CHAPTER ONE
INTRODUCTION

1.1.The problem

A growing literature has emerged in recent years to explain the association between fiscal stance[1] and macroeconomic performance. The most persuasive argument in the literature is about the two non- exclusive views regarding what makes a fiscal stance contractionary or expansionary. One view emphasises that "non Keynesian" expansionary effects of fiscal positions should occur, especially at high levels of debt, as indicated by the empirical result of Perotti (1997).While the standard Keynesian effect of a fiscal contraction posits that for a given monetary policy, a deficit reduction should create a downturn or recession, at least, in the short run. This contractionary effect should be larger with a spending cut than with a tax increase for a simple multiplier argument (Sutherland, 2007)

The design of fiscal policy[2],especially in developing countries, has recently become the focus of active debate within and between the international financial institutions as well as in the individual countries themselves. Thus, the issue of fiscal stance requires an examination of fiscal policies in a dynamic framework due to the fact that current fiscal stance could constrain future fiscal policies.

[1] Fiscal stance is a measure of the direct expansionary and contractionary adjustment that fiscal policy exerts on aggregate demand.

[2] Fiscal policy is defined here as the level and structure of taxes and public expenditure, and the extent of budget deficit. The latter is sometimes referred to as "macro-fiscal" policy

Fiscal stance received much of the blame for the assorted economic ills that beset developing countries in the 1980s- over indebtedness and the debt crisis, high inflation and poor economic performance and growth. (Easterly, 1999). Attempts to regain macroeconomic stability through fiscal adjustment achieved uneven success, raising questions about the macroeconomic consequences of public deficits and fiscal deterioration. As both government revenue and expenditure are affected by the state of the economic cycle. Therefore, the difference between government revenue and expenditure is not a good measure of fiscal stance.

What is required is a measure of the change[3] in fiscal surplus or deficit. Furthermore, macroeconomic performance of a country is determined by a number of factors that may be endogenous or exogenous. The endogenous factors include fiscal stance of the government, monetary policies, investment /savings, internal debt stock, among others. The exogenous factors include changes in terms of trade, economic performance and changes in international interest rates and prices.

Nigeria's fiscal deficits have persistently exceeded the conventional benchmark of 5.0% as a proportion of Gross Domestic Product (GDP) when it averaged 9.8% per annum between 1970 and 2008. Over the same period, the mean annual growth rates of real GDP, investment and money growth stood at 2.3%, 1.8% and 2.6%, respectivelyWhile, there is a growing body of empirical literature on the effect of fiscal deficit on the current account balance, there is very little attempt by researchers to investigate the extent to which fiscal stance has affected macroeconomic variables in African economies.

In addition, Nigeria's fiscal policy since the 1980s has invariably lacked the desirable characteristics required for its effectiveness as a tool of macroeconomic management. Thus, fiscal policy has not always been consistent with other macroeconomic policies

[3] What is important is the change in the budget balance, not its absolute value. In a dynamic economy with growth and inflation, changing surplus (deficit) would be consistent with changing demand for goods and services. This change most times is responsible for cyclicality in the economy.

(Yekini, 2001). Over the years, budgetary administration has been characterised by irregular release of budgeted funds, poor monitoring of government expenditure, loss of autonomy by state and local government in making expenditure decisions, increased abdication by government of its traditional function of tax collection, and increased complication of the process of paying government creditors and suppliers (Adeoye, 2006). Besides, government expenditure is highly elastic with respect to revenue development (Olaniyi et al, 2002).

The combination of factors such as the existence of large current account imbalances and a high dependence on an unstable oil market implies greater vulnerability of the Nigerian economy and government fiscal operations to adverse external shocks and the consequent economic disequilibrium. It is against this background that these research questions emerge: Can fiscal stance be responsible for macroeconomic performance of Nigeria? What is the impact of fiscal impulse on macroeconomic outcomes?

1.2. Objectives of the study

The broad objective of this study is to examine the effects of fiscal stance on macroeconomic performance in Nigeria. The specific objective is two-fold. These are to:

i. establish the relationship between fiscal stance and macroeconomic indicators
ii. determine the impact of fiscal impulse[4] on macroeconomic aggregates, such as real GDP, inflation, money supply and exchange rate.

Lessons for policy will be drawn from the results obtained

1.3. Justification for the research

Major attempts at measuring the effects of fiscal stance on macroeconomic outcomes have received significant research attention in developed economies. However, attention has recently shifted to examining the same phenomenon in developing countries, especially in

[4] Fiscal impulse is defined as a change in fiscal stance.

African Economies. Fiscal policy urged on the developing countries was to lead them out of economic malaise, but considerable uncertainty remains about the relationship between fiscal policy stance and the macroeconomy. (Alesina et al, 2009). There are various measures of fiscal stance, prominent among them are; the budget balance (BB) measure; the primary balance (PB) approach; and the cyclically adjusted fiscal balance (CAFB) measure. This study adopts the CAFB approach because it includes the effects of the economic cycle on revenue and expenditure (that is, the automatic stabilizers). It also allows us to identify the portion of the fiscal position that would be the direct result of discretionary fiscal policy decisions. (Villafuerte, et al, 2010)

Some researchers have considered fiscal operations of a Government to be generally large and inefficient (Raghbendra, 2001). Further, it has been posited that government's fiscal policy, especially taxes and transfer, often distort market prices thereby causing wide regressive effects on savings and investment (Singh, 2008). However, some researchers have posited that large government expenditure is a more powerful engine of growth (Woodford, 2009). This contention is based on the belief that government reconciles conflicts between private and social interests, thus, enhancing optimal allocation of economic resources to achieve economic growth. Therefore, the virtuous circle between good fiscal management and economic growth has been seen as a probable outcome of low and stable fiscal deficits.However, some of these positions were not informed by the findings of available research (Tswamuno, 2007). Hence, the need for a comprehensive study which examines the impact of fiscal stance on economic performance is imperative.

In the last few years, periods of large fiscal expansion are alternating with years of sharp fiscal contraction in most developing countries (Malcolm et al, 2001). These episodes have been associated with a variety of macroeconomic outcomes and have attracted the interest of macroeconomists since the early nineties. (Ardagna, 2004). In Nigeria, several researchers have studied the response of private consumption, private investment and GDP growth to substantial changes in the government budget (see Adeoye, 2006).

However, much of these hardly considered the reaction of fiscal stance around episodes of fiscal contraction and expansion[5].

Some of the related studies on fiscal policy and economic growth in Nigeria were carried out by Ariyo and Raheem (1990), Egwaikhide (1991), Ariyo (1993), Ekpo (1994), Ndebbio (1998), Adam and Bankole (2000), Yekini (2001), Olaniyi and Adam (2002), Adeoye (2006), as well as Aregbeyen (2007)[6]. However, the impact of a change in fiscal stance (fiscal impulse) on macroeconomic performance has not been explicitly examined by some of the previous studies. Thus, this study bridges this gap by explicitly using a macro-econometric model that explains the relationship between fiscal stance and macroeconomic outcomes.

The empirical contribution of this study to the existing literature goes beyond documenting the behaviour of macroeconomic outcomes around episodes of large changes in the fiscal stance. The study also provides additional evidence on the impact of fiscal policy shocks on economic outcomes like real GDP, inflation rate, money supply, and exchange rate, by focusing on the change in fiscal stance (fiscal impulse). Finally, this study adds to the literature that investigates whether fiscal stance contributed to dampen or magnify macroeconomic volatility in Nigeria.

1.4. Scope of the thesis

The primary focus of this study is on the effects of fiscal stance on macroeconomic performance in Nigeria. The study uses both annual and quarterly data[7]on Nigeria covering the time span 1970 to 2008. This period is chosen because it is the era that the

[5] See, for example, Alesina and Perotti (1997) Ardagna (2004a), Alesina and Ardagna (2009), for contribution on large fiscal contraction and expansion and the macroeconomy.

[6]Although, the study by Aregbeyen (2007) was on selected African countries, including Nigeria.

[7]Annual data and quarterly data are used to accomplish the first and the second objectives respectively.

country started experiencing wide variations in its nominal budget balance which may partly be explained by oil price and economic cycles.

1.5. Outline of the research

The rest of the thesis is organised into five chapters. Following this introduction is chapter two that presents macroeconomic trends, fiscal stance and fiscal impulse in Nigeria. Also examined in this chapter are various indicators of Nigeria's fiscal stance. Specifically, the pattern of movements in Fiscal stance, inflation rate, real gross domestic product, oil prices, trade balance and exchange rate are examined. Chapter three presents the literature review. The theoretical, methodological and empirical literature on the effects of fiscal stance on macroeconomic indicators is appraised. Chapter four is the theoretical framework with the methodology employed in the study, while chapter five reports the model estimation, evaluation and interpretation of results on the relationship between fiscal stance and macroeconomic outcomes. Finally, chapter six summarises the major findings, highlights the lessons for policy and concludes.

CHAPTER TWO
BACKGROUND TO THE STUDY

2.1. Nigeria's government nominal budget imbalance (1970-2008)

This section presents the mean values of the nominal budget imbalance in Nigeria. The emphasis is on development in revenue, expenditure and fiscal balance between 1970 and 2008.

The average values of revenue of the federal government, expenditure and budget balance are reported in Table 2.1. In order to give some indication of the sizes of federal government expenditure and budget balance, their sizes as a percentage of the level of GDP are also presented.

As shown in Table 2.1, the federal government was unable to maintain a reasonable balance between revenue and expenditure. Indeed, expenditure exceeded revenue for most of the years and so, budget deficit remained a key feature of the fiscal operation of the government.

Revenue as a ratio of GDP (REV % GDP) ranches between 11.15% and 22.54%. Between 1970 and 1974, revenue was 17.87% as a ratio of GDP. This value increased to 22.54% in 1975/1979. There was a drastic fall in this variable in 1980/1984, 1985/1989 and 1990/1994 to 15.56%, 12.94% and 12.52% respectively. A relatively sharp increase was recorded in 1995/1999 which stood at 14.25%. This ratio fell to 12.66% and 11.15% in 2000/2004 and 2005/2008 respectively.

Expenditure as a ratio of GDP (EXP % GDP) fluctuated between 11.73% and 25.18% in the period under consideration. The federal Government expenditure GDP ratio that was 17% in 1970/1974 rose to 25.18% in 1975/1979. It remained relatively constant between

1980 and 1994, averaging 21.5% per annum. The EXP % of GDP fell to an average of 16.7% in 1995-2004. There was a further decline in the ratio to an average of 11.7 percent between 2005 and 2008.

In the same vein, budget balance as a ratio of GDP (BB % GDP) recorded a surplus in the period 1970/1974 that was 0.9%. However, the period between 1975 and 2008 marked the period of deficits, averaging about 4.7% per annum.

A major problem with using nominal figures is that they do not take the distortionary effects of economic cycles into consideration. Buiter (2006), Abbott (2006), Makin (1995) and Villafuerte et al (2010) amongst others, have argued that in order to determine the government's fiscal stance, the budget imbalance is best adjusted to account for the effect of the economic cycle on revenue and expenditures (that is, the automatic stabilizers). This indicator allows the identification of the portion of the fiscal position that is the direct result of discretionary fiscal policy decisions. This gives rise to the computations of the cyclically-adjusted fiscal balance in Table 2.2.

2.2. Trend in fiscal stance and macroeconomic performance in Nigeria (1970-2008)

Reported in Table 2.2 are the fiscal stance and selected macro-economic variables, namely, real GDP growth rate, inflation, money supply as a ratio of GDP, exchange rate, oil price, and trade balance as a ratio of GDP. The magnitude of fiscal stance between 1970 and 1989 was in a deficit averaging -N1529.26 million per annum. In the period 1990-2008, the federal government recorded expansionary fiscal policy stance, except in the mid-1990s where contractionary fiscal stance dominated. Based on this indicator, it can be said that the fiscal stance of the government was expansionary in the reference period.

Evidence shows that the size of the fiscal stance was negative annually between 1990 and 2008, except in 1995 which recorded a surplus of N22.207 billion. The size of the fiscal stance oscillated widely between 1990 and 1994 with an average value of N3, 805.33 million. The value swung to a surplus of N22.207 billion in 1995 and fell to an average

deficit of N1, 893.23 billion between 2000 and 2008. Particular relevant to the current discussion is fiscal stance as a percentage of Real GDP. When this ratio is negative in any given fiscal year, the fiscal stance of the government is adjudged to be expansionary and contractionary when the ratio is positive. It can also be seen that fiscal stance as a ratio of GDP (FIS* % RGDP) is negative throughout the period under consideration except in 1995 in which a positive value was recorded (0.08%).

Table 2.1. Average Values of Nigeria's Government Nominal Budget Imbalance (1970-2008)

PERIODS	REV (Nm)	EXP (Nm)	BB (Nm)	REV%GDP	EXP%GDP	BB%GDP
1970-1974	1850.94	1526.9	324.04	17.87	16.95	0.92
1975-1979	6873.9	7605.96	-732.06	22.54	25.18	-2.65
1980-1984	7972.64	11573.9	-3601.3	15.56	22.64	-7.08
1985-1989	15116.4	24012.3	-8895.9	12.94	20.49	-7.56
1990-1994	67788	114354	-46566	12.52	21.42	-8.89
1995-1999	388497	489801	-101304	14.25	17.65	-3.39
2000-2004	877571	1077881	-200311	12.66	15.70	-3.04
2005-2008	2256101	2362955	-106854	11.15	11.73	-0.59
Grand Total	406480.8	463733.3	-57252.4	119.49	151.60	-4.12

Notes: REV is the revenue, EXP is the expenditure, BB is the budget balance, and GDP is the gross domestic product. The average values of the variables were computed by the author. Source: Central Bank of Nigeria (CBN) Statistical Bulletin, 2009.

The Nigerian economy has been characterized by double digit inflation averaging 18.08% between 1970 and 1989, it rose to 52.23% in 1992-1996, and then fell to less than 10% in the next 4 years. In 2001-2005, the mean inflation was 15.73%, and in the next 3 years (2006-2008), inflation recorded an average of 8.41%. On a closer examination, 1995 witnessed the highest inflation which stood at 72.8%, this year recorded contractionary fiscal stance. The lowest inflation of 5.4% occured in 2007, as shown by the available data, inflation was well above a single digit, except in some years like 1990, 1998-2000 and 2006/2007.

An examination of money supply as a ratio of GDP shows a positive trend between 1970 and 2008. The ratio in 1970/1998 averaging 0.27, it fell to 0.26 in 1990, and later rose to 0.28 in 1991. The period 1992 and 1994 recorded an average of 0.27. In the year 1995 and 1996, there was a drastic fall in MS/GDP to 0.16 and 0.14 respectively. There was a negligible increase in 1998 to 0.19, 0.22 in 1999 and 0.23 in 2000. In 2001, there was an upsurge in the ratio to 0.28. The value recorded in 2002 and 2003 was 0.23. On average, the ratio stood at 0.21 between 2004 and 2007. The year 2008 witnessed the highest value of about 0.38. It is striking from the statistics that 1995, 1996 and 1997 recorded the least values averaging 0.15.

Statistics show that the ratio of external debt to GDP between the period 1970 and 1989 was 0.55 percent on the average. This may be attributable to the structural adjustment programme which appears to have performed better in terms of sectoral and over all GDP growth rates which consequently reduced the need to borrow. In the year 1990, the fraction reduced to 2.40 percent. It reduced further to 1.03, 1.17, 0.78 and 0.48 percents in 1991, 1992, 1993 and 1994 respectively. The over – valuation of the Naira during these periods (especially in 1994) was a major cause of cheap import, which enhanced the Government revenue and subsequently reduced borrowing.However, the external debt-GDP ratio increased to 1.01 and 2.76 percents in 1995 and 1996 respectively. This may be due to the increased in debt burden during this era. It later fell to 1.14 percent in 1997 because of a downward pegging of allocation for debt serving in this year. There was a drastic fall in external debt-GDP ratio in 1998 to about 0.32, while in 1999 and 2000, it

rose to 1.02 and 2.10 percents respectively, the reason may be due to the huge amount of external borrowing that was necessitated by the advent of democracy to finance infrastructure and social services. The external debt-GDP ratio plummeted to an average of 0.82 in 2004, 2005 and 2006.This may be as a result of the Paris Club debt cancellation in this periods. In 2007 and 2008, the external debt-GDP ratio averaged 1.60 percent.

Oil price being a highly volatile variable averaged $19.15 barrel (bbl) between 1970 and 1989. The price increased to $29.10 bbl in 1990. A precipitous fall in oil price to $20.50 bbl was recorded in 1991. The reduction in the price followed an unceasing path until it reached $16.20bbl in 1994. A slight increase in oil price was observed in 1995, which stood at $17.36 bbl, the price rose to $21.60 bbl in 1996. A downward trend was observed between 1997 and 1999, which averaged $16.84bbl. The price rose to $28.67bbl in 2000, after which it plummeted to $24.50bbl in 2001. It is conspicuous that there was an uninterrupted increasing trend in oil price between 2001 and 2008.

Some striking features are discernible from the trade balance GDP ratio (TB%GDP). The ratio between 1970 and 1989 averaged 5.5%. However, there was a significant increase in this ratio which stood at about 24% in 1990. The TB % GDP ratio plummeted to 10.27% in 1991. On average, this ratio between 1992 and 1997 was 12%. The period 1998 was a year with an unfavourable trade balance, this is indicative that there was more import than export in that year, and this has a negative impact on the macro-economy. The period 1999 and 2003 recorded an average of 11.5%. The highest TB % GDP ratio was 30.5% which occurred in 2005, this ratio fell to 21% in 2006, thereafter it reduced drastically in 2007/2008 to about 16%.

Table 2.2. Fiscal Stance and Evolution of Macroeconomic Indicators in Nigeria (1970-2008)

YEAR	FIS*[8](Nb)	GRGDP	INF	MS/GDP	ED/GDP	OP($bbl)	TB%GDP	FIS* % RGDP
70-89	-1529.26	2.32	18.08	0.27	0.55	19.15	5.51	-3.01
1990	-3880.02	8.3	7.5	0.26	2.40	29.10	23.98	-10.88
1991	-5107.89	4.7	12.7	0.28	1.03	20.50	10.27	-20.78
1992	-3793.91	3.0	44.81	0.24	1.17	20.00	11.73	-31.92
1993	-3878.43	2.3	57.17	0.29	0.78	16.04	7.77	-32.42
1994	-2366.01	1.3	57.03	0.30	0.48	16.20	4.81	-14.99
1995	22.207	2.2	72.81	0.16	1.01	17.36	10.11	0.08
1996	-234.575	3.4	29.29	0.14	2.76	21.60	27.64	-0.25
1997	-1356.48	3.2	10.67	0.15	1.41	19.50	14.13	-0.52
1998	-2100.95	2.4	7.86	0.19	0.32	12.83	-3.16	-0.61
1999	-4480.66	2.7	6.62	0.22	1.02	17.96	10.22	-0.93
2000	-1424.14	5.4	6.94	0.23	2.10	28.67	20.97	-0.22
2001	-2603.64	8.4	18.87	0.28	1.08	24.50	10.79	-1.04
2002	-3165.98	3.5	12.89	0.23	0.33	25.40	3.35	-0.59
2003	-1719.46	10.2	14.03	0.23	1.19	29.10	11.87	-0.28
2004	-1330.76	6.6	15.01	0.20	2.29	38.70	22.92	-0.18
2005	-1115.41	6.5	17.85	0.19	3.05	55.30	30.51	-0.14
2006	-645.433	6.0	8.25	0.22	2.11	65.00	21.08	-0.03
2007	-700.341	6.5	5.38	0.25	1.61	86.00	16.06	-0.02
2008	-246.002	6.4	11.6	0.38	1.60	115.00	16.02	-0.01

Notes: FIS is the Fiscal Stance (Cyclically-Adjusted Fiscal Balance), GRGDP is the growth rate of real GDP; INF is the inflation rate; MS/RGDP is the Money Supply (M_2) as a ratio of RGDP; ED/GDP is the External Debt as a ratio of GDP; OP is the international Oil Price; TB % GDP is the Trade balance as a percentage of GDP;* FIS* and *FIS* % RGDP were computed by the Author..*

Sources: Central Bank of Nigeria (CBN) Statistical Bulletin, 2009. OP is obtained from British Petroleum Review of World Energy, 2009.

[8] FIS* can be calculated as: $\frac{R_t}{Y_t^*} - \frac{G_t}{Y_t^*}.\frac{Y_t}{Y_t^*}$. Details of this derivation and interpretations are shown on page 21.

Fiscal stance and inflation in Nigeria are presented in Figure 2.1. The cyclically-adjusted budget balance (CABB) is used as an indicator of fiscal stance. It is evident from the chart that expansionary fiscal policy dominated the fiscal stance of the country. However, periods of contractionary fiscal policy occurred in the early 1970s. Statistics reveal that the relationship between fiscal stance and inflation is eclectic, that is, it is heterogeneous, nonetheless, periods of expansionary fiscal policy are associated with high inflation except in 1995 where inflation rate hit the maximum (about 73%). This is indicative of a weak relationship fiscal stance and inflation. It can be deduced from the relationship that inflation may not only occur as a result of expansionary fiscal policy, but could also occur via monetary phenomenon.

Fiscal stance and growth rate of real GDP are shown in Figure 2.2. It is apparent from the chart that there is a strong relationship between the variables. That is, years of expansionary fiscal stance coincides with years of high growth rate of real GDP. Further scrutiny reveals that highest growth rates of real GDP occurred in the early 1970s and mid-1990s. Likewise, the utmost figure associated with contractionary fiscal stance was noticed in the 1970s, however, the expansionary fiscal stance was also recorded in the 1980s and late 1990s. These associations between fiscal stance and growth rate of real GDP further strengthens the use of cyclically-adjusted fiscal balance as a reliable indicator to measure the impact of fiscal stance on macroeconomic outcomes.

