomic stabilization such as stimulating a slow growing economy, opposing rising inflation, or helping reduce external weaknesses. In the longer term, the aim may be to foster sustainable growth or reduce poverty with actions on the supply side to improve infrastructure or education.

In assessing the effectiveness of the monetary policy in Ghana, Nigeria and South Africa, the use of the vector error correction model (VECM) to understudy the dynamics of inflation to monetary policy shocks, found that the impulse response function obtained from the VECM showed that while positive shocks to monetary policy decrease output, they do not decrease and inflation.

In the analysis, it is clearly seen that monetary policy shock has certain growth dampening effects during the period under study. This dampening effect can be traced from the control of inflation which may be anticipated and unanticipated. However, certain research allude to the fact that inflation as known may sometimes not necessarily be a monetary phenomenon. (Ajilore & Ikhide, 2013). This is really evident with the analysis from South Africa.

Despite the above assertions, it is clearly seen that the impact of fiscal policy shocks have a positive impact on the output of the entire economies use in the study. The magnitude of government spending on various macroeconomic variable fluctuations can be well noticed from a joint analysis with monetary policy variables. Gross domestic product, inflation and trade are seen to fluctuate at various periods with some recording negative impacts and others positive at different lags.

After exploring the joint analysis on fiscal and monetary policy shocks which is different from some other studies, it is interesting to note that this study agrees that positive government spending shocks have persistent output effects with diminishing effects over a passage of time, considering Africa with the use of three vibrant economies.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

5.1 Introduction

This chapter presents a summary of the entire study and concludes on the effects of fiscal and monetary policy shocks on macroeconomic fluctuations in Africa, considering three main economies: Ghana, Nigeria and South Africa. The study also makes necessary recommendations for policy implementation and further research. Lastly, this chapter presents some limitations of the study.

5.2 Summary

The effect of fiscal policy and monetary policy in the determination of macroeconomic fluctuations has been studied in various jurisdictions over the past years. These past studies have been conducted, separately considering either only fiscal policy or monetary policy in explaining macroeconomic fluctuations. These economic variables are known to in one way or the other affect the livelihoods of the people to which it applies. The proper implementation of the said fiscal and monetary policies have the strong tendencies of improving on the standards of living of the citizenry and on the economy as a whole for extended periods. The combined effect of these economic policies on fluctuations on macroeconomic variables have not been considered and much more in the context of Africa. This research intends to fill the lacuna that exists in the area of academia and beyond.

The study uses data from three different African countries from which inferences can be drawn and generalized for the African continent. The research work uses data covering 1970 to 2013, a period of thirty eight (44) years. The study in order to achieve its

objectives used the vector autoregressive model. This research employed VARs to study the dynamic effects of dynamics to fiscal and monetary policy on a variety of economic variables. Considerations were given to certain major macroeconomic variables. These were gross domestic product, inflation, and trade of the countries used for the study. The fiscal and monetary policies were respectively government spending and taxes and interest rates and money supply. The study also considered the use of impulse response functions to measure dynamic marginal effects of each shock of all the variables overtime. This was depicted in a graphical form to have a visual representation. As a seemingly robustness checks to the analysis carried out, the study also used the factor error variance decomposition to better assess the dynamic effect of fiscal and monetary policy effects on the above mentioned macroeconomic variable fluctuations over the 44 year period in Africa.

The study first finds a causal relationship in some of the variables. The effects of some fiscal and monetary variables are seen to have a reverse causality with some of the macroeconomic variables. The use of the VAR help in drawing out the needed analytical relationships of concern. The study shows that the shocks posed by the fiscal policies had a greater impact on the fluctuations on the major macroeconomic variables as compared to monetary in Africa. Over the period, it was clearly seen that there were fluctuations in inflation, GDP and the volumes of trade in response to the changes in the government spending and tax implementation policies.

5.3 Conclusion

This research work attempted to empirically establish the explanation of fiscal and monetary policies on macroeconomic fluctuations in Africa. Though studies have been

conducted in this area of research, very little has been sought on the joint effect of the fiscal and monetary policies on the GDP, trade and inflation of the countries under study for a generalization in Africa. The research revealed that in general, the effect of fiscal policy were greater than the effects of monetary policy on the macroeconomic variable fluctuations. The results of the study indicated that monetary policies had minimal but long term effects on the levels of the economic variables. This presupposes that business units may be mostly affected by monetary policy shocks. However, contractionary monetary policy was seen to generally reduce the levels of outputs as seen from the negative effect from the analyses. This was traceable in all the three countries used in the study and thus conforms to past literature. The levels of money supply is seen to have an effect on the levels of growth in all three countries with a dwindling individual effect which could be explained by the slight variations in economic structures and other factors.

The joint use of both fiscal and monetary to explain fluctuations in macroeconomic variables is deemed very necessary as this allows for a proper measure of each policy's effective assessment.

5.4 Future Research

Further work could be undertaken to refine the analysis as new, and improved data become available with each passing day. More generally, this research work indicates that findings about the impact of fiscal and monetary policies in explaining macroeconomic fluctuations may be quite sensitive to the methodological approach. Again, for a further research on the explanation of fiscal and monetary policy shocks on macroeconomic fluctuations, a panel data analysis could be useful. This may take the form of a panel vector autoregression (PVAR).

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