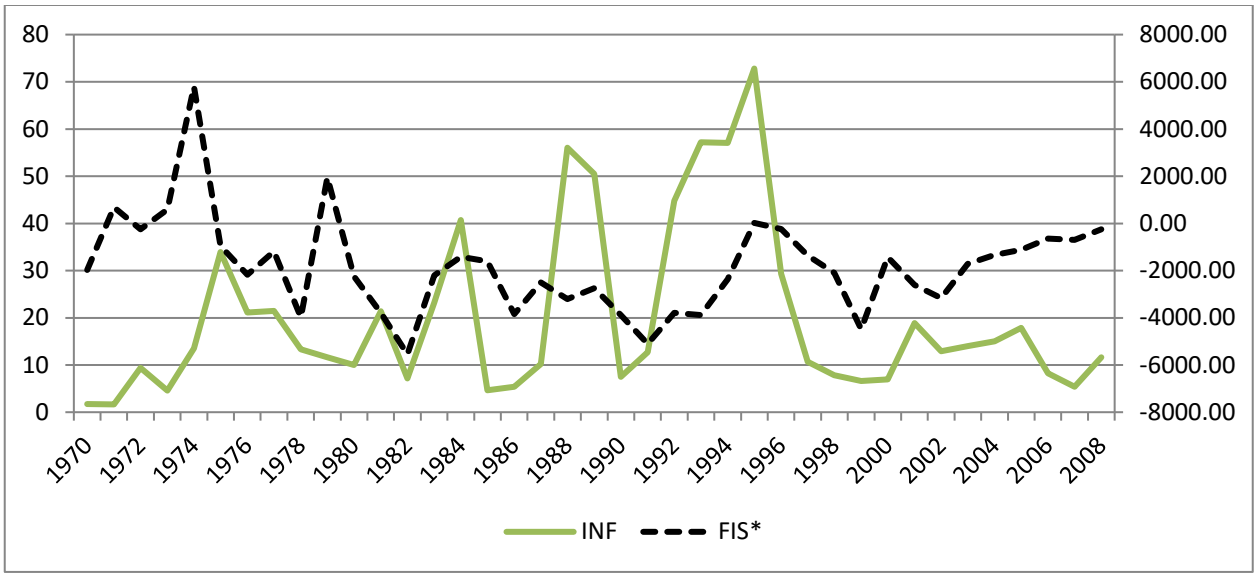

Figure 2.1. Fiscal Stance and Inflation in Nigeria (1970-2008)

Source: Underlying data obtained from CBN statistical bulletin, 2009

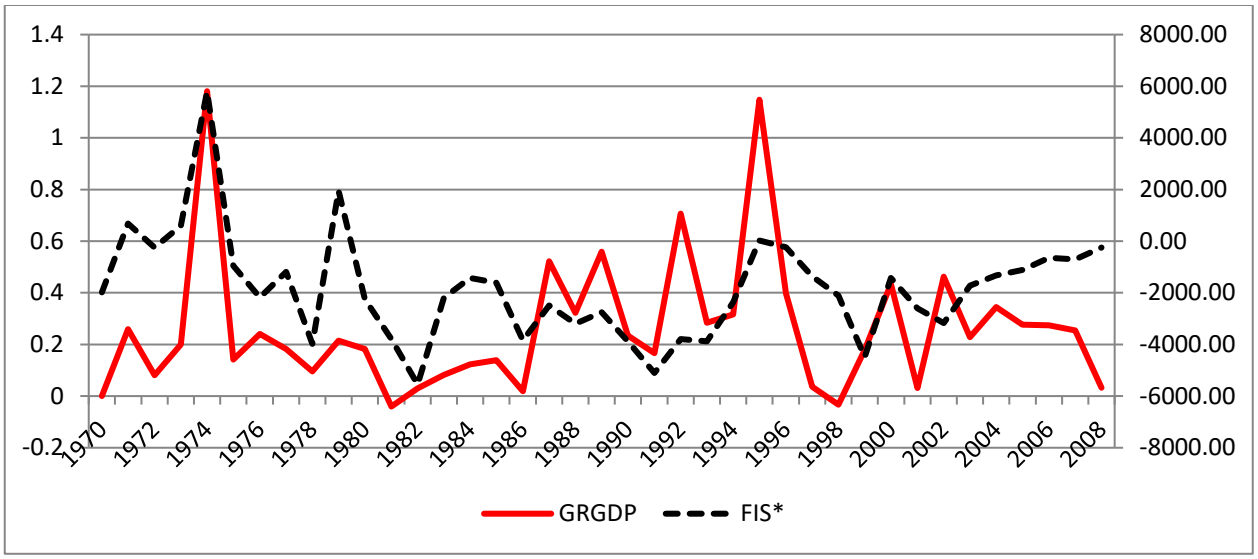

Figure 2.2. Fiscal Stance and Growth Rate of GDP in Nigeria (1970-2008)

Source: Underlying data obtained from CBN statistical bulletin, 2009.

2.3. Oil prices and fiscal impulse in Nigeria

The relationship between fiscal impulse and oil prices is depicted in Figure 2.3. Fiscal impulse has very strong and severe fluctuations over the entire period. It is glaring that the association between the variables is wide-ranging. In 1970, the value of fiscal impulse was 0.12; however, the period between 1971 and 1973 recorded a negative value which averaged -0.14. This period corresponded to the year of a stumpy oil prices. Meanwhile, in the mid-1980s, fiscal impulse recorded the highest value (0.96). Oil prices recorded a number of swings between 1970 and 2008. On average, the oil price between 1970 and 1989 was $19.15bbl. This period corresponded to the period when windfall gains accrued to the government of Nigeria as a result of a positive oil price shock between 1974 and 1978. This value surged to $29.10 bbl in 1990, and then declined to about $20.50 bbl in 1991. The mean oil price for the period between 1992 and 1999 stood at $18bbl. This value rose to about $28.7bbl in the year 2000. There was a fall in oil price to $24.50bbl in 2001. The periods between 2002 and 2007 recorded an increasing trend averaging $58.5bbl. However, the maximum value was noticed in 2008 which stood at $115bbl.

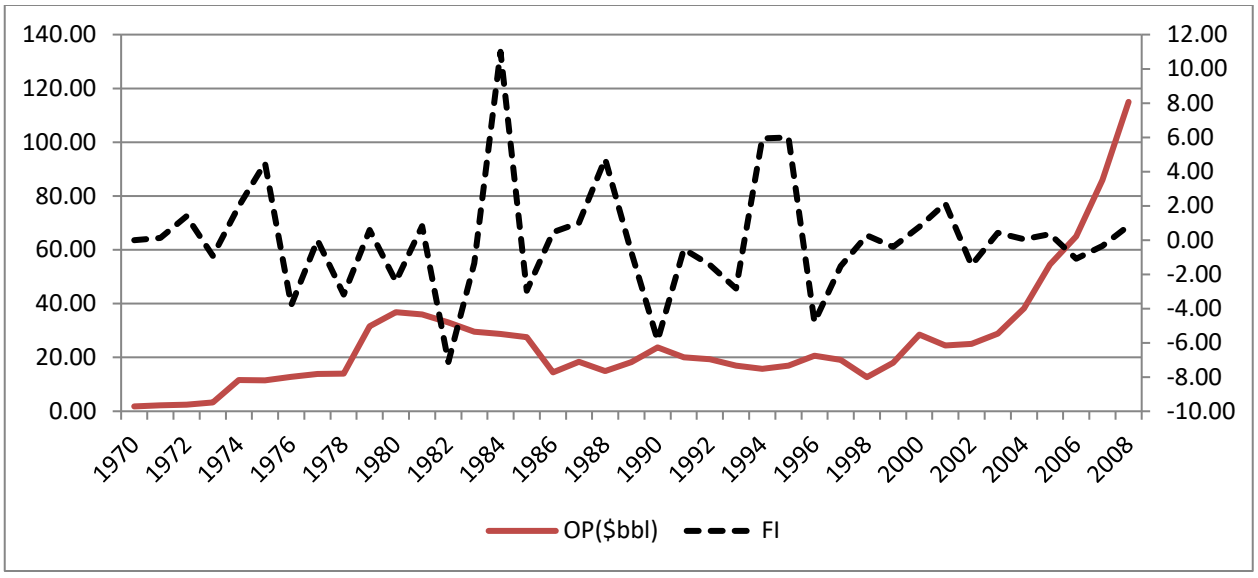

Figure 2.3. Fiscal Impulse and Real Oil Prices (1970-2008)

Source: Underlying data obtained from CBN statistical bulletin, 2009 and British Petroleum Review of World Energy, 2009.

2.4. The Nigeria's fiscal indicators

A thorough analysis of the fiscal stance in Nigeria rely on a varied set of fiscal indicators, including the overall fiscal balance (FB), primary balance (PB) and cyclically- adjusted budget balance (CABB).

The overall fiscal balance is a widely used indicator to assess the government's net financing need—or accumulation of net financial assets—and its fiscal vulnerability. When there is a high degree of correlation between oil prices and the headline fiscal balance, as it is the case in Nigeria, the volatility of oil prices creates a misleading picture of the underlying fiscal position and possible structural imbalances. Therefore, the primary budget balance, factoring out interest payments and resource-based revenue including investment income of the sovereign wealth fund, provides a better indication of the Nigeria's underlying fiscal stance. Furthermore, since the actual fiscal balance reflects cyclical—or temporary—effects on the government budget, as well as structural—or permanent—influences, it is important to refine the measurement of the fiscal position further by constructing a cyclically adjusted non-oil primary balance as a percentage of non-oil potential GDP, which reflects revenues and expenditures adjusted for the impact of the economic cycle.These key fiscal indicators are discussed in turn.

2.4.1. The overall budget balance approach: This is a widely used fiscal indicator, it is useful in assessing the government's net financing requirement (or accumulation of net financial assets) and fiscal vulnerability. However, it is not a good pointer for the impact of fiscal policy on domestic demand or the government's adjustment efforts in oil producing countries, like Nigeria (Villafuerte et al, 2010). For example, with rising oil revenue, a fiscal expansion through an increase in spending may be masked by an improving overall balance. This makes it an inappropriate indicator of fiscal stance in Nigeria. However, an overall budget balance is easy to implement and monitor.A ceiling on the overall fiscal deficit is effective in many countries, but the volatility of oil prices could make it procyclical in an oil-based economy like Nigeria. For example, it could trigger a consolidation in the event of a negative terms-of-trade shock or exacerbate the economic upswing in the case of a positive shock. Thus, a ceiling on the non- oil deficit

offers a better alternative and eliminates the problem of procyclicality.

$$\text{Re}\,venue\,(EV) - Expenditure\,(EXP) = Overall\ Balance\,(OB)$$

2.4.2. The primary budget balance(PBB) measure: This is another indicator of fiscal stance. It offers a further refinement by also excluding from the overall fiscal balance both interest receipts (typically associated with accrued financial savings in oil funds) and payments. Interest receipts and payments are not under the control of the government. The primary balance can also be a very informative indicator of fiscal sustainability through comparisons against long-term fiscal benchmarks based on intertemporal government wealth considerations. However, it is also not a good approach to measuring the stance of fiscal policy, especially in Nigeria, because the indicator in practice is always a deficit and therefore does not measure reasonably the injection/use of oil revenue in the economy, and the level of fiscal effort (Villafuerte et al, 2010). Symbolically, primary balance can be represented thus;

$$\text{Pr}\,imary\ Budget\ Balance\,(PBB) = Overall\ Budget\ Balance(OBB) - interest\ Payment\,(IP) + interest\ receipt(IR)$$

2.4.3. The cyclically-adjusted budget balance (CABB) measure: by including the effect of the economic cycle on oil revenue and expenditures (that is, the automatic stabilizers), this indicator allows to identify the portion of the fiscal position that would be the direct result of discretionary fiscal policy decisions. Fiscal policy in oil producing countries like Nigeria has often been defined as expansionary/contractionary when the change in primary balance is negative/positive. However, even without any fiscal policy measures, the change in the fiscal balance will automatically be negative/positive when the change in the output gap is negative/positive. This is because revenues are more sensitive than expenditures to changes in the output gap: as the output gap changes, several tax bases (e.g. income, consumption) change.

The cyclically-adjusted budget balance is computed to show the underlying fiscal position when cyclical or automatic movements are removed. In terms of revenues, three different

types of taxes are distinguished in the cyclical adjustment process: personal income tax; corporate income tax and indirect taxes. The sole item of public spending treated as cyclically sensitive is unemployment-related transfers. The adjustment is made at the level of total primary spending as time-series data on unemployment-related expenditure are not available across countries.

Cyclically-adjusted budget balance (ratio to potential output) which is a measure of fiscal stance used in this study can be exemplified thus;

$$\frac{R_t}{Y_t^*} - \frac{G_t}{Y_t^*} \cdot \frac{Y_t}{Y_t^*}$$

Where $CABB_t$ = cyclically-adjusted fiscal balance; $\frac{R_t}{Y_t}$ = ratio of revenue to real GDP; $\frac{G_t}{Y_t}$ =ratio of government expenditure to real GDP; $\frac{Y_t}{Y_t^*}$ = ratio of actual real output to potential real output.

The cyclically-adjusted components are calculated from actual tax revenues and expenditures adjusted according to the ratio of potential output to actual output,

2.5. Cyclically adjusted balances and the sensitivity of the budget balance to the business cycle.

This sub-section describes the mechanic of how the cyclically adjusted budget balances are computed, and what the main differences to other approaches are. In addition, it deals with the overall sensitivity of the budget balance to fluctuations of GDP. The cyclically adjusted balances and the sensitivities calculated in this sub-section are also compared with the results of other international institutions.

The method opted for in this study is compared with some alternatives. These other approaches are based on the assumption of a constant elasticity of revenue and expenditure bases relative to GDP. In order to compare them with the method used in this

study, approximated formulas capturing the main characteristics of each approach are presented in Box 2.1

2.5.1. A simplified approach

A very rough approach is to use a constant overall sensitivity σ_B, of the budget balance to fluctuations of real GDP. This sensitivity might, for instance, be derived from a regression of the budget balance on the output gap. The cyclical component of the budget balance, as a percentage of GDP, is then the product of the output gap and the overall sensitivity.

2.5.2. The European Commission approach

For longer periods, it is necessary to make allowance for such factors as the growth of the public sector, since the sensitivity of the general government balance does not only depend on the elasticities of revenue and unemployment outlays but also on their shares in GDP. In the case of revenue, the method adopted by the European Commission makes explicit allowance for this, using the actual yearly revenue share of GDP. This implies that the output gap is multiplied by a time-specific factor (European Commission, 1995). By contrast, the cyclical component of expenditure is calculated by multiplying the output gap by a constant parameter estimated over a long period. This parameter is the product of the inverse Okun coefficient (which relates the unemployment rate to the output gap) and the marginal budgetary cost of an increase in the unemployment rate.

2.5.3. The OECD approach

As the elasticities of the various categories relative to GDP may differ significantly, shifts in the composition of government revenues and expenditure may also lead to a bias in the computation of cyclical budget balances. In order to overcome this problem, the OECD calculates cyclical components for four individual revenue categories[9] (contrary to the European Commission which merges the individual elasticities into one weighted average estimate constant over the entire period). On the expenditure side, unemployment-related

[9] See Van den Nood (2000)

outlays are corrected for the cycle taking into account changes over time in the trend of the unemployment rate.

Both the OECD and the European Commission do not account for composition effects as they assume that cyclical fluctuations in GDP have a constant impact on the budget balance. However, it should be pointed out that their estimates of the elasticity of budget components with respect to GDP- explicitly (OECD) or implicitly (European Commission) - are not based on the assumption of a proportional response of tax bases to a change in GDP. They incorporate instead an "average composition effect", as they include the average reactions observed in the past of the macroeconomic bases to changes in GDP. Obviously, these average reactions, based on past co-movements, are generally not representative for individual years. In the approach followed in this study, the cyclical adjustment of fiscal balances is instead based upon the actual evolution of the macroeconomic bases.

Box 2.1. Different methods used to calculate the cyclical component of the budget balance

1. A simplified approach

$$B_{c,t} / Y_t = \sigma_B . y_{r,c.t}$$

With σ_B = the sensitivity of the budget balance to the cycle. The budget balance and its components are expressed as a percentage of GDP.

2. The European Commission approach

$$B_{c,t} / Y_t = \frac{R_t}{Y_t} \varepsilon_{R,Y_r} y_{r,c,t} - \left(\frac{X^u}{Y} \right) \varepsilon_{X^U,Y_r} y_{r,c,t}$$

where ε_{R,Y_r} is the output elasticity of revenue and $\left(\frac{X^u}{Y} \right)$ denotes the "average between 1970 and 1994".

3. The OECD approach

$$B_{c,t} / Y_t = \sum_j \frac{R_t^j}{Y_t} \varepsilon_{R^j,V^j} \varepsilon_{V^j,Y_r} y_{r,c,t} - \frac{R_t^u}{Y_t} \varepsilon_{R^U,U^\varepsilon U,Y_r} y_{r,c,t}$$

$$with\ \varepsilon_{R^U,U=1}$$

2.6. Intergovernmental fiscal relations (fiscal federalism) in Nigeria

Over the years, the concept of intergovernmental fiscal relations has been examined by various researchers and scolars. In fact, the nitty-gritty of intergovernmental fiscal relations (IGFR) is concretely located within the definitional elucidation of the concept of federalism though with economic blending. Thus, along this line, federalism could be taken to mean a system of government where revenue and expenditure functions are divided among the tiers/levels of government.

This division is usually done to enhance the government's effective provision of public goods and services at different levels to the citizens. It has been generally opined that revenue generating and spending responsibilities, intergovernmental transfer and the administrative aspects of fiscal decentralization are, in fact, the real issues involved in intergovernmental fiscal relations' or fiscal federalism as it is usually known.

Fiscal federalism refers to the allocation of tax-raising powers and expenditure responsibilities between levels of governments. The objectives of fiscal relations among units in a federation are:

- to ensure correspondence between sub-national expenditure responsibilities and their financial resources (including transfers from central government) so that functions assigned to sub-national governments can be effectively carried out;
- to increase the autonomy of sub-national government by incorporating incentives for them to mobilize revenues of their own;
- to ensure that the macroeconomic management policies of central government are not undermined or compromised;
- to give expenditure discretion to sub-national government in appropriate areas in order to increase the efficiency of public spending and improve the accountability of sub-national officials to their constituents in the provision of sub-national services;
- to incorporate intergovernmental transfers that are administratively simple. Transparent and based on objective, stable, non-negotiated criteria;

- to minimize administrative costs and, thereby, economize on scarce criteria;
- to provide 'equalization' payments to offset the differences in fiscal capacity among states and among local governments so as to ensure that poorer sub-national governments can offer a sufficient amount of key public services;
- to incorporate mechanisms to support public infrastructure development and its appropriate financing;
- to support the emergence of a governmental role that is consistent with market oriented reform; and
- . to be consistent with nationally agreed income distribution goals.

Specifically, Nigerian fiscal federalism structure involves the allocation of expenditure and tax raising powers among the federal, state and local government. As the financial relationship between and among existing tiers of governments, fiscal federalism deals with the system of transfer or grants through which the federal government shares its revenue with state and local government.

In Nigeria, local government expenditure has constantly surpassed the potential for revenue sources owing to the great gulf between their needs and their fiscal capacity. This has largely been caused by the incongruous nature of their revenue rights and fiscal jurisdiction with the duties and functions constitutionally allocated to them. In other words, the nature and scope of Nigerian fiscal system or federalism with reference to tax jurisdiction and revenue allocation are progenies of the constitutional and political developments of the country per se. There is no gainsaying the fact that “fiscal laws in Nigeria clearly give more tax powers to the federal government than the remaining two lower tiers of government”.

Given this core of IGFR, there appears to be a scholarly unanimity on the benefits a country like Nigeria could derive from fiscal decentralism because the negative multiplier effects of fiscal centralism are enormous and, above all, incompatible with the demands of federalism. This is so because federalism requires a diffusion of powers to accelerate

growth rates within the polity. Not only this, fiscal decentralization has been argued to be statistically and positively significant for economic growth.

It has been argued that decentralization of spending responsibilities to lower levels of government will ensure improved and efficient allocation of resources for the provision of local public goods and services which mostly represent the aspirations of people at that level. Not withstanding this argument for the positive multiplier effects of fiscal decentralization, the tendency in most federations including Nigeria has been to give fiscal centralism pride of place in the conduct of governmental business. In other words, in most federations, the tendency is for the federal government to retain responsibility for strategic sectors, including research and development. Thus, the need for fiscal decentralization has continued to gain momentum within most federated polities. For example, in Nigeria, almost every constitution-making process has sought information on what principles to utilize for the distribution of the national income. This has been the case in Nigeria, since the period of colonial administration and the introduction of the Richard Constitution in 1946, the Phillipson Commission of 1946, the 1951 Macpherson Constitution, the 1951 Hicks- Phillipson Commission, the 1953 Chick's Commission, the 1958 Raisman Commission, the 1964 Binns Commision.

2.7. The fiscal policy transmission mechanism

How does a change in fiscal policy feed through the economy to affect variables such as aggregate demand, national output, prices and employment? This simple flow-chart in Figure 2.4 identifies some of the possible channels involved with the fiscal policy transmission mechanism[10].

[10] It should be noted that symmetry is assumed between expansionary and contractionary fiscal policies

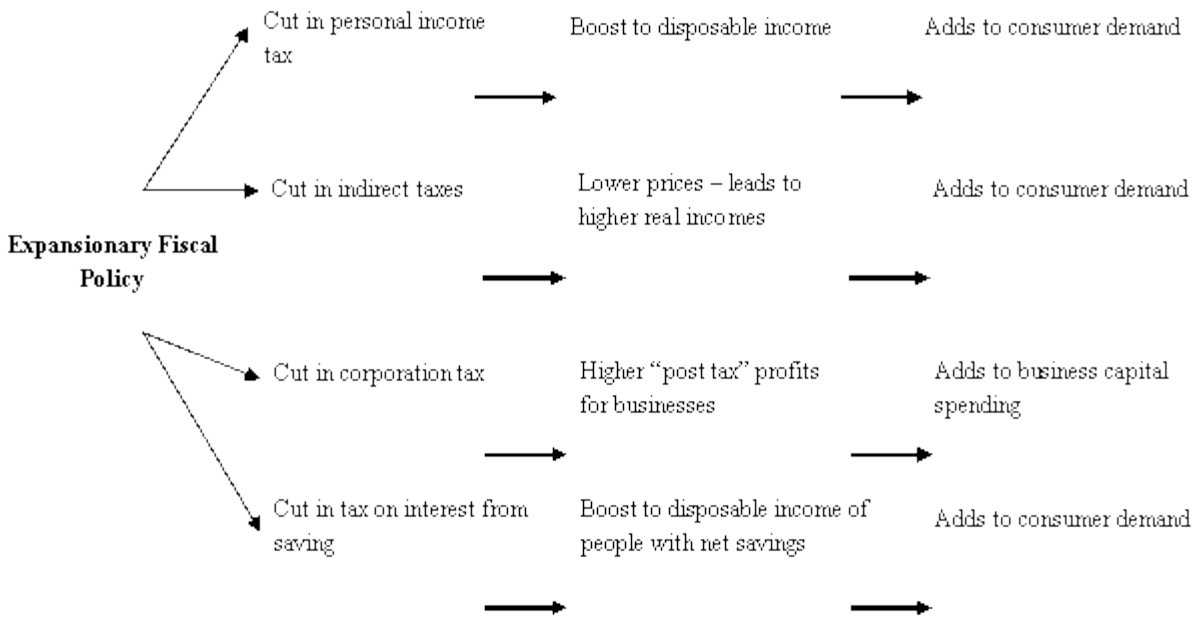

Figure 2.4. Transmission Mechanism of Fiscal Policy

The multiplier effects of an expansionary fiscal policy depend on how much spare productive capacity the economy has; how much of any increase in disposable income is spent rather than saved or spent on imports. And also the effects of fiscal policy on variables such as interest rates, output, trade balance, investment, etc.The determinants and components of fiscal policy are discussed below.

2.7.1. Government spending

Government (or public) spending each year takes up over 40% of gross domestic product (Hussain et al, 2008). Spending by the public sector can be broken down into three main areas:

- Transfer Payments: Transfer payments are government welfare payments made available through the social security system including the Jobseekers' Allowance, Child Benefit, the basic State Pension, Housing Benefit, Income Support and the Working Families Tax Credit. These transfer payments are not included in the national income accounts because they are not a payment for output produced directly by a factor of production. Neither are they included in general government spending on goods and services. The main aim of transfer payments is to provide a basic floor of income or minimum standard of living for low income households in our society. And they also provide a means by which the government can change the overall distribution of income in a country.
- Current Government Spending: i.e. spending on state-provided goods & services that are provided on a recurrent basis every week, month and year, for example salaries paid to people working in the NHS and resources used in providing state education and defence. Current spending is recurring because these services have to be provided day to day throughout the country. The NHS claims a sizeable proportion of total current spending – hardly surprising as it is the country's biggest employer with over one million people working within the system
- Capital Spending: Capital spending would include infrastructural spending such as spending on new motorways and roads, hospitals, schools and prisons. This investment spending by the government adds to the economy's capital stock and

clearly can have important demand and supply side effects in the medium to long term.

Government spending is justified on economic and social grounds including the desire to correct for perceived market failure when the market mechanism might fail to provide sufficient public and merit goods for social welfare to be maximized.

Therefore we justify government spending on these grounds:

- To provide a socially efficient level of public goods and merit goods
- To provide a safety-net system of welfare benefits to supplement the incomes of the poorest in society – this is also part of the process of redistributing income and wealth
- To provide necessary infrastructure via capital spending on transport, education and health facilities – an important component of a country's long run aggregate supply
- As a means of managing the level and growth of aggregate demand to meet the government's main macroeconomic policy objectives such as low inflation and high levels of employment

2.7.2. Automatic stabilisers and discretionary changes in fiscal policy

Discretionary fiscal changes are deliberate changes in direct and indirect taxation and govt spending – for example a decision by the government to increase total capital spending on the road building budget or increase the allocation of resources going direct into the NHS.

Automatic stabilisers include those changes in tax revenues and government spending that comes about automatically as the economy moves through different stages of the business cycle.

- Tax revenues: When the economy is expanding rapidly the amount of tax revenue increases which takes money out of the circular flow of income and spending

- Welfare spending: A growing economy means that the government does not have to spend as much on means-tested welfare benefits such as income support and unemployment benefits
- Budget balance and the circular flow: A fast-growing economy tends to lead to a net outflow of money from the circular flow. Conversely during a slowdown or a recession, the government normally ends up running a larger budget deficit.

2.7.3. Taxation

We now turn to the revenue that flows into the government's accounts from taxation. There are so many different kinds of taxation and the tax system itself often appears to be horrendously complex. But one important distinction to make is between direct and indirect taxes.

- Direct taxation is levied on income, wealth and profit. Direct taxes include income tax, national insurance contributions, capital gains tax, and corporation tax.

- Indirect taxes are taxes on spending – such as excise duties on fuel, cigarettes and alcohol and Value Added Tax (VAT) on many different goods and services.

Based on the above background information provided in this chapter, the study therefore review the relevant literature in chapter three.

CHAPTER THREE

LITERATURE REVIEW

There is a rapidly growing literature on fiscal stance and macroeconomic performance. For clarity and ease of appreciation, the review here is organised into three parts, namely, theoretical, methodological and empirical. They are discussed in that order.

3.1. Theoretical review

The dominant theories on the relationship between fiscal stance and macroeconomic performance are grouped into five. These are the IS-LM-BP model, the Ricardian Equivalence hypothesis (REH), the neoclassical theory, the neokeynesian theory and new consensus on macroeconomic paradigm. These theories are discussed in turn.

3.1.1. The IS-LM-BP model

In a standard investment-saving,money demand- money supply, balance of payment (IS-LM-BP) model, expansionary fiscal policies lead to, *ceteris paribus*, increases in aggregate demand and short-term interest rates, while the effect on long-term interest rates depends on expectations of the future fiscal policy stance of the government. For instance, assume that the current budget deficit increases and expectations of future deficits are also higher, then, both current and future short-term interest rates will increase, leading to higher long-term interest rates in the current period. However, Alesina and Perotti (1997, 2002) modified the IS-LM model and highlighted four major characteristics of fiscal stance, which may determine whether they are contractionary or expansionary: their composition, the initial level of debt/GDP or the growth rate of the debt to GDP ratio, the wage-income policy which accompanies the stance and whether or not a devaluation occurs at the outset of the adjustment. They further explicated the identity for the goods

market, money market, and external sector from which the relationship between the overall fiscal balance and the macroeconomic outcomes are derived.

In the standard IS-LM model, private investment depends negatively on interest rates, and therefore a fiscal expansion paid for by increased borrowing that leads to higher interest rates reduces investment. In an open economy IS-LM (Mundell-Fleming) model, there can also be crowding out through the exchange rate. Higher interest rates attract capital inflows which lead to an appreciation of the exchange rate, and the resulting deterioration in the external current account offsets the increase in domestic demand deriving from a fiscal expansion. The crowding out through interest rates and exchange rate is influenced by certain features of the IS-LM framework. Examples of such features are discussed below.

3.1.1.1. The determinants of private investment: The crowding out is likely to be greater if investment is fairly sensitive to interest rates. However, if investment is an increasing function of current income, multiplier-accelerator models can generate quite large fiscal multipliers even if there is crowding out through interest rates.

3.1.1.2. Money demand and monetary policy: The crowding out through interest rates hinges on the assumption that money demand is a function of interest rates and income. The less sensitive money demand is to interest rates, and the more sensitive it is to income, the more crowding out there will be. However, the tendency for interest rates to rise in response to a fiscal expansion could be offset by an easing of monetary policy.

3.1.1.3. Openness and the exchange rate regime*:* In an open economy, the size of fiscal multipliers will depend primarily on whether the exchange rate is flexible or fixed. With a flexible exchange rate, capital inflows attracted by higher domestic interest rates cause the exchange rate to appreciate with perfect capital mobility, there is complete crowding out and so fiscal policy may be ineffective. With a fixed exchange rate; a fiscal expansion will produce a smaller increase in interest rates than in a closed economy, and with perfect capital mobility, fiscal policy is very effective because the money supply will increase to

ensure that domestic interest rates will not rise at all (i.e., domestic and foreign interest rates will remain the same).

3.1.1.4. Price flexibility: The extent of crowding out is also affected by price flexibility. Neo Keynesian models allow for price flexibility, although nominal rigidities remain if prices do not adjust completely to clear markets. Price flexibility will tend to narrow the range of values taken by fiscal multipliers, and in particular to limit the influence of the exchange rate regime. In a closed economy, a fiscal expansion will lead to higher prices that choke off part of the increase in aggregate demand in the short term, reinforcing the crowding out through interest rates that occurs with price rigidity. In an open economy with a flexible exchange rate, the extent of crowding out depends on the response of domestic prices to changes in the exchange rate. In particular, if domestic prices move with the exchange rate, crowding out will be less than with price rigidity, since appreciation of the exchange rate will lower prices. With a fixed exchange rate, the current account will deteriorate in response to price increases via a real appreciation of the exchange rate, and there will be more crowding out than with price rigidity.

3.1.1.5. Changes in interest rates, the exchange rate, and prices*:* These can in addition influence crowding out via wealth effects on aggregate demand. This will be the case in particular if consumption depends on current financial wealth. An increase in interest rates will generally reduce the nominal value of financial assets, as will an appreciation of the exchange rate in the case of foreign currency assets. For households and firms that are net creditors, these wealth effects will reinforce crowding out effects through interest rates and exchange rates described above, and reduce fiscal multipliers further. The impact of higher prices is more ambiguous, since they can have opposite effects on nominal and real wealth.

3.1.1.6. Dynamic effects of fiscal policy: The dynamic effects of fiscal policy have to be considered (Astley and Garrat, 1996). If crowding out takes longer to manifest itself than the direct impact effect of a fiscal expansion, fiscal multipliers are likely to be relatively large in the short term but then to decline over time. In particular, the wage-price loop,

which determines the rapidity of price increases in response to a fiscal expansion, and the responsiveness of trade volumes to changes in the domestic currency price of imports and exports, which will influence the size of short-term fiscal multipliers.

3.1.2. The Ricardian Equivalence hypothesis

The Ricardian Equivalence hypothesis enunciates the effects of the government's choice between taxes and bonds. It argues that when there are taxes, the representative household's budget constraint is such that the present value of its consumption cannot exceed its initial wealth plus the present value of its after tax labour income. Further, a variation in budget deficit is neutral to economic activity; as in the face of rising budget deficit, taking consideration the interests of future generations, which would increase saving so as to provide for the higher tax burden in the future, offsetting the likely impact of budget deficit on macro-economy.

In like manner, Leeper (1991) argues that even if all debt is backed by taxes, the means used to finance shocks to the government's budget have important implications for future generations. The author distinguishes between active and passive policies. An active monetary and passive fiscal policy would be one in which monetary policy acts to target nominal interest rates and does not respond to the government's debt, while fiscal policy must then adjust taxes to ensure inter-temporal budget balance. Conversely, an active fiscal policy and passive monetary policy would be one in which the monetary authority must adjust segniorage revenues to ensure inter-temporal budget balance while fiscal policy does not respond to shocks to debt.

In Ricardian Equivalence hypothesis, a Keynesian approach is based on an assumption that consumption is related to current income. If consumers are Ricardian in the sense that they are forward-looking, and are fully aware of the government's inter-temporal budget constraint, they will anticipate that a tax cut today, financed by issuing government debt, will result in higher taxes being imposed on their infinitely lived families in the future. Permanent income is therefore unaffected, and in the absence of liquidity constraints and with perfect capital markets, consumption will not change (Barro, 1974). Thus, there is

Ricardian equivalence between taxes and debt. Perfect Ricardian equivalence implies that a reduction in government saving resulting from a tax cut is fully offset by higher private saving, and aggregate demand is not affected. The fiscal multiplier is zero in this case.

The focus of the Ricardian equivalence literature is on the effects of cuts in lump-sum taxes for a given path of government spending. With proportional or progressive taxes, the way in which the supply-side effects of tax cuts affect permanent income also have to be taken into consideration. If a fiscal expansion takes the form of increased government spending, the impact on permanent income depends on how this will be paid for in the future. A temporary increase in government spending that will be offset by cuts in future spending will have no impact. However, an increase in government spending financed by higher future taxes will lead to a reduction in permanent income and therefore possibly negative fiscal multipliers—although the precise extent of the resulting fall in output will depend on the productivity of government spending.

It is important to note that Ricardian equivalence is based on strong assumptions. Thus, short time horizons, less than perfect foresight, partial liquidity constraints, imperfect capital markets, and a non-altruistic desire to pass some of the current fiscal burden to future generations can re-establish a stronger link between fiscal policy and consumption (Blanchard, 1985;Fatas and Mihov,2002). Consequently, the practical significance of Ricardian equivalence is problematic, at least in its perfect form.

It is nevertheless worth asking whether there are circumstances where a Ricardian response is more likely. For example, if a government is bound by a fiscal rule which requires that a fiscal expansion has to be reversed, then even individuals who do not have very long time horizons may adjust their saving behavior to at least partially prepare for higher future taxes. Similarly, where it is widely perceived than the current path of government debt is unsustainable, and that future tax increases will soon be required to lower the debt, there could be a seemingly Ricardian offset to a fiscal expansion even in a Keynesian framework (Sutherland, 2007). However, if forward-looking individuals fear that debt would be monetized, or that private savings would be pre-empted by the

government, fiscal policy could be seemingly Keynesian in effect in a Ricardian framework, especially once debt or spending exceeds certain threshold levels (Leeper, 1991).

Ricardian behaviour results in consumption smoothing to offset the lifetime and intergenerational redistribution implied by government debt policy. Overlapping generations models also produce consumption smoothing, but with no bequest motive this occurs over an individual's lifetime. However, a criticism of both the infinitely lived families and overlapping generations' models is that they cannot satisfactorily explain the more realistic case of partial consumption smoothing. Thus,Luiz (2000) develops a savers-spenders model in which not only is consumption smoothing less than perfect, but also many people have little net worth and bequests are an important influence on wealth accumulation (which are observed facts).

3.1.3. The Neoclassical theory

The Neoclassical concept of economic growth believe that a rise in the budget deficit leads to an increase in the rate of interest, these neoclassical economists have argued that budget deficit has detrimental effect on in turn leads to a decline in interest-sensitive components of private spending, in particular, the phenomena of crowding out of private investment. The neoclassical model, following Solow (1956), predicts that long-run growth is entirely determined by exogenous technical progress, typically assumed to grow at a constant rate in the 'steady-state'. Physical or human capital accumulation, can only affect growth during 'transitional' periods when the economy is out of its steady-state (e.g. following an increase in savings rates). (Mankiw et al.1992). In this case, productivity growth-fiscal policy may influence innovation, R&D among others. (Romer, 1987, 1990; Aghion and Howitt, 1992; Einersson and Marquis, 1997). In developing countries, a more likely channel is the impact of fiscal policy on the acquisition of foreign technologies such as those embodied in imported capital and/or final goods.

Non-Keynesian effects of fiscal policy emerge from new classical models which address well-known shortcomings of the Keynesian approach, and in particular its lack of microeconomic foundations. While the new classical models place considerable emphasis on the supply-side effects of fiscal policy, the focus here is on features of some of the new classical models with demand-side implications.

3.1.3.1. Rational Expectations*:* Although some variants of the Keynesian approach recognize the role of expectations (e.g., on consumption in life cycle and permanent income models), they typically rely on adaptive expectations. By comparison, rational expectations tend to bring forward adjustments in variables that would occur more progressively with adaptive expectations. Thus, the longer-term effects of fiscal policy will mutter even in the short term, and in this connection the distinction between temporary and permanent policy changes is important. For example, while a temporary fiscal expansion that has no long-term effects will not influence expectations, a permanent fiscal expansion can add to crowding out—possibly to an extent that fiscal multipliers turn negative—because households and firms will expect that an initial increase in interest rates and appreciation of the exchange rate will persist and could become larger (Krugman and Obstfeld, 2000).

The distinctive feature of full-fledged new classical models is that prices clear markets, so that fluctuations in output are the result of supply-side shocks and not of changes in aggregate demand. One implication of the new classical models, first highlighted by Lucas (1975) and Martin, (1990), is that fully anticipated policies affecting aggregate demand (but not aggregate supply) have no effect on growth either in the short term or the longer term. Only unanticipated policies—which reflect either surprises by the government or imperfect information—have an effect, which emerges entirely through the supply side. This does not mean that these models are silent on fiscal policy. However, they focus on the design of optimal fiscal policy, as distinct from the impact of fiscal policy on economic activity (see Mendoza and Ostry, 2007).

3.1.4. The Neo Keynesian theory

The introduction of an autonomous investment function is often considered as what differentiates a Keynesian theory of growth from other approaches. There is, however, no agreement in the literature on what characterises a Keynesian investment function and several investment-led growth theories have been proposed. The first type of theory (labelled neo-Keynesian) was proposed by Aghion et al., 1992 and Appleyard and Field, 2001. They are characterized by full capacity utilisation of plants, flexible income shares and a functional relationship between the rate of capital accumulation and the rate of profits. They assume that firms under-utilise their productive capacity and apply mark-up procedures in determining prices.

Moreover, capital accumulation is driven by profitability (through the rate of profits) and by effective demand (through the degree of capital utilisation). These investment-led growth theories have been further elaborated in the literature. In what follows, an attempt is made to compare the alternative lines of development of investment-led growth within the Keynesian tradition by introducing a homogeneous set of equations which can be modified to take account of the assumptions relating to capital utilisation, income distribution and investment determinants.

The standard Keynesian effect of a fiscal contraction is that, for a given monetary policy, a deficit reduction should create a downturn or recession, at least in the short-run. This contractionary effect should be larger with a spending cut than with a tax increase for a simple multiplier argument. This spectacular argument holds for fiscal expansion. However, in the new Keynesian theory, Giavazzi et al (2000) modeled private consumption. They argued that if private consumption or expectations is altered asymmetrically by tight or loose fiscal stance, then, the signaling value of expansions and contractions have to be considered. This gives an indication that the overall fiscal stance is not the only thing that matters for the expectations of the private agents or private consumption. This in turn, suggests that the eclectic view of expansionary fiscal contractionaryhyphothesis by standard Keynesian theorists is not rejected.

3.1.5. New consensus on macroeconomic paradigm

Finally, the New Consensus in Macroeconomics (NCM) paradigm also emerged in the 1980s and has become highly influential in terms of current macroeconomic thinking and of macroeconomic policy, especially fiscal and monetary policies. The birth of the NCM was made possible after the collapse of the grand neoclassical synthesis in the 1970s. The theory draws heavily on new Keynesian economics (Meyer, 2001; Woodford, 2003; Goodfriend, 2007; Woodford, 2009). This theory further proposes that aggregate demand and output gap are determined by both contractionary and expansionary fiscal policy stance.

The current NCM model is a typical product of the Lucas critique (Lucas, 1976). One of the most important outcomes of the Lucas critique was to highlight the *ad hoc* structure of early formal models. This led to the view that modern formal models of the economy had to be "rigorous," meaning that the behavior of the agents in formal models had to have micro-foundations, be optimal, and based on rational expectations. These features have played a key role in the replacement of large models with small models. In fact, the NCM model has rigorous micro-foundations. Furthermore, in its standard version it only uses three equations, which, in turn has facilitated the construction of highly mathematical and complex versions of it.

Whereas the NCM model encompasses some of the most attractive features of the modern, small formal models of the macro-economy, it also shows some of their weaknesses. Small formal models have rigorous micro-foundations and are often based on rational expectations. However, these seemingly attractive features require the use of simplistic and often controversial assumptions, which strongly limit the explanatory powers of small models. For instance, one of the most controversial assumptions of the NCM model is the absence of any essential role for the public sector and fiscal policy.

As argued by Goodhart "this is symptomatic of a deeper reluctance among macro-economists to conceive of any essential role for government. They seem intellectually happier to imagine an economy which is only inhabited by private sector agents and an

‘independent’ Central Bank with its own loss function (and no mandate from, or acceptability to, a democratically elected government)” (Goodhart, 2005). Given the size of the public sector and the increasing role of fiscal policy in modern economies, this assumption is difficult to defend. This is even more the case today. How could the NCM model be used to assess, let alone propose, solutions to the 2007–2009 financial crisis and related recession when the public sector is not even part of the core model?

The NCM is based on a three-equation model, namely an IS-type curve, a Phillips curve, and a monetary policy equation. The model has several standard features of the modern New Keynesian approach to macroeconomics. All three equations can be derived from explicit optimizing behavior of individual agents in the presence of market failures, including imperfect competition, incomplete markets, and asymmetric information. These market failures generate transitory price and wage stickiness, which, in turn, give support to the view that in the short run, the aggregate supply responds to changes in the aggregate demand.

Aggregate demand has thus a transitory, yet nontrivial, role in determining the equilibrium level of output and employment in the economy. In other words, where individual agents behave rationally, the outcome of their actions has adverse macroeconomic effects. On this basis, activist government actions are then justified to eliminate or limit some of these effects. In terms of the mechanics of the model, price and wage stickiness play a key role in relating the monetary policy rule to the IS-type curve. The central bank, via changes in the short-run nominal interest rate, is actually able to control the short-run real interest rate. In this way, the central bank is able to affect the consumption and investment components of aggregate demand and, hence, the current level of output. This is an important theoretical result because it goes well with another important tenet of the NCM model, namely that low and stable inflation is conducive to growth, stability, and the efficient functioning of the market. When the economy is hit by shocks that take it away from its natural path, it is the central bank that is responsible for achieving the desired rate of inflation in the long run; subject to that, they are also responsible for bringing output and employment to their equilibrium levels in the short-run (Adam and Bevan, 2005).

However, in pursuit of its objectives, the central bank faces a short run trade-off between inflation and output. This trade-off is captured by the Phillips curve, which can be thought of as the aggregate supply component of the NCM model. Drawing on Meyer (2001), Goodhart (2005), and Arestis (2009) a simplified version of the NCM model can thus be represented by a set of three equations describing the dynamics of changes in the output gap (equation 3.1), in the inflation rate (equation 3.2), and the interest rate policy rule (equation 3.3)

$$(y-\bar{y})_t = a_0 + a_1(y-\bar{y})_{t-1} + a_2 E_t(y-\bar{y})_{t-1} + a_3(i_t - E_t(\pi)_{t+1}) + S_1 \quad (3.1)$$

$$\pi_t = b_1\pi_{t-1} + b_2 E_t(\pi_{t+1}) + b_3(y-\bar{y})_t + S_2 \quad (3.2)$$

$$i_t = r^* + C_1(\pi - \pi^T) + c_2(y-\bar{y}) \quad (3.3)$$

Where $a_3 < 0$ and a_0 is a constant that indicates, among others things, the effects of fiscal variables on the output gap $(y-\bar{y}); b_1 + b_2 = 1, and\ b_3 > 0; C_1 > 1, and\ C_2 > 0; E_t$ is the expectations operator; i_t is the nominal interest rate controlled by the central bank; π is the rate of inflation; π^T is the target for the inflation rate; r^* is the equilibrium real interest, that is, the interest rate that prevails in the long-run when current output y is at potential level $\bar{y}$; finally, S_1 and S_2 represent stochastic shocks.

Equation (3.1) describes an IS-type curve with the current output gap determined by past and expected future output gaps, as well the real interest rate. It is an IS-type of curve since, like the traditional IS curve of the 1960s neoclassical synthesis, it relates the real interest rate to the level of output and employment. However, it differs from the traditional IS curve for a variety of reasons. First, it is derived from intertemporal optimization of a utility function, which reflects optimal consumption smoothing. In other words, it is an IS curve that has rigorous micro-foundations. Secondly, and related to the previous point, the NCM-IS curve contains lagged and forward looking elements. The NCM-IS curve is thus a forward looking of the IS curve. Thirdly, the NCM-IS curve relates the real interest rate to the output gap, namely the difference between current *y* and potential *y* levels of output.

Equation (3.2) is a Phillips theory with inflation determined by the current output gap, as well as past and expected future inflation rates (Phillips, 1958). The latter term is of great interest. It is an indirect measure of the degree of commitment and credibility of the central bank to the long-run goal of price stability. Also, consistent with equation (3.1) and different from the traditional curve Phillips curve of the 1960s neoclassical synthesis, the current rate of inflation is determined by the current output gap rather than the level of output.

Finally, equation (3.3) is a simple monetary policy rule, namely, a standard Taylor rule, with the nominal interest rate explained by the current output gap, the deviation of current inflation from its target, and the equilibrium real interest rate. Some versions of the NCM model present more complex monetary policy rules, adding to a standard Taylor rule variables such as a lagged interest rate, which indicates an interest rate "smoothing" policy strategy of the central bank (see, for instance, Arestis 2009). Equation (3.3) represents a major innovation of modern formal models of the economy. It replaces the old LM curve of the of the 1960s neoclassical synthesis, which assumed a monetary aggregate rather short-run interest rate as the main control variable of the central bank. This means that in the NCM model, the quantity of money is a residual of the money supply process (Fontana, 2009). Furthermore, equation (3.3) shows that monetary policy as a systematic response to the inflation and output performance of the economy.

This set of equations (3.1–3.3) summarise the core propositions of the "New Consensus"macroeconomics and its policy implication, namely that the central bank has a key role in achieving and maintaining price stability in the long-run, while at the same time providing as much output stabilization as possible in the short-run. These short- and long-run goals are achieved through an aggregate demand channel and an inflation expectations channel of the transmission mechanism of monetary policy.

In sum, besides the traditional Keynesian model of IS-LM-BP modified by Alesina and Perotti, most of these theories are static in nature- they are not able to account for adjustment or cyclicality that might have occurred in the recent times, (Villafuerte et al,

2010), and could not be relied upon as an explicit theory when considering the impact of fiscal policy stance on macroeconomic performance in a dynamic society like Nigeria.

3.2. Methodological review

In general, most methodological works on fiscal stance and macroeconomic performance are largely quantitative. Five types of methods have featured prominently in the literature.These are, OLS/2SLS and cointegration methods, sensitivity and probit analyses, granger causality test, vector autoregressive (VAR) techniques and panel data techniques. These are discussed in turn.

Kouassy and Bohoum (1993) discussed the appropriateness of the measures adapted for fiscal adjustment in Cote d'Ivoire and the determinants of fiscal deficit over two decades (1970-1990). The study further investigated the impact of public investment cuts and tax rate manipulation on the fiscal deficit over the short and medium terms. The study adopted a model that is based on a disaggregation of the different components of fiscal deficit. An ordinary least square (OLS) estimation technique was used to estimate the four structural equations model as components of fiscal deficits. Also, Easterly and Rebelo (1993) examine the impact of fiscal policy on economic growth. This was implemented using cointegration techniques with cross-section time series data drawn from some developed countries.

Ekpo (1994) investigates the impact of government expenditure on economic growth in Nigeria. The ordinary least square (OLS) technique was used to estimate the equations that link public sector investments with private sector initiatives. The study only estimated private investment model with the assumption that all the factors affecting private investment would automatically affect growth. In other words, it is assumed that there is a direct link between private investment and growth. Likewise, Adam and Bankole (2000) examined the effects and determinants of fiscal deficits in a macroeconomic context in Nigeria, the paper employed a Two-Stage Least Square (2SLS) method. It was argued that a reduction in federal government presence in the economy, lower interest rates, and increased fiscal decentralization were crucial to deficit reduction and improvements in

investment, growth and macroeconomic performance. Adeoye (2006) also investigated the impact of fiscal policy on economic growth in Nigeria based on the Denison growth accounting model. The OLS method was used to estimate the model. However, this is an indirect approach to link fiscal policy with growth. A more direct and dynamic approach is to link growth variables with an adjustment in fiscal stance, which is the pre-occupation of this study.

Alesina and Perotti (2002) distinguished a successful from an unsuccessful fiscal consolidation referring to its impact on the debt-to-GDP ratio. Using a correlation and sensitivity analyses, they presented the available the evidence of fiscal adjustments on 20 OECD countries between 1965 and 2000. They found an important asymmetry between loose and tight fiscal policies. Loose policies come mainly from increases in government expenditures, particularly in transfers. Tight policies are essentially implemented through higher taxes, particularly direct taxes on households. However, GDP grew faster during and in the aftermath of the adjustment both in absolute and relative terms to the average growth rate in the countries. Guidice, et al (2003) also concluded in a similar way. Using cross country correlation and probit regressions, they find that half of the consolidation episodes undertaken in the European Union (EU) countries in the past three decades (since 1970s) were followed by acceleration in growth. Moreover, half of these expansionary fiscal contractions were undertaken without a decrease in real interest rate.

Ndebbio (1998) examined the full impact of fiscal deficits, money supply and inflation in Nigeria. It established through the macro-economic models of granger causality test that, for the Nigerian economy, the relationship between fiscal deficit and inflation is no longer unidirectional, rather, it is a two way system in which, simultaneously, fiscal deficit is caused by inflation and inflation is also caused by fiscal deficit.

Fatas and Mihov (2002) also investigated the dynamic effects of shifts in fiscal policy stance on macroeconomic variables, making use of a large class of general equilibrium models with the empirical results from an identified vector autoregression (VAR). A similar study by Ndako (2008) examined the causal relationship between fiscal balance

and economic growth in South Africa using quarterly time series data from 1983:q1-2007:q4. The paper used Vector Error Correction model (VECM) based causality tests to establish a link between fiscal balance and economic growth.

Finally, using panel regressions, Kalle (2005) evaluates the effects of fiscal policy on economic growth during recessions, he highlights the Keynesian impact of some expansionary fiscal policies during recessions for relatively closed economies. Likewise, Aregbeyen (2007) examined the growth effects of government expenditures for a panel of forty African countries from 1970 to 2000. Also, Ardagna (2009) investigated the impact of large fiscal consolidations and expansions on long-run growthusing a panel of OECD countries covering the period between 1960 and 2002. More precisely, he showed that inflation and GDP growth's responses to changes in fiscal stance depend on countries' initial fiscal operations. The main advantage of panel methodology is its feasibility in terms of estimation. However, prominent among the problems associated with panel data econometrics are selectivity and heterogeneity biases (Hsiao, 2003).

It is clear that the authors applied the ordinary least square (OLS), cointegration, error correction estimation, correlation analysis, granger causality, panel regressions, probit regression and vector autoregressive (VAR) techniques to estimate their models. However, most of these studies highlight evidence of expansionary fiscal contraction episodes, without taking into consideration the impact of the change in fiscal stance on macro-economy.

This present study, however, departs from previous methodological works because it estimates a small macro-econometric model that captures both the direct and indirect effect of fiscal stance on macroeconomic performance in the Nigerian economy. Macro-econometric models are mainly used for policy analysis, forecasting and management, which are central to the present study. The use of macro-econometric model can improve the quality of decision making, enhance the range of policy choices, and lead to optimal management of the economy. In the area of policy analysis and management, policy simulation is a *sine qua non.* To get a better understanding of the economy in terms of the

transmission channels of fiscal stance to macro-economy, the construction and estimation of a macro-econometric model is required.

The macro-econometric model formulation was predicated on sound economic theories and thus, the parameter estimates have meaningful economic interpretations. The macro-econometric model has linkages within and across blocks. To determine the effect of fiscal stance on key macroeconomic and policy variables in the model with particular interest on output and inflation, generalized method of moment (GMM) estimation techniques was employed to estimate the parameters of the model. The significance of the GMM estimation technique is that it is a technique for obtaining consistent estimates of the structural coefficients of a simultaneous equations model by direct estimation.Second, GMM takes care of sample selection and simultaneity biases which are major problems associated with some of the previous estimation techniques. Two stage least square (2SLS) technique is also used as an alternative estimation technique to check the robustness of the baseline results. 2SLS is considered as an equation-by-eqaution estimation method and hence, the estimator yields estimates that are asymptotically efficient.

The advantage of 2SLS over the GMM is that, in the GMM estimation, any incorrect specification of even one-equation may lead to incorrect estimation of all the structural parameters of the model. In addition, GMM is more likely to suffer from the effects of poor quality data than the 2SLS. However, the generalized method of moment (GMM) technique is becoming more relevant especially in models where the past values of some information set are used as instruments. Another factor that has aided the use of GMM is its efficiency among the class of instrument estimators (Green, 2001). However, main drawback of these techniques is the choice of the lag length, which is chosen most times in an ad hoc manner.

The impact of fiscal impulse on macroeconomic variables is examined with the aid of structural vectorautoregresive (SVAR) technique. The main advantage of structural VAR analysis is that the necessary restrictions on the estimated reduced form model, required

for identification of the underline structural model, can be provided by economic theory. Once the identification is achieved, it is possible to recover the structural shocks. These shocks can then be used to generate impulse response and variance decomposition functions to assess the dynamic impacts on different economic variables.

3.3. Empirical review

Several findings are discernible from the various empirical investigations on the effects of fiscal stance on macroeconomic performance. Some authors found that relationship between the stance of fiscal policy and macroeconomic performance is important in determining the growth of the economy. Few studies found that the relationship is not an essential ingredient of economic growth. However, other studies are imprecise in their findings. The results of these authors are grouped and discussed in the order in which they are listed.

Although a lot of work has been done on fiscal stance and economic growth generally, not many case studies on African economies have been used to show that macroeconomic policies are important for long-run growth. Both cross-sectional studies and case studies on other regions show that variables such as inflation, fiscal deficit, money supply and investment are macroeconomic policy indicators that do affect growth. The results however, do not show the channels through which these variables affect growth or how the different variables affect one another. With particular reference to Iran, Aghevli and Sassan-pour (1982), develop a small macro-econometric model to assess the impact of oil revenues on the economy. The model developed, which has its roots in the monetary approach, provided some useful results. Their findings clearly indicated that increased oil revenues had stimulative effect on the growth of the Iranian economy.

The study by Landau (1983) is illuminating. Based on a sample of 96 developing countries, the author inferred that big government (leading to fiscal deficits), measured by the share of government consumption expenditures in gross domestic product (GDP), reduced the growth of per capita income. Landau (1986) further reaffirmed his earlier findings by examining another set of variables influencing economic growth, including

per capita income, the structure of production, population and global economic conditions).

Using Cross Country regressions, Ram (1986) reported that although growth in general is positively correlated with the rate of change in total public expenditure, it is negatively correlated with the level of such expenditure. Similarly, Ram (1986) and Grossman (1988), report positive relationships between government fiscal deficits and economic growth. It is however important to note that most of these empirical studies reviewed above were based on cross country analysis on which country-specific recommendations cannot be isolated. This shows the policy relevance of this research work for Nigeria. This result was also obtained by Levine and Renell (1992). In other words, the direct tests of the impact of budget deficits on growth based on cross-country data have also been recently performed by a number of studies: Martin and Fardmanesh (1990) found the correlation significant and negative only for middle-income countries, while Levine and Renell (1992) found the correlation fragile. It should be noted that cross-country or cross-sectional studies do not address the problems specific to a given region or country. Equally missing is any country-specific study that examines fiscal policy impact on economic growth.

Moreover, based on cross-country regressions of a large sample of developing countries, Aizenman and Marion (1993) present empirical evidence that suggests that, to varying degrees, there is a significant and negative correlation between growth and uncertainty in a number of fiscal variables, such as levels of revenue, public expenditure, and budget deficits. The uncertainty in a variable is measured in the model employed by the standard deviation of the residuals from a first-order autoregressive process of that variable.

Of particular relevance to the current discussion is the aspect of the article of Easterly and Rebelo (1993) that examined the impact of fiscal policy stance on economic growth. This was experimented using a regression analysis with cross-section time series data drawn from some developedand developing countries. Onthe whole, the evidence, particularly from cross-country data, seems to suggest that the response by private sector savings to public sector dissavings does not completely neutralise the latter.

Also, Kouassy and Bohoum (1993), discussed the appropriateness of the measures adapted for fiscal adjustment in Cote d'Ivoire 'and the determinants of fiscal deficit over two decades. The study further investigates the impact of public investment cuts and tax rate manipulation on the fiscal deficit over the short and medium terms. The study did not evaluate the effects of fiscal instruments on growth, despite the fact that it used a very narrow base instrument that could have been easily used to examine those effects. The study adopts a model that is based on a disaggregation of the different components of fiscal deficit. An ordinary least square (OLS) estimation technique was used to estimate the four structural equations formed as components of fiscal deficits. The regression-results show that public investment is positively linked with fiscal deficits. In a related study, Kouassy and Bohoum (1994) use a growth model to analyse the relationship between fiscal adjustment and growth in Cote dTvoire, The authors established that public investment has a net' crowding-in effect on the private sector and a positive impact on growth.

Jappelli and Meana (1994), in a cross-country study, showed that public expenditures on investment and consumption have different impact on economic activity. Public investment stimulates output and so increases government revenues and, in turn, allows the government to spend more. So, based on cross-country data, the study analyses the determinants of public expenditures that are allocated to public investment. The implication of findings from the study is that specific spending promotes growth; that is, specific revenue sources can be allocated to specific expenditures which in turn promotes output growth. Economic theory justifies earmarking, which assigns revenues from specific taxes to specific activities.

In his study of Tanzania, Osoro (1997) observed that the growing public spending was the cause of large public deficits. His suggestion is to curtail public expenditure as well as broaden the tax base, since more tax revenue may not increase public expenditure. But, given the needs and demands on the public sector's resources, expenditure will always tend to increase. However, his study was aimed at examining causality, so the effects of fiscal policy on growth and other macroeconomic aggregates were not investigated. He stresses curtailing public expenditures in general and not any specific expenditure. This

may mean across-the-board budgetary cuts, which may have negative effects on general economicperformance, since some spending may promote growth.

Amin, 1998, in his work on Cameroon, examined the effects of fiscal policy on growth. The study focuses on the relationship between public spending and growth via private investment. A derivative of the Denison growth accounting model was employed in Cameroun to analyse the relationship between Cameroon's fiscal policy and economic growth. An ordinary least square (OLS) technique was used to estimate the equations that link private investments with growth. The result from the study shows that expenditures especially on education and health crowd in private investment. The results further showed some evidence of causality running from infrastructure to private investment to growth.

El-Khouri (2002) provided a general framework through which the stabilisation function of fiscal policy works. The study began with the traditional IS-LM aggregate supply and aggregate demand model to assess the short run effects of fiscal policy on output, prices, and the current account of the balance of payments and to explore the interactions between fiscal policy and monetary and exchange rate policies. It then addressed issues specific to fiscal policy and macroeconomic management, including methods for measuring fiscal balance, cyclical and structural deficits, the sustainability of the fiscal deficit, and policies for managing debt and fiscal surpluses. The study concluded by exploring how the three primary instruments of fiscal policy -tax policy, expenditure policy and overall budgetary policy can affect a country's long-term growth,

Duravel and Ndung'u (1999) extricated the external macroeconomic implications of fiscal deficits in Kenya. The study specifically formulates and analyses the linkages of fiscal deficits and the external sector. This study used the Easterly, Rodriguez and Schmidt Hebbel framework to analyse the effects of fiscal deficits on the macroeconomic variables in Kenya. The study finds among other things that fiscal policy in Kenya has clearly had important effects on external balance, not only because of the size of the deficits but also because of the constraints that the government is facing in financing the deficits.

Norman (2001),Vonhagen and Strauch(2001), Adam and Bevan (2005) found that in addition to the size and persistence of the fiscal adjustment, budget composition matters in explaining different private sector responses to fiscal position and hence, the effects on economic growth. Along similar concept, Ardagna (2009) showed that inflation and GDP growth's responses to changes in fiscal stance depend on countries' initial fiscal positions. While, Mendoza and Ostry (2007) argue that fiscal policy stance in most countries is responsive to budgetary deficits. High debt countries do run a risk of having an unsustainable fiscal stance. They find these countries to be Malaysia, Hungary, Ecuador, Morocco, Indonesia, Bulgary, Cote d'Ivoire, Egypt, Israel, Lebanon, Nigeria and Pakistan. Clearly, both transition and developing economies belong to this group. In the same vein, Alesina and Perotti (2002) found that primary cyclically adjusted deficit improved by 3.6 percent of GDP from before to after the adjustment period, but the debt to GDP ratio increased by more than 30 percent in the same years.

Yekini (2001) evaluated the structural determinants of government budget deficits (fiscal deficits) in Nigeria between 1970 and 1998. The study adopts a structural quantitative approach to examine the effects of the level of economic development, growth of government revenue, instability of government revenue, government control over expenditure and extent of government participation in the economy on budget deficits in Nigeria, The model estimation results revealed that the level of economic growth, growth of government revenue, instability of government revenue and control of government over expenditure are of budget deficits in Nigeria.

A study by Ariyo (1993) characterised the build-up as well as evaluated the desirability of Nigeria's fiscal deficit profile between 1970 and 1990. Ariyo'sfindingssuggested that the structure of government expenditure is inherently unsustainable by the country's resource profile. The results also showed that the Structural Adjustment Programme (SAP) implemented in 1986 hardly addressed the problem fiscal deficit and macroeconomic outcomes in Nigeria.Further study by Makin (1995) provided a behavioural explanation for the persistence of huge annual fiscal deficits in Nigeria. The study reveals that the excess expenditure over and above the budgeted estimates was not anchored on any

macroeconomic target. It also reports large revenue and expenditure variances which suggest the absence of any positive learning effects over the years. The study attributedthe intrusion of the political class which probably nullified the degree of professionalism of the technocrats as a major cause for the variance.

It is also obvious in the empirical result of Egwaikhide (1991) that the major factors responsible for the growth of fiscal deficits in the 70s and early 80s in Nigeria were the slow growth of government revenue, developmental commitment, increased public participation in the economy, inflation and unproductive investment. Whereas, the study of Ekpo (1994) showed that infrastructural spending crowds in private investment and thereby spurs growth. Adam and Bankole (2000) in their study concluded that a reduction in federal government presence in the economy, lower interest rates, and increased fiscal decentralization are crucial to deficit reduction and improvement in investment, growth and macroeconomic performance.

Aregbeyen (2007) found that productive expenditures (capital and public investment) has a significant positive impact on economic growth. Also, Adeoye (2006) found a negative relationship between capital expenditure as a ratio of GDP and output growth.

Chete and Adeoye (2002), in their paper, explored the fiscal deficit/economic growth connection for Nigeria. The study provided a quantitative evaluation of the effects of fiscal deficit on economic growth in Nigeria. A number of methodological approaches were employed to examine this link. Specifically, the study employs Granger causality tests, variance decomposition analysis, impulse response analysis and econometric techniques. The results that emanated from the study suggest an anticipated positive impact of fiscal deficit on growth.

The results from these previous studies were insightful, however, most of the Nigerian specific studies have not empirically examined the effect of a change in fiscal stance on macroeconomic outcomes, which is the major thrust of this study. It is however important to note that most of the empirical studies reviewed above are based on cross country

analysis in which country-specific recommendations can not be isolated. This shows the policy relevance of this research work for Nigeria. Besides, most of the studies on Nigeria were carried out about a decade ago, which necessitate the need for a more recent study of this nature. Likewise, the results of these previous studies might be losing relevance due to several structural (probably in the form of economic cycles) and institutional changes, hence, the justification for the use of cyclically adjusted fiscal balance in this study as a measure of fiscal stance.

Concisely, the main preoccupation of this chapter was a discussion on the theoretical, methodological and empirical literature on fiscal stance and macroeconomic variables, such as, output, money supply and inflation. It was evident from the review of both theoretical and empirical literature that the results obtained have been mixed and inconclusive. The review also identified the methodological gaps in the literature.

CHAPTER FOUR
THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

Contained in this chapter is the theoretical basis for the thesis. In addition, the methodology is articulated, the structural model is specified and the sources of data indicated.

4.1. Theoretical framework

4.1.1. Open economy Keynesian model

The discussion here begins with the theoretical analysis of the short-run (or Keynesian) fiscal policy effects on economic growth. For ease of appreciation, reference is made to the works of Alesina and Perotti (2002) and Kandil (2004), who employed an IS-LM framework of national accounts to analyse the effect of fiscal policy on macroeconomic indicators. However, this study sets off from these works by emphasising both internal and external balances, and modeling both the demand and supply sides of the economy using standard open economy IS-LM-BP framework. Unlike Alesina and Perotti (2002) and Kandil (2004) who undermined the importance of external balance by modeling explicitly only the goods and money markets.

The external sector is captured in this study through the Balance of Payment (BOP) equation, which shows different combinations of income and interest rate that ensures equilibrium (Appleyard and Field, 2001). The fundamental identity in the BOP equation is therefore expressed as the current account balance.

4.1.1.1. IS framework- The goods market

In national accounts, the total output (Y) or GDP is the sum of private consumption C, government consumption G, total investment I, and net export $(X - M)$. The equilibrium

condition in the goods market requires that aggregate expenditure be equal to income, that is:

$$Y = C + G + I + (X - M) \quad (4.1)$$

All of those GDP components can be further divided into several sub – components. This can be done based on the fact that most of these sub-components are the macroeconomic indicators.

Equation (1) can be written in logarithms form as follows:

$$y_t = c_t + g_t + i_t + x_t - m_t \quad (4.2)$$

Each of the components of total output is therefore modeled in sequence.

4.1.1.2. Consumption function

According to the Keynesian theory, consumption is a function of disposable income

$$c_t = \beta_0 + \beta_1 yd_t \quad (4.3)$$

Price is also an important determinant of consumption especially in an economy where price is unstable, hence, price is included in our model. An increase in price reduces the real value of consumers' liquid assets and purchasing power of money, thus reducing consumption. Interest rate is also included as a determinant of consumption, especially durable consumer goods. The consumption of durable consumer goods is sometimes financed by borrowing. Moreover the inclusion of interest rate is predicated on the fact that individuals smooth out their consumption through borrowing and saving, which are affected by interest rate. The effect of interest rate on consumption is however indeterminate due to its income and substitution effects which oppose each other.

The model for consumption in linear form is therefore represented in equation (4.4) below:

$$C_t = \beta_0 + \beta_1 y_t + \beta_2 \rho_t + \beta_3 r_t \quad (4.4)$$

Where, p_t is price, r_t is interest rate, other variables remain as defined earlier.

4.1.1.3. Government expenditure function

According to Wagner's law of increasing state activities, government expenditure grows, as the economy grows. Government expenditure is elastic with respect to income because the traditional functions of the state expand in terms of intensity and coverage more rapidly than the expansion of an economy. Thus income, which is a measure of the expansion of an economy, is also a determinant of government expenditure. Ekpo et al (2004) posit that government expenditure behaviour is determined by the level of economic activity, population size and inflation rate. Hence, government expenditure is modeled in linear form as

$$g_t = \alpha_0 + \alpha_1 y_t + \alpha_2 pop_t + \alpha_3 p_t \qquad (4.5)$$

$$\alpha_1, \alpha_2, \alpha_3 \succ 0$$

Where:

y, pop *and* p are gross domestic product, population and inflation rate respectively.

4.1.1.4. Investment function

The standard investment theory opines that investment has a negative relationship with interest rate. Hence, investment function can be expressed in equation (4.6).

$$i_t = i_0 + i_1 r_t \qquad (4.6)$$

$$i_1 < 0$$

Where i is investment and r is interest rate.

The investment function is modified by including the growth rate of the economy. This is important for Nigeria, which is a typical developing economy with potential for growth. The growth rate of the economy serves as an indicator of the expected profitability of investment. Based on this modification, therefore, the investment function becomes.

$$i_t = i_0 + i_1 r_t + i_2 y_t \qquad (4.7)$$

4.1.1.5. Export function

The real exports are determined by the demand and supply factors.

Demand for export

Demand for export is normally taken as a weighted average of the incomes of trading partners, and the real exchange rate. This can be represented thus:

$$X^d = f(Y^f, e) \quad (4.8)$$

Where X^d, Y^f *and* e are export demand, income of trading partners and real exchange rate respectively.

Supply of export

Supply of export depends on relative price, which can be represented below.

$$X^s = X^s(RP) \quad (4.9)$$

Where X^s is the supply of export and RP is relative price.

At equilibrium in the export market, supply of and demand for exports are equal:

$$X^d = X^s = X \quad (4.10)$$

Given the fact that Nigeria is a highly import dependent economy, the export sector depends on the import of intermediate goods for the supply of export. Therefore, imports become one of the determinants of export. Given the income of trading partners, the export function is expressed as:

$$x_t = x_0 + x_1 e_t + x_2 RP_t + x_3 im_t \quad (4.11)$$

The variables are as defined earlier

The *a priori* expectations are $x_1, x_2, x_3 > 0$

4.1.1.6. Import function

The simple import function posits that import is determined by domestic income since this is a measure of ability to import; real exchange rate and foreign reserves. A depreciation of real exchange rate implies an increase in the domestic price of imports. It therefore, makes import to be expensive relative to domestically produced goods. It is expected to lead to reduction in imports, all things being equal. But this may not be the case, especially for imported intermediate goods and raw materials which have low elasticity of substitution (Krugman and Tailor, 1978 and Egwaikhide, 1999). As a result of this the

effect of depreciation of real exchange rate may not necessarily be negative. The import function is represented in equation 4.12

$$im_t = f(y_t, e_t, FR_t) \tag{4.12}$$

The linear counterpart of the import function is presented in equation 4.13

$$im_t = im_0 + im_1 y_t + im_2 e_t + im_3 FR_t \tag{4.13}$$

FR = foreign reserves

All other variables are as earlier defined.

The *a priori* expectations are $im_1 > 0, im_2 < 0, im_3 > 0$

Substituting equations 4.4, 4.5, 4.7, 4.11 and 4.12 into equation 4.2 gives

$$y_t = \frac{\beta_0 + i_0 + \alpha_0 + x_0 - im_0 + (\beta_3 + i_1) r_t + (x_1 - im_2) e_t + (\beta_2 + \alpha_3) p_t}{1 - \beta_1 - \alpha_1 - i_2 - im_1}$$

$$\frac{+\alpha_2 POP_t + x_2 RP_t - im_3 FR_t}{1 - \beta_1 - \alpha_1 - i_2 - im_1} \tag{4.14}$$

4.1.1.7. Money market

This section deals with money market equilibrium and it includes two equations, namely, money demand and money supply equations.

Demand for money

In modeling the money demand, the study follows the standard theories of money demand: The Quantity Theory of money; Keynesian money demand function and Friedman's restatement of the Quantity Theory of money. Money demand is therefore expressed as a function of some macroeconomic variables like real income and interest rate. This can be shown in equation (4.15)

$$m^d = \theta_0 + \theta_1 y_t + \theta_2 r_t \tag{4.15}$$

Because economic agents may hold foreign money for speculative purposes, the demand for money may be influenced by exchange rate. The money demand equation is modified to reflect agents' speculative activities and it is expressed as:

$$m^d = \theta_0 + \theta_1 y_t + \theta_2 r_t + \theta_3 e_t \qquad \theta_1 > 0, \theta_2 < 0, \theta_3 < / > 0 \tag{4.16}$$

Supply of money

The real money supply is equal to the nominal money balances, M, which is assumed to be exogenously determined, deflated by price, P. Money supply equation is therefore expressed as:

$$m^s = m_t - p_t \tag{4.17}$$

Equilibrium condition in the money market requires that real money demand be equal to real money supply, and this is expressed as equation (4.18) below

At equilibrium, $m^d = m^s$

$$m_t - p_t = \theta_0 + \theta_1 y_t + \theta_2 r_t + \theta_3 e_t \tag{4.18}$$

From (4.18), making y_t the subject of formula, gives

$$y_t = \frac{m_t - p_t - \theta_0 - \theta_2 r_t - \theta_3 e_t}{\theta_1} \tag{4.19}$$

Equation (4.19) is interpreted thus: that the real output is determined by nominal money balances (m_t), price level (p_t), interest rate (r_t) and exchange rate (e_t). However, there are other determinants of real output that are not captured here.

4.1.1.8. External sector: balance of payment (BP) equation.

The BP equation is used to capture the external sector. This shows different combinations of income and interest rate that ensure equilibrium in the balance of payments (Appleyard and Field, 2001). The balance of payments (BoP) account has three main components, these are; the current account, the capital account and the official reserve transactions. The fundamental identity in the BOP equation can be expressed as:

$$B = CA + KA \tag{4.20}$$

Where B is the balance in the official reserve transactions account, CA is current account balance and KA is the capital account balance. Equilibrium in the BoP requires that balance in the official reserve transactions account be equal to zero.

$$CA = X - M \tag{4.21}$$

Where X is export and M is import

Current account is a function of total output (y), real exchange rate (e), foreign reserves (fr) and relative prices (rp). This is shown in equation (4.22)

$$CA = f(e, y, fr, rp) \quad (4.22)$$

Capital account balance depends on real interest rate

$$K = f(r) \quad (4.23)$$

Expressing the balance of payments account in linear form gives:

$$B = \lambda_0 + \lambda_1 e_t + \lambda_2 y_t + \lambda_3 FR_t + \lambda_4 RP_t + \lambda_s r_t = 0 \quad (4.24)$$
$$\lambda_1 < / > 0, \lambda_2, \lambda_3, < 0, \lambda_4, \lambda_5 > 0$$

Solving for y_t in equation (4.24) gives (4.25)

$$y_t = \frac{\lambda_0 + \lambda_1 e_t + \lambda_3 FR_t + \lambda_4 RP_t + \lambda_5 r_t}{\lambda_2} \quad (4.25)$$

Equation (4.25) states that external sector variables like real exchange rate (e), foreign reserves (fr) and relative prices (rp) are determinants of economic growth.

4.1.1.9. Price function

Equation (4.26) represents the monetarist façade to price determination. In the monetarists' school of thought, the idea is that an increase in the supply of money in excess of the demand for money results in inflation (Grossman, 1988). Moreover, it is based on the assumption that price adjust to excess money supply taking into consideration the impact of interest rate on domestic prices. There is also a positive relationship between exchange rate and the domestic price level. The Grossman model has been used in modeling the price level in Ghana and Kenya, among other developing economies (see for example, Chhibber and Shafik (1990) for Ghana, Durevall and Ndung'u (1999) for Kenya). The model is an inverted money demand equation expressed as follows.

$$P = f(M, Y, C) \quad (4.26)$$

Where P is inflation rate, M is money supply, Y is real output and C is the cost of holding cash. Equation (4.26) states that inflation is a function of money supply, real output and cost of holding money.

In the Grossman model, it was assumed that prices adjust to excess supply in the money market. This assumption made it possible to invert the real money balance function to become a price equation. Following this framework, the price level is expressed in equation (4.27a). The equation expresses inflation as a linear function of money supply, real output, interest rate and exchange rate.

In theory, a dwindling in output leads to a surplus demand for goods and a rising movement in interest rate. Hence, the demand for real money balances reduces and the price level increases. The price equation can therefore be stated thus:

$$P_t = \gamma_0 + \gamma_1 M^s{}_t + \gamma_2 Y_t + \gamma_3 i_t + \gamma_4 e_t \quad (4.27a)$$

Where P is the general price level, M^s is the money supply, Y is the total output, iis the interest rate, and e is the exchange rate.

In linear form, the price equation is expressed as:

$$p_t = \gamma_0 + \gamma_1 m^s{}_t + \gamma_2 y_t + \gamma_3 i_t + \gamma_4 e_t \quad (4.27b)$$
$$\gamma_1, \gamma_3, \gamma_4 > 0, \gamma_2 < 0$$

4.1.1.10. Government revenue function

The level of income and import are the determinants of the revenue that accrue to the government. It is expected that income and government revenue are positively related. However, import level shows an inverse effect. Therefore, as the import level increases, the government revenue is expected to fall. The price of oil is included since increased/ decreased in government revenue is accompanied by oil boom /surge. The government revenue equation can then be written thus:

$$GR_t = \psi_0 + \psi_1 IM_t + \psi_2 Y_t + \psi_3 OP_t + \psi_4 M^s{}_t + \psi_5 I_t \quad (4.28)$$

Where GR is the government revenue, IM is the imports, Y is the total output, OP is the oil price, M^s is the money supply and I is the level of investment.

Expressing equation (4.28) in logarithm form gives (4.29):

$$gr_t = \psi_0 + \psi_1 im_t + \psi_2 y_t + \psi_3 op_t + \psi_4 m^s{}_t + \psi_5 i_t \quad (4.29)$$

$$\psi_1 < 0, \psi_2 > 0, \psi_3 <> 0, \psi_4 > 0, and \psi_5 > 0$$

4.1.1.11. Fiscal balance equation

The overall fiscal balance is widely used as fiscal indicator, and it is useful in assessing the government's fiscal stance, especially in developing countries (Villafuerte et al, 2010). However, the theoretical linkages between the fiscal stance and macroeconomic indicators which is the focus of this section is obtained from the systems of equations derived above. To arrive at the budget balance function (an index of fiscal stance) in our model, we simply deduct the government expenditure equation from the revenue equation. That is, subtracting equation (4.29) from (4.5) gives;

$$gr_t - g_t \tag{4.30}$$

$$gr_t = \psi_0 + \psi_1 im_t + \psi_2 y_t + \psi_3 op_t + \psi_4 m^s{}_t + \psi_5 i_t$$
$$g_t = \alpha_o + \alpha_1 y_t + \alpha_2 pop_t + \alpha_3 p_t \tag{4.31}$$

$$\psi_0 + \psi_1 im_t + \psi_2 y_t + \psi_3 op_t + \psi_4 m^s{}_t + \psi_5 i_t - (\alpha_o + \alpha_1 y_t + \alpha_2 pop_t + \alpha_3 p_t) = 0$$
$$\psi_0 + \psi_1 im_t + \psi_2 y_t + \psi_3 op_t + \psi_4 m^s{}_t + \psi_5 i_t - \alpha_o - \alpha_1 y_t - \alpha_2 pop_t - \alpha_3 p_t = 0 \tag{4.32}$$

Solving for y_t in equation (4.31), we arrive at (4.32)

$$\psi_2 y_t - \alpha_1 y_t = \alpha_o - \psi_0 - \psi_1 im_t + \alpha_2 pop_t - \psi_3 op_t + \alpha_3 p_t - \psi_4 m^s{}_t - \psi_5 i_t$$
$$y_t(\psi_2 - \alpha_1) = \alpha_o - \psi_0 - \psi_1 im_t + \alpha_2 pop_t - \psi_3 op_t + \alpha_3 p_t - \psi_4 m^s{}_t - \psi_5 i_t$$

$$yt = \frac{\alpha_o - \psi_0 - \psi_1 im_t + \alpha_2 pop_t - \psi_3 op_t + \alpha_3 p_t - \psi_4 m^s{}_t - \psi_5 i_t}{\psi_2 - \alpha_1} \tag{4.33}$$

The *a priori* expectations are $\psi_1 < 0, \psi_2 > 0, \psi_3 <> 0, \psi_4 > 0, \psi_5 > 0 \, and \, \alpha_3 > 0$

Equation (4.33) shows the relationship between budget balance (which is an index of fiscal stance) and macroeconomic outcomes. All the variables are as defined previously. It should be noted that all the variables in the right hand side of equation (4.33) are all determinants of government revenue and expenditure. Also, fiscal balance is obtained by subtracting expenditure from revenue, equation (4.33) therefore depicts the connection between fiscal stance and real output growth.

4.1.2. Analytical framework for fiscal balance and macroeconomic inter-linkages

Based on the macro-econometric model that would be specified insub-section 4.3.1, it is important to schematically explain the interactions among variables across blocks and how they are repeated until the system finds the equilibrium for the economy. It is therefore pertinent to understand how the variables or blocks are linked to each other in the macroeconomic system.

The emergence of the structuralist models in the 1980s sets the frame for analysing the pass-through of fiscal balance to other macroeconomic variables. Notable among these authors that emphasized the fiscal accounts are Nickel (1981), Hamsen (1982) and Eisner at al (1984). The structuralist models had peripheral focus on fiscal sector mainly used to highlight the fiscal-monetary nexus. A relatively elaborate attempt was made by Ram (1986) to assess the impact of money financed deficit on inflation. Rangarajan and Mohanty (1997) assessed the relationship between fiscal deficit, external balance and monetary growth. Rao (2000) also assessed the fiscal impact on interest rate and inflation, limited to formalising the links between budget deficits, money creation and debt financing. Goyal et al (2004) conclude that the fiscal stance of the federal and the state Governments when examined individually is unsustainable.

The schematic representation to trace the path of fiscal balance and other intertwined macro variables is shown in Figure (4.1). This relationship is unique in two ways. First, it links the pressure of government borrowing on bond interest rates, which is important benchmark for the financial assets. Second, it clearly brings out spillover of the bond interest rates on lending rates and crowding out through financial prices. The model structure is presented in figure (4.1) below. In modeling fiscal balance and their interaction with the key macroeconomic variables, the studies adapt a structural approach, which provides comprehensive inter–sectoral linkages.

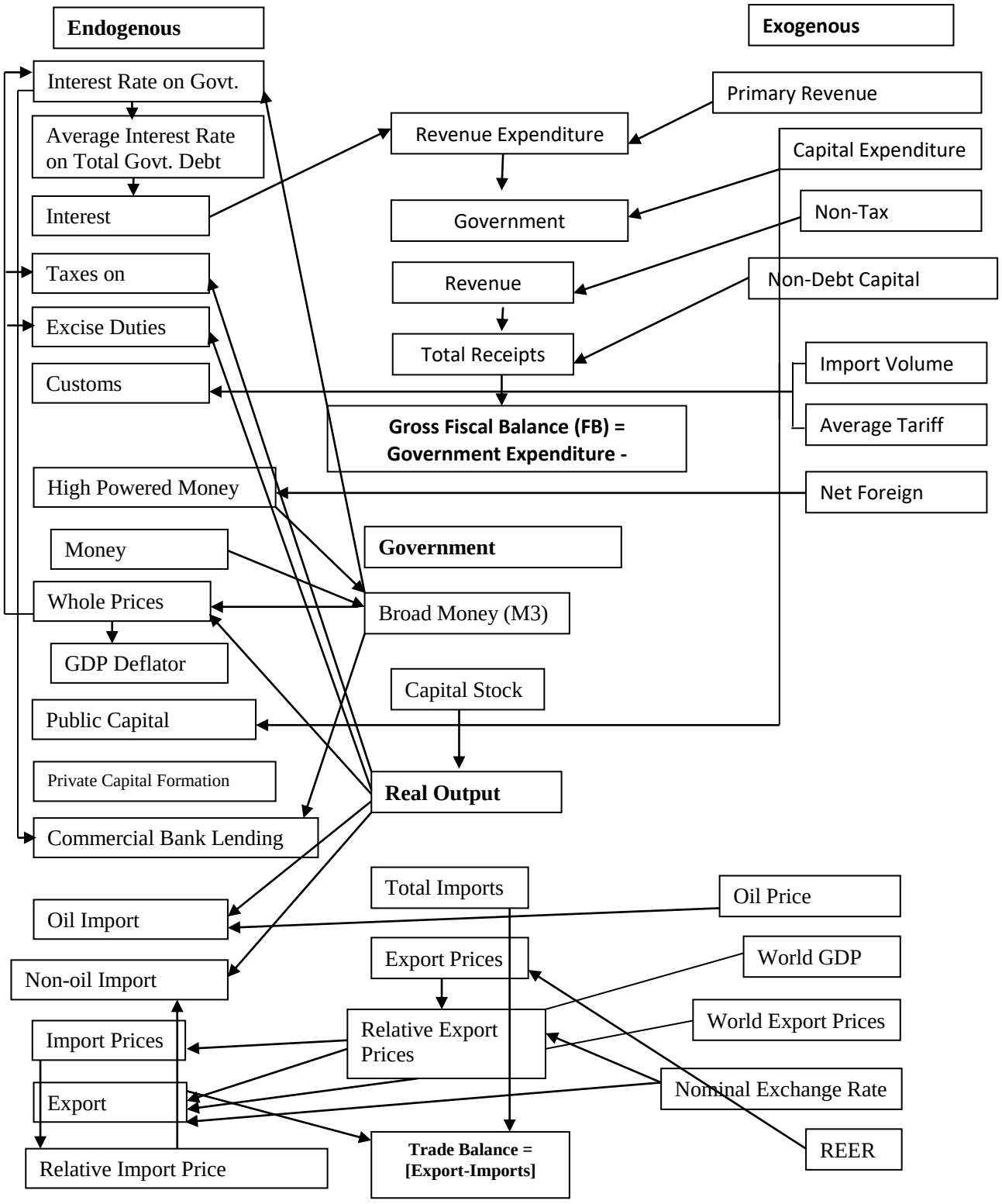

Figure 4.1. Model framework for determination of pass through of fiscal balance to macroeconomic variables

4.2 Research methodology and model specification

The theoretical framework presented above identified the channels through which fiscal stance affects macroeconomic activity. Here, two models are specified to capture the objectives of the study, and thereafter the estimation techniques and procedure are articulated. First, a macro-econometric model consisting of five blocks, namely, the growth equation block, the investment block, the money supply block, the inflation block and the external sector block. These channels would be used to examine the impact of fiscal stance on macroeconomic performance in Nigeria. Second, the SVAR specification is employed for the identification of fiscal policy shocks on macroeconomic aggregates.

4.2.1 A macro-econometric model

As stated earlier, the model used in this research work is derived from the standard Keynesian macroeconomic model. However, some modifications were made to the standard Keynesian model with the aim of providing a stylized representation of fiscal transmission channels in Nigeria consistent with economic theory and specific facts describing the economy. The standard Keynesian model was divided into three markets; the goods market, the money market and the external sector market through balance of payment. The macro-econometric model used in the current study is divided into five blocks; the growth block, the gross investment block, the money supply block, the inflation block and the external sector block. Each block captures specific equations whose formulations are guided by economic theory as presented in the literature as well as the structure of the economy.

The present model, however, deals with an open economy and hence, made an extension by including the growth equation in a view to trace the real output channel.The model presented below is a small one. It is made up of five behavioural equations. There are 18 variables in the model, of which 12 are endogenous and 6 are exogenous. The model was subjected to the order condition of identification[11] and the result showed that the model was identified. To investigate whether expansionary fiscal contractions are present, and to assess the roles of

[11] The order condition states that "the total number of variables in the model, H, minus the number of variables appearing in the particular equation, H*, should be equal or greater than the number of endogenous variables in the model, K, minus one, That is, H-H* $\geq$ K-1. (Dutta, 1975)

macroeconomic aggregates as fiscal-policy transmission channels, the study estimates a recursive system consisting of five blocks which are discussed in turn:

(i) The growth equation;

(ii) The gross investment equation;

(iii) The money supply block;

(iv) An equation linking fiscal policy to inflation; and

(v) The external sector equation.

4.2.1.1 The growth equation

The growth function is consistent with the traditional open economy IS-LM framework. Real output is expressed as a function of both fiscal and monetary policy variables (Galli, 1992; Dohmen, 2002 and Hsing, 2005). Trade balance is also included in the equation to capture the influence of the external sector on output growth. Gross investment as a share of GDP (I_t) is also a determinant of growth. Gross investment here includes privateand public investment. The coefficient is expected to be positive. The population growth rate (N_t) is part of the definition of per capita income growth, but also affects growth through domestic market size and domestic demand. The coefficient could be positive or negative. The form of the growth equation is:

$$LnY_t = \beta_0 + \beta_1 LnI_t + \beta_2 LnN_t + \beta_3 LnT_t + \beta_4 LnM_t + \beta_5 LnFIS_t + \theta\mu_{1t-1} + \varepsilon_1 \quad (4.34)$$
$$\beta_1, \beta_4, \beta_5 > 0; \beta_2, \beta_3 < / > 0 \text{ and } \theta < 0$$

Where I_t is total investment as a share of GDP, N_t is population growth rate, T_t is trade balance GDP ratio, M_t is the money supply, FIS_t is fiscal stance, and μ_{1t-1} is the error correction term.Equation (4.34) states that real output is a log linear-function of total investment, population growth rate, trade balance, money supply, fiscal stance and error correction term, respectively. All subsequent stochastic equations are represented in this form and interpreted in a similar way.

4.2.1.2 The investment equation

In the literature, both the investment model with adjustment cost (e.g., the Tobin's theory of investment) and the investment model without adjustment cost (example, the neoclassical and Keynesian theories of investment) posit that investment depends negatively on interest rate and positively on income. The investment (I_t) in equation (4.35) is for gross investment (as defined in the growth equation,combining public and private investment). Investment appears in the growth equation and is endogenous to fiscal policy. To identify the indirect effectof fiscal policy stance on growth through investment, equation (4.35) is estimated.

$$LnI_t = \alpha_0 + \alpha_1 Lni_t + \alpha_2 LnT_t + \alpha_3 LnY_t + \alpha_4 LnN_t + \alpha_5 LnFIS_t + \alpha_6 INF_t + \sigma\mu_{2t-1} + \upsilon_t \quad (4.35)$$
$$\alpha_1 < 0; \alpha_2, \alpha_4, </> 0;\ \alpha_3, \alpha_5 > 0 \text{ and } \sigma < 0$$

Where I_t is gross investment, i_t is interest rate. Other variables are defined earlier. This equation specifies gross investment as a function of interest rate, trade balance, real output, population growth rate, fiscal stance and error correction term.

4.2.1.3 Money supply equation

Money supply is functionally related to real output, high powered money, interest rate and fiscal stance. The relationship between money supply, real output and high- powered money represents the multiplier approach[12] to money supply determination. The money supply model to be estimated is therefore specified as follows:

$$LnM_t = \phi_0 + \phi_1 LnH_t + \phi_2 LnY_t + \phi_3 Lni_t + \phi_4 LnFIS_t + \gamma\mu_{3t-1} + \lambda_t \quad (4.36)$$
$$\phi_1, \phi_2 > 0;\ \phi_3, \phi_4 < 0 \text{ and } \gamma < 0$$

Where:

$$H_t = BD_t + \Delta NFA_t + \Delta OA_t \quad (4.37)$$

Thus, H_t is high-powered money, BD_t is budget deficit, ΔNFA_t is a change in net foreign asset, and ΔOA_t is a change in other assets, while other variables are as defined earlier. Budget deficit (BD) is the difference between government expenditure and revenue, and it represents fiscal dominance in the money supply process. It is assumed that budget deficit

[12] Detailed derivation of the multiplier approach to money supply determination can be found in David Cobham (1987)

is financed by borrowing from the Central Bank of Nigeria (CBN). Equation (4.36) indicates that money supply is a log-linear function of high powered money, real output, interest rate and fiscal stance. Also, equation (4.37) shows that high-powered money is the sum of budget deficit, changes in net foreign asset and changes in other assets. Interest rate has a negative influence on money supply. As market interest rates rise, opportunity costs of borrowing increases and banks hold fewer excess reserves. If the CBN increases the interest rate, banks will be less likely to borrow money from CBN and will thus be wearier of making loans to ensure that they have the necessary reserve requirements. Thus, if interest rate is higher, banks make fewer loans, the money multiplier is not fully utilized to its end, and the change in the money supply for a given initial deposit is smaller.

4.2.1.4 Inflation equation

Fiscal policy stance is a determinant of inflation, which appears in the growth and investment equations. The impact of other exogenous variables like money supply, real output, expected inflation, the currency depreciation rate as well as the trade balance on inflation are represented in equation (4.38).

$$P_t = \sigma_0 + \sigma_1 LnM_t + \sigma_2 LnY_t + \sigma_3 LnEX_t + \sigma_4 LnFIS_t + \sigma_5 P^e{}_t + \omega\mu_{4t-1} + \psi_t$$
$$\sigma_1, \sigma_2, \sigma_5 > 0;\ \sigma_3, \sigma_4 < / > 0 \ and\ \omega < 0 \qquad (4.38)$$

Where:

EX_t is the nominal exchange rate, $P^e{}_t$ is expected inflation. Other variables are as defined earlier. Macroeconomic theory postulates that fiscal stance cause inflation. Yet empirical research has had limited success in uncovering this relationship.Alsothe theoretical relationships between inflation and exchange rate are ambiguous, evidence suggests a strong link between the choice of the exchange rate regime and macroeconomic variables, for example inflation. Adopting a pegged exchange rate can lead to lower inflation, but also to slower productivity growth.

4.2.1.5 External sector: exchange rate equation

The theoretical framework for modeling the real exchange rate follows the specification of Edwards (1989) which takes into consideration the effect of nominal exchange rate

depreciation, macroeconomic policies (including monetary and fiscal policies) and fundamental variables on the real exchange rate. According to this model, a depreciation of the nominal exchange rate is expected to result to a depreciation of the real exchange rate. Excess supply of domestic credit (ESC) is used to capture the effect of expansionary monetary policy on the real exchange rate. For the purpose of this study and based on the structure of the Nigerian economy, the real exchange rate function is modeled as follows:

$$Lnex_t = \phi_0 + \phi_1 LnESC_t + \phi_2 LnTT_t + \phi_3 LnEX_t + \phi_4 LnFIS_t + \phi_5 LnEd_t + \phi_6 \inf_t + \eta\mu_{5t-1} + \pi_t$$
$$\phi_1, \phi_5, \phi_6 < 0;\ \phi_2, \phi_3, \phi_4 < / > 0,\ and\ \eta < 0 \qquad (4.39)$$

Where ex_t is real exchange rate, ESC_t is excess supply of domestic credit, TT_t is terms of trade, Ed_t is external debt as a ratio of GDP, $\inf_t$ is inflation rate, whilst other variables are as defined earlier.

As a general rule, a country with a consistently lower inflation rate exhibits a rising currency value, as its purchasing power increases relative to other currencies. Countries will engage in large-scale deficit financing to pay for public sector projects and governmental funding. While such activity stimulates the domestic economy, nations with large public deficits and debts are less attractive to foreign investors. The reason is that a large debt encourages inflation, and if inflation is high, the debt will be serviced and ultimately paid off with cheaper real dollars in the future.

Terms of trade is a ratio comparing export prices to import prices, the terms of trade is related to current accounts and the balance of payments. If the price of a country's exports rises by a greater rate than that of its imports, its terms of trade have favorably improved. Increasing terms of trade show greater demand for the country's exports. This, in turn, results in rising revenues from exports, which provides increased demand for the country's currency (and an increase in the currency's value). If the price of exports rises by a smaller rate than that of its imports, the currency's value will decrease in relation to its trading partners.

4.2.1.6 The endogeneity of fiscal stance

This specification allows direct and indirect channels for the effects of fiscal policy on growth to be distinguished in a system that remains sufficiently tractable to be estimated,using standard econometric methods. The direction of causality in this system runs from fiscal policy to exchange rate movements that in turn affect inflation. These variables are expected to have an impact on gross investment, and money supply which are components of growth. The model corresponds to system of equations with restrictions on the feedbacks among the endogenous variables. The unrestricted system of the equations is also estimated by allowing feedbacks between endogenous variables.

With y, a vector of endogenous variables and x,a vector of exogenous variables, the recursive system is expressed as:

$$y = By + \Gamma x + \xi \qquad (4.40)$$

Where B is an upper triangular matrix containing for each pair of endogenous variables i and j with elements $\beta_{ij} \neq 0$ and $\beta_{ji} = 0$, Γ is a matrix of direct effects of the exogenous variables on the endogenous variables, and ξ is a vector of the equations' error terms. With the error covariance matrix of the system diagonal (i.e., so that the disturbance terms are not correlated across equations), Equation (4.40) can be estimated using standard least square techniques with parameter estimates that are unbiased and efficient. If the error covariance matrix is not diagonal, the above system can be estimated simultaneously allowing for feedbacks among the error terms of the different equations.

A feature of this system is that total effects on yof each exogenous and endogenous variable can be estimated using the reduced form $y = \Pi x + \zeta$. The total effect of xonyis given by $\Pi = (I - B)^{-1}\Gamma$ and the total effect of yon yis given by $\Theta = (I - B)^{-1} - I$ [13]

[13]The indirect effects can be calculated by subtracting the direct effects matrices B and Γ from the respective total effects of **y** and **x**.

4.2.2. The Structural VAR Framework

The aim of a structural VAR is to use economic theory rather than the Cholesky decomposition to recover structural innovations from residuals of a reduced-form VAR. Consider the following bivariate VAR model in which each variable has contemporaneous effect[14] on the other.

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix}\begin{bmatrix} y_t \\ z_t \end{bmatrix}=\begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix}+\begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}\begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix}+\begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (4.41)$$

Equation (4.41) can be written in a compressed form as:

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t \quad (4.42)$$

Where

$$B=\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix},\ x_t=\begin{bmatrix} y_t \\ z_t \end{bmatrix},\ \Gamma_0=\begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix},\ \Gamma_1=\begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix},\ x_{t-1}=\begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix},\ \varepsilon_t=\begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

The reduced-form of the structural or primitive form (4.41) can be written as:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix}=\begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix}+\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}\begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix}+\begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix} \quad (4.43)$$

or

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (4.44a)$$

Where

$$A_0=\begin{bmatrix} a_{10} \\ a_{20} \end{bmatrix},\quad A_1=\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix},\quad e_t=\begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix}$$

Comparison of equations (4.42) and (4.43) above suggests that the errors in the reduced-form VAR e_{yt} and e_{zt} are indeed composites of the underlying structural shocks ε_{yt} and ε_{zt} since:

$$A_0 = B^{-1}\Gamma_0;\ A_1 = B^{-1}\Gamma_1;\ e_t = B^{-1}\varepsilon_t \quad (4.44b)$$

so that:

[14] See Enders, 2004

$$\begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix} = \begin{bmatrix} \frac{1}{1-b_{12}b_{21}} \end{bmatrix} \begin{bmatrix} 1 & -b_{12} \\ -b_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (4.45)$$

e_t is the one step ahead forecast errors[15] in x_t but does not have any structural interpretation, and ε_t is the autonomous changes in x_t in model (4.41). To obtain the impulse response function (IRF) or variance decompositions (VDC), it is necessary to use the structural shocks ε_t and not the forecast errors e_t.

The idea of structural decompositions is to take the observed values of e_t from an empirical VAR and to restrict the system so as to recover ε_t as $\varepsilon_t = Be_t$. The restriction has to be such that the various ε_{ij} are recovered and the assumed independence of the various ε_{ij} are preserved.

To solve this identification problem, the number of equations and unknown will be counted: the OLS can obtain the variance-covariance matrix Σ

$$\Sigma = \begin{vmatrix} \sigma^2_{11} & \sigma_{12} & .... & \sigma_{15} \\ \sigma_{21} & \sigma^2_{22} & .... & \sigma_{25} \\ . & . & . & . \\ \sigma_{n1} & \sigma_{n2} & ... & \sigma^2_{n} \end{vmatrix}$$

Where each element of Σ is constrained as the sum: $\sigma_{ij} = \left(1/T\right)\sum_{t=1} e_{it}e_{jt}$

Since Σ is symmetric, it contains only $\left(n^2+n\right)/2$ distinct elements. But the SVAR has a total of n^2 unknowns [$n^2 - n$ in B since the diagonal elements are all unity, plus n in

[15] From 4.43a, the coefficients A_0 and A_1 can be used to obtain the various values of x_{t+1} conditional on the observed values of x_t. Thus, updating 4 one period ahead, $x_{t+1} = A_0 + A_1x_t + e_{t+1}$, and taking the conditional expectation of x_{t+1} yields $E_tx_{t+1} = A_0 + A_1x_t$. The one-step forecast error is $E_tx_{t+1} = A_0 + A_1x_t$. In general, the forecast error is $e_{t+n} + A_1e_{t+n-1} + A_1^2e_{t+n-1}.....A_1^ne_{t+1}$

$\text{var}(\varepsilon_{it})$] to be identified from the known $(n^2+n)/2$ from the empirical VAR. It is therefore necessary to impose at least $n^2 - \left[\left(n^2-n\right)/2\right] = \left(n^2-n\right)/2$ restrictions on the structural model.

4.2.3. The empirical model of fiscal policy shocks and macroeconomic aggregates

This study employs the VAR framework to capture the second specific objective of the study. A small open economy Structural Vector Autoregressive (SVAR) model would be specified. The specification is made up of five endogenous variables depicting the relationship between fiscal impulse (FI) and macroeconomic indicators like, Log of Money Supply (LnMS), Change in consumer price index (INF), Log of Real Gross Domestic Product (LnRGDP), and Exchange Rate (EXR).

4.2.3.1 Contemporaneous structural VAR

Following the wisdom of structural VAR model, the functional form of structural equation of each variable that also reflects information from prior theoretical research is specified in equation 4.46.

The following restrictions are applied to the contemporaneous structural parameters of B in 4.42. All the zero restrictions are on the contemporaneous structural parameters, and no restrictions are imposed on the lagged structural parameters of Γ .Specifically, this study uses the non-recursive structural equation in 4.46.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ B_{21} & 1 & B_{23} & B_{24} & 0 \\ B_{31} & B_{32} & 1 & 0 & 0 \\ B_{41} & B_{42} & B_{43} & 1 & 0 \\ B_{51} & B_{52} & B_{53} & B_{54} & 1 \end{bmatrix} \begin{bmatrix} \mu_{FI} \\ \mu_{LnMs} \\ \mu_{Inf} \\ \mu_{LnRGDP} \\ \mu_{EXR} \end{bmatrix} = \begin{bmatrix} \varepsilon_{FI} \\ \varepsilon_{LnMs} \\ \varepsilon_{Inf} \\ \varepsilon_{LnRGDP} \\ \varepsilon_{EXR} \end{bmatrix} \quad (4.46)$$

The first equation represents the exogenous factor of our model and it is assumed to contemporaneously affect all variables in the system. The second equation represents the traditional money supply function in which money supplyis a function of fiscal impulse and inflation (FI and INF).

The third equation is the inflation function that characterized the dynamic response of inflation to fiscal impulse and money supply (FI and LnMS). The fourth equation can be interpreted as a short-run output equation with real output allowed to respond contemporaneously to shocks from fiscal impulse, money supply and inflation (FI, LnMs and INF). The last equation suggests that exchange rate responds immediately to all other variables.

Apart from the restrictions imposed by (Kim, 2003) and (Kim & Roubini, 2000), in the case of monetary policy reaction function. We assume a Taylor type policy function for Inflation in which interest rate respond contemporaneously to inflation, output as well as exchange rate in line with (Sek, 2009). Exchange rate is added to capture any possibility of indirect intervention in foreign exchange market in Nigeria by monetary authorities.

4.2.3.2 Long-run structural equations

The Structural VAR (SVAR) approach builds on an earlier work of Sims (1980) by attempting to identify the impulse responses through *a priori* restrictions on the covariance matrix of the structural errors. The essence of this is to simply avoid arbitrary identifying restrictions which characterizes the unrestricted VAR. However, several techniques can be used to recover the required information. The standard reduced-form VAR provides reduced-form errors from which structural shocks can be recovered. Short-run and long-run approaches can be used to recover the required information. Sims (1986), Bernanke (1986), Blanchard et al (1986) and Ndako (2004) use the short-run approach by applying non-recursive and direct restrictions on the contemporaneous interactions among the variables. An alternative approach is the long-run restrictions of Blanchard and Quah (1989), Shapiro and Watson (1988), Astley and Garrat (1996), Blanchard and Perotti

(2002) and Chakraborty (2006). They used restrictions on the long-run dynamic effect of the shocks on particular variables in the system to identify the structural shocks.

In this inquiry, the Blanchard and Perotti (2002) long-run restriction approach is to be explored in this respect, in the moving average representation, the sequences FI, LnMS, INF, LnRGDP, and EXR can be expressed as a linear combination of current and past structural shocks.

$$FI_t = \sum_{k=0}^{\infty} S_{11}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{12}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{13}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{14}(k)V_{4t-k} + \sum_{k=0}^{\infty} S_{15}(k)V_{5t-k} \quad (4.47)$$

$$LnMS_t = \sum_{k=0}^{\infty} S_{21}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{22}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{23}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{24}(k)V_{4t-k} + \sum_{k=0}^{\infty} S_{25}(k)V_{5t-k} \quad (4.48)$$

$$INF_t = \sum_{k=0}^{\infty} S_{31}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{32}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{33}(k)V_{3t-k} \sum_{k=0}^{\infty} S_{34}(k)V_{4t-k} + \sum_{k=0}^{\infty} S_{35}(k)V_{5t-k} \quad (4.49)$$

$$LnRGDP_t = \sum_{k=0}^{\infty} S_{41}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{42}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{43}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{44}(k)V_{4t-k} + \sum_{k=0}^{\infty} S_{45}(k)V_{5t-k} \quad (4.50)$$

$$EXR_t = \sum_{k=0}^{\infty} S_{51}(k)V_{1t-k} + \sum_{k=0}^{\infty} S_{52}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{53}(k)V_{3t-k} + \sum_{k=0}^{\infty} S_{54}(k)V_{4t-k} + \sum_{k=0}^{\infty} S_{55}(k)V_{5t-k} \quad (4.51)$$

This can be represented in a vector form as follows

$$\begin{bmatrix} FI_t \\ LnMS_t \\ INF_t \\ LnRGDP_t \\ EXR_t \end{bmatrix} \begin{bmatrix} S_{11}(L) & S_{12}(L) & S_{13}(L) & S_{14}(L) & S_{15}(L) \\ S_{21}(L) & S_{22}(L) & S_{23}(L) & S_{24}(L) & S_{25}(L) \\ S_{31}(L) & S_{32}(L) & S_{33}(L) & S_{34}(L) & S_{35}(L) \\ S_{41}(L) & S_{42}(L) & S_{43}(L) & S_{44}(L) & S_{45}(L) \\ S_{51}(L) & S_{52}(L) & S_{53}(L) & S_{54}(L) & S_{55}(L) \end{bmatrix} \begin{bmatrix} V_{1t} \\ V_{2t} \\ V_{3t} \\ V_{4t} \\ V_{5t} \end{bmatrix} \quad (4.52)$$

Where V_{1t}, V_{2t}, V_{3t}, V_{4t} and V_{5t} are uncorrelated white noise disturbances and $S_{ij}(L)$ are polynomials in the lag operator, where the individual coefficients are denoted as $S_{ij}(k)$.

Equation (4.52) can be written as

$$X_t = S(L)V_t \quad (4.53)$$

Where

$X_t = \left[FI_t \;\; \text{LnMS}_t \;\; INF_t \;\; LnRGDP_t \;\; \text{EXR}_t \right]$ and $V_t = \left[V_{1t} \;\; V_{2t} \;\; V_{3t} \; V_{4t} \; V_{5t} \right]$. The shocks V_t are normalized, such that;

$Var(V_{1t}) = Var(V_{2t}) = Var(V_{3t}) = Var(V_{4t}) = Var(V_{5t}) = 1$ i.e

$$(V_t V_t^{'}) = \begin{bmatrix} Var(V_{1t}) & Cov(V_{1t}, V_{2t}) & Cov(V_{1t}, V_{3t}) & Cov(V_{1t}, V_{4t}) & Cov(V_{1t}, V_{5t}) \\ Cov(V_{2t}, V_{1t}) & Var(V_{2t}) & Cov(V_{2t}, V_{3t}) & Cov(V_{2t}, V_{4t}) & Cov(V_{2t}, V_{5t}) \\ Cov(V_{3t}, V_{1t}) & Cov(V_{3t}, V_{2t}) & Var(V_{3t}) & Cov(V_{3t}, V_{4t}) & Cov(V_{3t}, V_{5t}) \\ Cov(V_{4t}, V_{1t}) & Cov(V_{4t}, V_{2t}) & Cov(V_{4t}, V_{3t}) & Var(V_{4t}) & Cov(V_{4t}, V_{5t}) \\ Cov(V_{5t}, V_{1t}) & Cov(V_{5t}, V_{2t}) & Cov(V_{5t}, V_{3t}) & Cov(V_{5t}, V_{4t}) & Var(V_{5t}) \end{bmatrix} \quad (4.54)$$

V_{1t}, V_{2t}, V_{3t}, V_{4t} and V_{5t} are the Fiscal Impulse, log of Money Supply, Inflation Rate, log of real GDP, and Exchange Rate shocks respectively. The coefficients of $S_{11}(L)$, for instance, represent the impulse response of fiscal shock on output and inflation. If fiscal impulse is unaffected by money supply and inflation shocks in the long run, this implies that the cumulated effects of V_{2t} and V_{3t} on FI_t must be equal to zero, i.e.

$$\sum_{k=0}^{\infty} S_{12}(k) V_{2t-k} + \sum_{k=0}^{\infty} S_{13}(k) V_{3t-k} = 0 \quad (4.55)$$

The structural shocks, V_t, are not observed. To recover the fiscal impulse, money supply, inflation, output and exchange rate shocks, the estimation proceeds as follows. To identify the structural model, the VAR is first estimated in its unrestricted form.

$$\begin{bmatrix} FI_t \\ LnMS_t \\ INF_t \\ LnRGDP_t \\ EXR_t \end{bmatrix} = \begin{bmatrix} \Phi_{11}(L) & \Phi_{12}(L) & \Phi_{13}(L) & \Phi_{14}(L) & \Phi_{15}(L) \\ \Phi_{21}(L) & \Phi_{22}(L) & \Phi_{23}(L) & \Phi_{24}(L) & \Phi_{25}(L) \\ \Phi_{31}(L) & \Phi_{32}(L) & \Phi_{33}(L) & \Phi_{34}(L) & \Phi_{35}(L) \\ \Phi_{41}(L) & \Phi_{42}(L) & \Phi_{43}(L) & \Phi_{44}(L) & \Phi_{45}(L) \\ \Phi_{51}(L) & \Phi_{52}(L) & \Phi_{53}(L) & \Phi_{54}(L) & \Phi_{55}(L) \end{bmatrix} \begin{bmatrix} FI_{t-1} \\ LnMS_{t-1} \\ INF_{t-1} \\ LnRGDP_{t-1} \\ EXR_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix} \quad (4.56)$$

Or

$$X_t = \Phi(L) X_{t-1} + \varepsilon_t \quad (4.57)$$

As all equations in the system share the same matrix of regressors, estimation of the reduced-form model amounts to applying ordinary least square (OLS) separately to each

equation in (4.56), after including the optimal number of lags to eliminate serial correlation from the residuals. The estimated unrestricted model can be inverted to the wold moving average representation.

$$\begin{bmatrix} FI_t \\ LnMS_t \\ INF_t \\ LnRGDP_t \\ EXR_t \end{bmatrix} = \begin{bmatrix} C_{11}(L) & C_{12}(L) & C_{13}(L) & C_{14}(L) & C_{15}(L) \\ C_{21}(L) & C_{22}(L) & C_{23}(L) & C_{24}(L) & C_{25}(L) \\ C_{31}(L) & C_{32}(L) & C_{33}(L) & C_{34}(L) & C_{35}(L) \\ C_{41}(L) & C_{42}(L) & C_{43}(L) & C_{44}(L) & C_{45}(L) \\ C_{51}(L) & C_{52}(L) & C_{53}(L) & C_{54}(L) & C_{55}(L) \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix} \tag{4.58}$$

Or

$$X_t = C(L)\varepsilon_t \tag{4.59}$$

With $C(L) = [I - \Phi(L)L]^{-1}$

The variance-covariance matrix of the vector of reduced-form innovations, Σ is given by

$$E(\varepsilon_t \varepsilon_t^{'}) = \begin{bmatrix} Var(\varepsilon_{1t}) & Cov(\varepsilon_{1t},\varepsilon_{2t}) & Cov(\varepsilon_{1t},\varepsilon_{3t}) & Cov(\varepsilon_{1t},\varepsilon_{4t}) & Cov(\varepsilon_{1t},\varepsilon_{5t}) \\ Cov(\varepsilon_{2t},\varepsilon_{1t}) & Var(\varepsilon_{2t}) & Cov(\varepsilon_{2t},\varepsilon_{3t}) & Cov(\varepsilon_{2t},\varepsilon_{4t}) & Cov(\varepsilon_{2t},\varepsilon_{5t}) \\ Cov(\varepsilon_{3t},\varepsilon_{1t}) & Cov(\varepsilon_{3t},\varepsilon_{2t}) & Var(\varepsilon_{3t}) & Cov(\varepsilon_{3t},\varepsilon_{4t}) & Cov(\varepsilon_{3t},\varepsilon_{5t}) \\ Cov(\varepsilon_{4t},\varepsilon_{1t}) & Cov(\varepsilon_{4t},\varepsilon_{2t}) & Cov(\varepsilon_{4t},\varepsilon_{3t}) & Var(\varepsilon_{4t}) & Cov(\varepsilon_{3t},\varepsilon_{5t}) \\ Cov(\varepsilon_{5t},\varepsilon_{1t}) & Cov(\varepsilon_{5t},\varepsilon_{2t}) & Cov(\varepsilon_{5t},\varepsilon_{3t}) & Cov(\varepsilon_{5t},\varepsilon_{4t}) & Var(\varepsilon_{5t}) \end{bmatrix} \tag{4.60}$$

Under the assumptions that the innovations in ε_t are a linear combination of the structural disturbances in V_t, the structural shocks can be related to the disturbances of the reduced-form model as follows;

$$\begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix} = \begin{bmatrix} S_{11}(0) & S_{12}(0) & S_{13}(0) & S_{14}(0) & S_{15}(0) \\ S_{21}(0) & S_{22}(0) & S_{23}(0) & S_{24}(0) & S_{25}(0) \\ S_{31}(0) & S_{32}(0) & S_{33}(0) & S_{34}(0) & S_{35}(0) \\ S_{41}(0) & S_{42}(0) & S_{43}(0) & S_{44}(0) & S_{45}(0) \\ S_{51}(0) & S_{52}(0) & S_{53}(0) & S_{54}(0) & S_{55}(0) \end{bmatrix} \begin{bmatrix} V_{1t} \\ V_{2t} \\ V_{3t} \\ V_{4t} \\ V_{5t} \end{bmatrix} \tag{4.61}$$

Or

$$\varepsilon_t = S(0)V_t \tag{4.62}$$

With $E(\varepsilon_t \varepsilon_t^{'}) = S(0)\ E(V_t V_t^{'})\ S^{'}(0) = \Sigma$

Knowledge of $S(0)$, the matrix of the contemporaneous effect of the structural disturbances V_t on X_t, will allow recovery of the structural shocks from the reduced-form innovations, ε_t

4.3 Estimation techniques and procedures

The first task in the estimation procedure is to examine the connection between fiscal stance and macroeconomic aggregates in Nigeria. The impact of fiscal impulse on macroeconomic variables is also of great importance to this study. Most studies that have examined similar relationship adopted the ordinary least square (OLS) technique, cointegration approach and vector autoregressive (VAR) to estimate their models. However, these methodologies have been flawed on the ground that they are unable to take care of sample selection and simultaneity biases and is, therefore prone to the problem of weak instrument (Clarida et al, 2000). Thus, this present study however, departs from previous works because it estimated a small macro econometric model via a superior and more policy applicable generalized method of moment (GMM) technique. The baseline GMM technique is employed for each equation to estimate the effect of fiscal stance on macroeconomic indicators. Two-stage-least-square (2SLS) technique is also used as an alternative estimation technique to check the robustness of the baseline results. However, the structural vector autoregressive (SVAR) technique is employed in examining the impact of fiscal impulse on macroeconomic and policy variables in Nigeria.

Next, the time series properties of the variables were examined. The classical econometric theory is anchored on the assumption that the observed data come from a stationary process, that is, a process whose means and variances are constant over time. Any series that is not stationary is said to be non stationary. The rationale behind stationarity test is the fact that most economic variables evolve, grow and change over time in both real and nominal terms. This is so because a substantial part of economic theory generally deals with long-run equilibrium relationships generated by market forces and behavioural rules. Consequently, running a regression among such economic variables with the false assumption that they are stationary will result in spurious regression. (Granger and Newbold, 1974; and Chhiber and Wijnbergen, 1988). It therefore follows that any

analysis, forecast and policy recommendation based on such results would be meaningless. These problems are avoided by determining the order of integration of the variables. To conduct this stationary test, several approaches are employed in applied econometrics, prominent among these are the Ng-Perron Modified test and Dickey Fuller-GLS test. If the variables are non-stationary in levels, they are differenced at least once to make them stationary. However, differencing a variable may lead to a loss of long-run information. Thus, to determine whether a long run relationship exists between the dependent variable and the explanatory variables, cointegration test is conducted.

In cointegration, it is believed that individual variables might not be stationary but a linear combination of the variables tends to be stationary, implying the existence of cointegration. To test for cointegration, the study adopted both the Engle-Granger and Johansen maximum-likelihood approach. The existence of cointegration is indicative of a long-run relationship between the explained and the explanatory variables and the short run dynamics can be described by an Error Correction Mechanism (ECM). Given that the model represents a system of simultaneous equations, the study used the generalized method of moment (GMM) estimation technique in estimating the model, since the use of ordinary least square (OLS) estimation seems to be inappropriate because it overestimates the coeeficients. Also, the system estimation of the GMM helps to solve the endogeneity bias.

The structural vector autoregressive (SVAR) models of equations (4.47) - (4.51) were estimated in an attempt to determine the impact of fiscal impulse on macroeconomic aggregates. Long run restriction approach is explored in the moving average representation. To identify the structural models, the VAR is first estimated in its unrestricted form. The estimation of the reduced-form model amounts to applying ordinary least squares (OLS) separately to each equation in (4.58), after the inclusion of the optimal lags to eliminate serial correlation from the residuals. As for the number of lags in the model, the standard information criteria of Akaike (AIC) and Hannan-Quinn criteria (HQC) chose an optimal lag length of two.

The estimation of Sims and Zha (2002) procedure was employed to analyse both the contemporaneous and long run structural models of the VAR framework. In order to validate the specification, a set of estimations were performed for the robustness of the inferences. A five-variable SVAR set up in the benchmark specification might be too much to ask from the data as its time span might be too short for Nigeria. Such specification could be considered as over-parameterised. In order to account for this, the VAR is re-estimated under a number of alternative settings. First, is the reduction of the lag length of the SVAR specification from four lags to two lags. Second, a two variable model that will be sub-divided into real sector and monetary sector would be considered. For the third specification, oil price is assumed to capture the real exogenous influence stemming from global macroeconomic developments which follows its own dynamics as in the SVAR specification.

4.4. Data requirements and sources

The study makes use of annual time series data between the period 1970 and 2008, as well as quarterly data for the period 1970:q1 to 2008:q4. The data were obtained from the various issues of the Central Bank of Nigeria (CBN) Statistical Bulletin, 2009. Oil price was obtained from the British Petroleum Review of World Energy (BPRWE), 2009. This period is chosen because it coincides with the period the country started experiencing wide variations in her nominal budget balance which might partly be explained by oil price volatility and economic fluctuations. The variables in the stochastic equations are expressed in real terms. Furthermore, all the variables in the stochastic equations are expressed in natural logarithms and thus the coefficients are interpreted as elasticities.

CHAPTER FIVE
MODEL ESTIMATION, EVALUATION AND INTERPRETATION OF RESULTS

5.1. Introduction

This chapter presents the estimated results of the models specified in the previous chapter. It begins with the preliminary estimates of the model. The descriptive statistics of the variables are highlighted, and the results of the unit root tests are reported. That is, the Ng-Perron Modified Unit Root and Dickey Fuller-GLS Unit Root Tests.The Johansen Maximum Likelihood cointegration test is used to determine the long run relationship among the variables. The Error Correction Mechanism (ECM) of the stochastic equations is undertaken. This is to tie the short-run disequilibrium to the long-run equilibrium. The relationship between fiscal stance and macroeconomic variables, on one hand, are examined with the aid of generalized method of moment (GMM) estimation technique. Two-stage-least-square (2SLS) technique is used as an alternative estimation technique to check the robustness of the baseline results. On the other hand, the impact of fiscal impulse on macroeconomic aggregates is investigated using the structural vector autoregressive (SVAR) technique. The estimated results for both GMM and SVAR models are then presented and analysed. Lastly, a set of robustness analyses of the inferences are carried out in order to validate the benchmark specification with a view to imbuing confidence in the policy applicability of the findings and inferences drawn.

5.2 Descriptive statistics of the variables

This sub-section discusses the statistical properties of the variables. Thus, the univariaite statistics of the variables, which include the mean, median, skewness, Jarque-Bera, kurtosis, among others are reported. The results of the descriptive statistics for selected variables are presented in Table 5.1.

It is evident from Table 5.1 that both the mean (first moment) and skewness (third moment) for each of the variables are less than unity (approximately equal to zero for all the varables). For instance, money supply had a mean of 0.02 and skewness of 0.63, while the mean value and skewness of gross investment are 0.04 and 0.08 respectively. The skeness is a measure of the symmetry of the histogram. The rule of thumb for any standardised normal variable is that, both its mean value and skewness should be zero. Based on this criterion, it can be inferred that all the variables in the model have standard normal distribution. In addition, inflation rate, excess supply of domestic credit, fiscal impulse, external debt, terms of trade and oil price are negatively skewed, while the other variables are positively skewed. A variable with negative skewness is said to be far below the mean, while a variable with positive skewness is usually above the mean.

Furthermore, the results shows the kurtosis (fourth moment) which measures the tail shape of a histogram. Variables with values of kurtosis less than three are called platykurtic (fat or short-tailed), with total investment and trade balance falling under this category. On the other hand, variables whose kurtosis value is greater than three are called leptokurtic (slim or long-tailed) and the variables that qualified for this are fiscal impulse, inflation rate and interest rate. External debt and expected inflation are mesokurtic because they have kurtosis value around three. Juxtaposed against these are the probability values and the Jarque-Bera test of normality, which is an asymptotic test. From Table 5.1, it is clear that the residuals are normally distributed, as the probability values for all the variables are very low, and close to zero.

In summary, the descriptive statistics revealed that the data sets are normally distributed. This is so because most of the probability values are less than unity, while their means nearly equals the corresponding medians.

Table 5.1. Descriptive statistics for selected variables

Variable	Mean	Median	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
Real Output	0.31	0.25	0.34	0.91	5.89	16.53	0.00
Total Investment	0.04	0.04	0.02	0.08	2.83	3.84	0.15
Population	0.26	0.16	0.34	1.58	5.24	21.22	0.00
Trade Balance	0.24	0.22	0.20	0.04	2.74	0.11	0.95
Inflation Rate	0.05	0.09	0.19	-0.86	5.14	10.65	0.00
Money Supply	0.02	0.02	0.46	0.63	3.94	3.48	0.18
Fiscal Stance	0.27	0.20	0.22	1.15	3.51	7.82	0.02
Interest Rate	0.28	0.27	0.12	1.09	4.03	8.23	0.02
High Powered Money	0.25	0.16	0.42	1.84	8.82	67.21	0.00
Budget Deficit	0.27	0.20	0.22	1.15	3.51	7.82	0.02
Exchange Rate	0.05	0.05	0.24	0.66	5.14	8.96	0.01
Expected Inflation	-0.23	-0.25	0.33	0.01	3.12	0.02	0.99
Excess Supply of Domestic Credit	0.04	0.06	0.40	-0.91	4.19	6.74	0.03
Fiscal Impulse	0.27	0.28	0.16	-0.05	4.21	2.10	0.35
External Debt	0.09	0.14	0.43	-0.43	3.12	1.05	0.59
Terms of Trade	0.00	0.01	0.07	-0.69	3.85	3.72	0.16
Oil Price	0.03	0.02	0.52	-0.71	3.22	2.18	0.02

Source: Author's Calculations, using E-views 7.1.

5.3 Unit root tests

In line with recent developments in time series modeling, unit root tests of the time series properties of the data are examined to determine the order of integration of the variables used in the model. A series is said to be integrated of order d, denoted I(d), if the series becomes stationary or I(0) after being differenced d times. The Modified Ng-Perron and Dickey Fuller-GLS tests are performed. The statistics of both tests allow one to test formally the null hypothesis that a series is I(1) against the alternative that it is I(0). The Dickey Fuller-GLS test was employed to compliment the Modified Ng-Perron test in order to enhance the judgment about the stationarity of the variables. The results from both tests are consistent and show that all the variables are stationary at first difference (that is, they are integrated of order one). The results of the stationarity tests for the variables are presented in Tables 5.2 and 5.3.

Table 5.2. Ng-Perron modified unit root tests results

VARIABLE	MZa	MZt	MSB	MPT
ΔEXR	-18.3095**	-2.9884**	0.1691**	5.2398*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔFIS	-36.6269**	-4.2782**	0.1181**	2.4945**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔINF	-42.4689**	-4.6040**	0.1082**	2.1634**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnY	-18.3085**	-2.9918*	0.1637**	5.1860**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnM	-18.1961**	-2.8504**	0.1563**	5.9861**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔOP	-14.8762**	-2.4820*	0.1692**	7.4926**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnT	-65.4963**	-5.7229*	0.0837**	1.3935*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnN	-45.4456**	-4.3469*	0.0877**	1.2435*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnI	-21.1989**	-3.7564**	0.5124**	4.1452**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLni	-42.3811**	-6.7124**	0.8614**	6.1425**
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
ΔLnH	-35.7634**	-5.7124*	0.1765**	2.1265*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)

ΔLnP^e	-43.8732**	-5.1287*	0.6752**	3.1425*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
$\Delta LnESC$	-32.9812**	-7.1534*	0.0154**	1.6142*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
$\Delta LnEd$	-41.4932**	-5.7129*	0.0614**	1.1524*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)
$\Delta LnTT$	-36.2148**	-3.7124*	0.0762**	2.4165*
1%	(-13.8000)	(1.42000)	(0.14300)	(4.03000)
5%	(-11.3000)	(-2.81200)	(0.16800)	(5.48000)

*Notes: Δ symbolizes that the variables are in their first difference. The asymptotic critical values of Ng-Perron Modified unit root tests are in their respective levels of significance. ** (*) denotes the rejection of the null hypothesis at 1 % (5%) significance level.*

Source: Computed by the Author using E-views 7.1

Table 5.3. Dickey Fuller-GLS unit root tests results

Variable	T-Statistics	1%	5%	Order of Integration
EXR	-3.866463*	-3.77000	-3.190000	I(1)
FIS	-6.817927**	-3.77000	-3.190000	I(1)
INF	-6.176292**	-3.77000	-3.190000	I(1)
LnY	-9.154214*	-3.77000	-3.190000	I(1)
LnM	-5.436809**	-3.77000	-3.190000	I(1)
OP	-9.100975**	-3.77000	-3.190000	I(1)
LnT	-7.637348**	-3.77000	-3.190000	I(1)
LnN	-5.465237**	-3.77000	-3.190000	I(1)
LnI	-8.378248**	-3.77000	-3.190000	I(1)
Lni	-7.982548**	-3.77000	-3.190000	I(1)
LnH	-5.981536**	-3.77000	-3.190000	I(1)
LnP^e	-4.672415**	-3.77000	-3.190000	I(1)
LnESC	-8.872451**	-3.77000	-3.190000	I(1)
LnEd	-9.814256**	-3.77000	-3.190000	I(1)
LnTT	-6.637348**	-3.77000	-3.190000	I(1)

*Notes: All the variables are stationary at first difference. The asymptotic critical values of Dickey Fuller-GLS unit root tests are in their respective levels of significance. ** (*) denotes the rejection of the null hypothesis at 1 %(5%) significance level.*

Source: Computed by the Author using E-views 7.1

5.4. Cointegration test

Time series variables which are not stationary may have some linear combination of them that is stationary. In such a case, the variables are said to be cointegrated. This implies that there is a long-run relationship among the non stationary variables. If the tests for stationarity reveal that most of the variables are not stationary, there is need to conduct cointegration test. This study follows the Johansen and Juselius (1990) to determine the number of cointegrating vector using two likelihood ratio test statistics, the trace and maximal eigenvalue test statistics were utilized to determine the number of cointegrating vectors. However, it is commonly acknowledged that the statistical properties of the Johansen procedures are generally better and the cointegrating test is of higher power compared to that of the Engle-Granger (Charemza and Deadman, 1997). The results of the trace and maximal eigenvalue tests statistics are presented in Table 5.4. The results of Johansen maximum likelihood procedures showed that the variables in each of the stochastic equations are cointegrated.

The procedure followed to determine the number of cointegrating vectors began at the top of the table with the hypothesis that there are no cointegrating vectors, H_O. A rejection of the hypothesis would lead to testing the alternative hypothesis, which is H_A. The testing procedure continues until the null hypothesis cannot be rejected any longer.Based on the test statistics, the hypothesis of no cointegration, H_O is rejected. The results indicated the existence of more than one cointegrating vectors in some of the stochastic equations, as shown by the Maximum Eigen values and trace statistics, which are statistically significant at the 5% level. The result further reveals that four cointegrating vectors were identified for the real output equation, while three cointegrating vectors were observed for each of the following equations; investment, money supply, inflation and exchange rate. These results are not surprising as their long-run relationships may well involve more than just the variables tested. The consistency in the test results confirmed the existence of long-run relationship among the exogenous and endogenous variables in the model.

Table 5.4. Johansen maximum likelihood cointegrationtestresults

	Trace Test k=4					Maximum Eigenvalues Test k=4				
	H_O	H_A	(λ trace)	Critical values		H_O	H_A	(λ max)	Critical values	
Equation				5%	1%				5%	1%
Real Output	$r \leq 0$	$r > 0$	144.49	95.75	104.65	r = 0	r = 1	50.44	40.08	51.80
Investment	$r \leq 0$	$r > 0$	94.05	69.82	98.04	r = 0	r = 1	44.05	33.87	49.71
Money Supply	$r \leq 0$	$r > 0$	49.99	47.86	85.3	r = 0	r = 1	27.06	27.58	28.96
Inflation	$r \leq 0$	$r > 0$	22.94	29.79	63.21	r = 0	r = 1	15.99	21.13	25.81
Exchange Rate	$r \leq 0$	$r > 0$	6.95	15.49	36.98	r = 0	r = 1	6.94	14.26	19.78

Note: r represents number of cointegrating vectors and k represents the number of lags.

**(**) denotes rejection of the null hypothesis at the 5% (1%) level*

Source: Computed by the Author using E-views 7.1

5.5. Vector Error correction model (VECM)

Based on the results of the cointegration tests, estimates of the vector error correction mechanism (VECM) of the stochastic equations are undertaken. An over parameterised and a parsimonious short run vector error correction models are shown in Tables 5.5 and 5.6, respectively. The equations represent the short run dynamics and adjustment to the long-run. In the VECM model, the residuals from cointegrating regressions lagged one period were used as the error correction term in the dynamic equations.

5.5.1 Interpretation of vector error correction model (VECM)

Here, the short-run dynamics of the analysis are estimated using the error correction representation of the model that includes two lags for each of the first differences for the eighteen variables and the equilibrium error correction terms. Error correction coefficient can be treated as a mechanism, which ties the short-run behavior to its long-run value. ECM simply shows the speed with which the system converges to equilibrium. If it is statistically significant it shows what proportion of the disequilibrium in dependent variables in one period is corrected in the next period.

For instance, the growth equation (equation 4.33) posits changes in real output, as a function of changes in its lag, the lags of gross investment, population, trade balance together with one lag of error correction terms, (ECT(-1)). The estimated error correction term (ECT) in this equation has a right sign and is statistically significant, which is -0.23. This means that 23% of the discrepancy between the actual and the long-run, or equilibrium value of real output is eliminated or corrected annually.

In Gross investment equation, (equation 4.34), apart from its own lagged value, only population, terms of trade, interest rate, real output and inflation appear to matter for short-run growth of gross investment. The estimated error correction term in the gross investment equation at -0.15 at the 5.0 per cent level, it is statistically significant. This means that 15% of the discrepancy between the actual and the long-run, or equilibrium value of gross investment is eliminated or corrected annually.

Table 5.5. Over parameterised short run Vector Error Correction Model

Variable	Equation1 D(lnY)	Equation 2 D(LnI)	Equation 3 D(LnM)	Equation 4 D(P)	Equation 5 D(Lnex)
Constant	0.29 (2.53)	-0.71 (-0.05)	0.52 (1.98)	-0.12 (-3.01)	-0.08 (-2.04)
D(LnI(-1))	0.79 (2.56)	0.45 (1.99)			
D(LnI(-2))	0.43 (1.96)	0.81 (0.17)			
D(LnN(-1))	0.56 (2.11)	0.38 (2.56)			
D(LnN(-2))	0.28 (1.08)	0.03 (2.67)			
D(LnT(-1))	0.45 (0.06)	-1.97 (-3.10)			
D(LnT(-2))	0.34 (2.57)	-0.29 (-1.65)			
D(LnM(-1))	1.34 (0.44)		2.64 (1.96)	-0.75 (-0.49)	
D(LnM(-2))	0.12 (0.09)		0.95 (2.72)	-0.13 (-0.15)	
D(LnFIS(-1))	1.84 (0.93)	-1.48 (-2.56)	-2.07 (-1.61)	0.33 (2.49)	0.38 (2.01)
D(LnFIS(-2))	0.18 (1.56)	-0.09 (-1.23)	-0.38 (-0.69)	0.18 (1.96)	-1.72 (-4.32)
D(Lni(-1))		0.29 (2.53)	0.59 (0.34)		
D(Lni(-2))		0.12 (1.73)	-3.27 (-0.04)		
D(Lny(-1))	0.39 (2.01)	2.10 (0.29)	1.09 (2.18)	2.09 (1.04)	
D(Lny(-2))	2.14 (1.06)	1.09 (2.18)	2.08 (0.21)	0.63 (2.65)	
D(LnH(-1))			0.03 (0.72)		
D(LnH(-2))			0.01 (1.08)		
D(LnEX(-1))				0.25 (2.83)	-0.15 (-2.29)
D(LnEX(-2))				024 (1.34)	-1.32 (-1.39)
D(LnP^e (-1))				1.09 (3.43)	
D(LnP^e (-2))				-1.81 (3.04)	
D(LnTT (-1))					1.92 (2.60)
D(LnTT (-2))					0.82 (1.49)
D(LnESC (-1))					1.27 (0.15)
D(LnESC (-2))					-2.05 (1.14)

D(LnEd (-1))					1.24 (0.57)
D(LnEd (-2))					-0.43 (0.36)
D(LnINF (-1))		-0.33 (2.04)		0.83 (2.40)	0.25 (2.06)
D(LnINF (-2))		1.46 (1.04)		0.22 (1.30)	0.18 (1.07)
ECT(-1)	-0.23 (2.71)	-0.15 (-2.18)	-0.19 (2.71)	-0.37 (-2.18)	-0.25 (-2.18)
R^2	0.77	0.95	0.77	0.95	0.95
Adj. R^2	0.72	0.92	0.72	0.92	0.92
F-stat.	261.08	174.45	261.08	174.45	174.45

Note: The t values are in parentheses

Source: Computed by the Author, using E-views 7.1

Table 5.6. parsimonious short run Vector Error Correction Model

Variable	Equation1 D(lnY)	Equation 2 D(LnI)	Equation 3 D(LnM)	Equation 4 D(P)	Equation 5 D(Lnex)
Constant	0.29 (2.53)	-0.71 (-0.05)	0.52 (1.98)	-0.12 (-3.01)	-0.08 (-2.04)
D(LnI(-1))	0.79 (2.56)	0.45 (1.99)			
D(LnI(-2))	0.43 (1.96)	------- -------			
D(LnN(-1))	0.56 (2.11)	0.38 (2.56)			
D(LnN(-2))	------- -------	0.03 (2.67)			
D(LnT(-1))	------- -------	-1.97 (-3.10)			
D(LnT(-2))	0.34 (2.57)	------- -------			
D(LnM(-1))	------- -------		------- -------	------- -------	
D(LnM(-2))	------- -------		0.95 (2.72)	------- -------	
D(LnFIS(-1))	------- -------	------- -------	-2.07 (-1.61)	0.33 (2.49)	0.38 (2.01)
D(LnFIS(-2))	------- -------	------- -------	-0.38 (-0.69)	0.18 (1.96)	------- -------
D(Lni(-1))		------- -------	------- -------		
D(Lni(-2))	------- -------	1.09 (2.18)	------- -------		
D(Lny(-1))		------- -------	------- -------	2.09 (1.04)	
D(Lny(-2))	0.39 (2.01)	2.10 (0.29)	1.09 (2.18)	------- -------	
D(LnH(-1))			0.03		

			(0.72)		
D(LnH(-2))			------- -------		
D(LnEX(-1))				------- -------	-0.15 (-2.29)
D(LnEX(-2))				------- -------	------- -------
D(LnP^e (-1))				1.09 (3.43)	
D(LnP^e (-2))				-1.81 (3.04)	
D(LnTT (-1))					1.92 (2.60)
D(LnTT (-2))					------- -------
D(LnESC (-1))					------- -------
D(LnESC (-2))					------- -------
D(LnEd (-1))					1.24 (0.57)
D(LnEd (-2))					------- -------
D(LnINF (-1))		-0.33 (2.04)		0.83 (2.40)	0.25 (2.06)
D(LnINF (-2))		------- -------		------- -------	------- -------
ECT(-1)	-0.23 (2.71)	-0.15 (-2.18)	-0.19 (2.71)	-0.37 (-2.18)	-0.25 (-2.18)
R^2	0.77	0.95	0.77	0.95	0.95
Adj. R^2	0.72	0.92	0.72	0.92	0.92
F-stat.	261.08	174.45	261.08	174.45	174.45

Note: The t values are in parentheses

Source: Computed by the Author, using E-views 7.1

Money supply equation (equation 4.35) also shows the significance of fiscal stance, real output, high-powered money and also its own lag in explaining its short-run growth. The result indicates that the error correction term (ECT) of this equation is significant and also rightly signed. The value of ECT stood at -0.19, implying that the speed of adjustment to the long-run relationship in this equation (money supply equation) is 19%.

The inflation equation (equation 4.37) shows the significance of fiscal stance, expected inflation and real output in explaining changes in inflation in the short-run. The result shows that the ECT of this equation is significant and also rightly signed. It is -0.37. It is interpreted to mean that 37% of the discrepancy between the actual and the long-run, or equilibrium value of inflation is corrected annually.

Lastly, a closer look at the real exchange rate equation (equation 4.38) shows that changes in real exchange rate, as a function of changes in its lag, the lags of fiscal stance, nominal exchange rate, terms of trade, external debt and together with one lag of ECT. The value of ECT in this equation has a right sign and is statistically significant, which stood at -0.25. This means that 25% of the discrepancy between the short-run and the long-run value of real exchange rate is amended annually.

5.6. Macro-econometric model Estimation and interpretation of results

Results for the macro-econometric model estimations are set out in Tables 5.7-5.11. Each Table contains a column with the baseline GMM estimation for each equation using both the fiscal stance and other macroeconomic components as regressors. We also present a set of alternative results based on different estimator to check the robustness of the baseline results. The alternative estimator used in this study is the two-stage-least-square (2SLS) technique. The advantage of this alternative estimator is that it eliminates the influence of outliers on the baseline result. Based on the descriptive statistics and the overall performance criteria of the model, the results of the estimation using annual time series data were chosen for detailed interpretation and policy recommendations. The results of the behavioural equations contained in Tables 5.7 to 5.11, and the discussion of the results are in the order in which the equations are presented.

Since the macro model consists of a system of equations where some right-hand-side variables are correlated with the error term in the equation that they appear, the use of the ordinary least square (OLS) technique is inappropriate because it produces biased and inconsistent estimates of the parameters. This implies that some of these right-hand-side variables appear as dependent variables in other equations. Thus, in order to overcome this problem, the generalised method of moment (GMM) method was used to estimate the coefficients of the behavioural equations. Two-stage-least-square (2SLS) technique was also explored as an alternative estimation technique to check the robustness of the baseline results. This was particularly relevant given the simultaneity of the model that represent both the direct and indirect effects of fiscal stance on real output, investment, money supply, inflation and exchange rate.

As a pre-requisite for the use of GMM, identification test was performed on each of the stochastic equations in the model. The model was identified based on the order condition of identification, making the use of GMM an appropriate estimator.

5. 6.1 The growth equation

The estimation result of the output growth function in Table 5.7 reveals that all the variables have their expected signs. However, some were found to be statistically significant, while others were insignificant at the conventional levels. The results show a positive relationship between fiscal stance and output growth. In the literature, an expansionary fiscal stance would necessitate an increase in economic or transaction activity. Thus, a 10.0% increase in fiscal stance would increase the output growth by about 12.1%. However, fiscal stance is not statistically significant in influencing output growth in Nigeria. The outcome of this result is in dissonance with the results of Ndebbio (1998) on fiscal deficit and inflationary process in an open economy: the case of Nigeria, who reported that fiscal deficit exerted a positive impact on output growth and price level.

An interesting finding in the growth equation is the antithetical relationship between population growth and the growth rate of real GDP. This implies that domestic market expansion due to population growth does not lead to higher output growth. This is evident

in the estimated result where a 10.0% increase in population leads to about 2.5% reduction in real GDP growth rate. It can also be seen from the result that population growth is statistically significant in determining the growth rate of output.

The coefficient of trade balance is negative but significant at the conventional levels. The negative balance of trade suggests that more units of exports are needed per unit of imports. However, this may worsen the current account deficit and exert a negative effect on output growth. Nigeria has been experiencing an unfavourable balance of trade with adverse effects on import earnings. The reduction in export earnings significantly affect output growth, since export earning constitutes one of the major sources of government revenue in Nigeria. Specifically, a 10.0% increase in the balance of trade, would reduce output growth by about 0.3%, however, trade balance is statistically significant in determining output growth in Nigeria. Comparatively, the findings here did not deviate from the results reported by Asante (2000) for Ghana. However, empirical studies by Rossiter (2002) reported a positive effect of trade balance on economic growth.

Also evident from the output equation is the coefficient of money supply, which is positive and statistically significant. The positive relationship between money supply and real output is consistent with the basic IS – LM model for an open economy in which an expansionary monetary policy leads to a rise in real GDP growth rate. This finding is compatible with the real effect of monetary policy reported by Abradu – Otoo et al (2003) for Ghana and Ikhide (2002) for Zimbabwe. Specifically, a 10% increase in money supply resulted in 1.0% increase in real GDP growth rate.

Furthermore, the positive relationship between investment and real output is not surprising, since an increase in investment may cause real output to increase through the multiplier effect. The expansion in money supply increases private sector credit, causing investment spending to increase, with increased output as the inevitable concomitant. In addition, a 10.0% increase in money supply leads to 0.9% increase in output growth. This result validates the argument that an expansionary monetary policy that reduces interest rate, leads to output growth partly because it spurs investment. This result works via the

multiplier-accelerator effect. However, expansionary monetary policy is also inflationary. The policy implication that can be derived from this result is that government should undertake prudent monetary policy that can enhance output growth with minimal inflation rate. Likewise, interest rates should be market-determined in order to provide incentive for investment which eventually lead to output growth. Therefore, a value of 0.227 implies that about 23.0% of the disequilibrium between the short-run and long – run is adjusted for within a year.

Table 5.7. Growth equation regression: dependent variable-Real GDP growth rate

Variable	Baseline GMM		2SLS	
	Coefficient	z-Statistics	Coefficient	z-Statistics
Constant	0.324	0.83	0.213	2.19
LnFIS	1.210	1.70*	-0.183	1.80*
LnN	-0.248	2.06**	-0.251	1.90*
LnT	0.028	6.66***	-0.028	6.15***
LnM	0.102	2.20**	0.035	0.96
LnI	0.087	1.73*	0.088	1.92*
ECT(-1)	-0.227	2.71***	-0.231	1.19*

Source: Author's Calculations using E-views 7.1

Significant at 10%; **Significant at 5%;*Significant at 1%*

5.6.2 The investment equation

The estimation results in Table 5.8 show a negative relationship between interest rate and gross investment. However, the coefficient is insignificant at the 5% level. This result refutes the McKinnon-Shaw hypothesis, which posits a positive relationship between interest rate and savings, that is, an increase in interest rate will lead to an increase in savings and therefore, make fund available for investment. The implication is that investment is not responsive to interest rate change, especially in the short-run. Thus, it can be argued that the interest rate-investment channel of fiscal policy mechanism is weak in Nigeria. A plausible explanation for the insignificant coefficient of the interest rate is the poorly developed financial markets, together with the high and volatile inflation, which tends to weaken this channel.

Although, the coefficient of real output is found to be positively related to gross investment, it is however, insignificant at the 5% level. Thus, a 10.0% increase in real output would increase gross investment by about 0.6%. Nevertheless, the result contradicts the neoclassical investment theory, which suggests that investment causes output growth and not real output leading to investment (Fielding, 1997). The general wisdom is that, increases in real output would drive domestic savings and hence, funds would be available for investment financing. However, the Nigerian economy is characterized by low – income earners, which dampen savings in the country and expectedly the amount of funds available for investment is low.

Population growth is negatively related to growth of per capita income. Evidence from the result shows that, population growth is insignificant in determining investment in Nigeria. This implication of this result is that domestic market expansion due to population growth does not lead to higher output growth. Furthermore, the finding is in consonance with the empirical result of Baldacci, et al (2003), which reported a negative relationship between population growth and gross investment in low – income countries. It is also revealing from the result that investment is positively driven by fiscal stance. This is evident in Table 5.8 where a 10.0% increase in fiscal stance leads to about 23.4% increase in gross investment. Thelikelyjustification for this result is that expansionary fiscal stance tends

tocrowd-outinvestment, however, if additional investment is financed via public equity capital market, it will lead to an increase in interest rates, credit rationing and a tax burden (Chhibber and Wijnbergen 1988).

Following from the result, it can be deduced that inflation reduces investment. The effect is non-linear. Subsequently, a 10.0% increase in the rate of inflation reduces the investment by 0.1%. Based on the result, the non-linear effect of inflation on investment is counter-intuitive. This implies that this variable seems to be significant in influencing investment in Nigeria. The coefficient of balance of trade is negative but insignificant at the conventional levels. This variable is often used as a proxy for external shocks to the economy. From the result, a 10.0% increase in trade balance leads to 0.2% decrease in investment. This empirical result is in agreement with the work of Adam et al, (2000), where he obtained a negative relationship between balance trade and gross investment in some selected low – income countries. Finally, the error correction term reveals that bout 15.3% of the adjustment to long – run equilibrium occurs within a year.

Table 5.8. Investment equation regression: dependent variable-gross investment

Variable	Baseline GMM		2SLS	
	Coefficient	z-Statistics	Coefficient	z-Statistics
Constant	-0.231	0.89.	0.645	1.80
Lni	-0.149	2.21**	-0.147	2.07**
LnY	0.059	4.38***	1.420	0.01
LnN	-0.111	0.95	-0.121	0.74
LnFIS	2.340	0.17	0.025	0.14
INF	-0.011	2.17**	-0.001	1.48*
LnT	-0.020	0.03	0.003	0.05
ECT(-1)	-0.153	2.18**	-0.149	0.12

Source: Author's Calculations using E-views 7.1

Significant at 10%; **Significant at 5%;*Significant at 1%*

5.6.3. The money supply equation

In the money supply function given in equation (4.36), a positive relationship between money supply and high-Powered money is evident. Perhaps, this is indicative of the existence of the multiplier approach to money supply determination in Nigeria. This variable is statistically significant as shown by the z-statistics. Thus, a 10.0% increase in high-Powered money directly increases money supply by 2.7%. It suffices to know that a change in high-powered money has a major impact on money growth in Nigeria.

Furthermore, both the real output and fiscal stance have the expected signs on their respective coefficients. Both variables have positive effects on money supply. However, while fiscal stance is statistically significant, the estimated coefficient of real output is insignificant. In Nigeria, government usually finances its huge fiscal deficit by borrowing from the central bank (credit creation) which fuels inflation. The result confirms that money growth is determined by expansionary fiscal stance which again reinforces the multiplier approach to money supply determination. This outcome is consistent with the empirical result of Sowa (1991) for Ghana.

Theoretically, the market interest rate is expected to have a negative effect on money supply. When interest rate rises, loans become more expensive and loan demand is reduced and subsequently leads to reduction in money supply. Following the result, the coefficient of interest rate is negative but significant at the conventional levels. Thus, a 10.0% increase in interest rate would reduce the supply of money by 5.2%. In addition, increases in interest rate may lead to an increase in loan supply and banks may cut back credit supply due to adverse selection and moral hazard problems. Furthermore, a 10.0% increase in fiscal stance would lead to 11.9% increase in money supply. This result also supports the multiplier approach to money supply determination. Finally, with a parameter value of – 0.34, the error correction term has the expected sign and showed a low adjustment towards equilibrium.

Table 5.9. Money supply equation regression: dependent variable-money supply (M_2)

Variable	Baseline GMM		2SLS	
	Coefficient	z-Statistics	Coefficient	z-Statistics
Constant	0.218	1.90	0.371	0.23
LnH	0.274	2.40**	0.728	0.81
LnY	0.186	0.67	0.643	2.14**
Lni	-0.520	0.57	0.065	1.06
LnFIS	1.192	2.58**	2.634	0.43
ECT(-1)	-0.341	1.32	-0.454	1.52

Significant at 10%; **Significant at 5%;*Significant at 1%*

Source: Author's Calculations using E-views 7.1

5.6.4. Inflation equation

Table 5.10 represents the inflation equation result. All the regressors (except real output) are statistically significant at the 5% level and the signs of the parameter values are data admissible and theory consistent. Money growth exerts a strong positive impact on inflation in Nigeria. Following from the result, a 10.0% increase in money growth results in 3.9% increase in inflation. This is a confirmation of the earlier findings of Kallon,1994 and Greene et al 1991 on the same issue in Sierra Leone. The significance of money growth validates the monetarist doctrine that inflation in Nigeria during the study period was partly a monetary phenomenon. A direct policy implication of this is easily appreciated. If the government is desirous of achieving price stability, effective control of money growth must be pursued by the monetary authorities. It can also be understood that expansionary fiscal policy, with repercussions on monetary policy, propagates inflation.

The coefficient of real output has a negative effect on inflation but it is insignificant. From the analysis, a 10.0% increase in real output leads to about 4.1% increase in inflation in Nigeria. This result is at variance with the works of Odusola and Akinlo (2001). The general wisdom in the literature is that an increase in real output is expected to ease the demand pressure in the country, thereby resulting to a fall in the general price level. This variable is however insignificant and the implication for such a result is that, real output growth is not a strong determinant of inflation in Nigeria. A plausible reason for such a result rests on the fact that domestic production has been poor and the country heavily depends on import to compliment domestic production. The policy implication of this is that the government should implement measures aimed at boosting domestic production of non-tradablewith a view of dampening demand pressure and reducing inflation.

The coefficient of exchange rate has the hypothesized positive sign and was statistically significant at the 5% level. A 10.0% depreciation in nominal exchange rate leads to 1.1% increase in inflation. This result is in consonance with the findings of Sesay (1999), and Egwaikhide (1994). This result suggests that a depreciation of the exchange rate precipitates inflation. Exchange rate depreciation propagates inflation directly through their impact on the costs of imported consumer goods or indirectly through their impact on the costs of intermediate goods (intermediate inputs). Nigeria depends heavily on imported

consumer goods as well as intermediate inputs for her numerous industries. It is not surprising therefore that a depreciation of the domestic currency increased in the domestic price of imported goods, and hence a rise in the domestic price level. This is a confirmation of strong exchange rate pass-through to domestic prices in Nigeria. The policy lesson from this result is that excessive depreciation of the domestic currency is inflationary with its resultant consequences of reducing consumers' real income and could increase government budget deficit (if expenditure responds to inflation faster than revenue). Thus, the monetary authorities should restrain from excessive depreciation of the local currency and provide measures that will enhance exchange rate stability. This can be achieved by setting a target (band) within which the domestic currency can depreciate.

Also from the result, the fiscal stance variable is significant in the inflation model. The variable is positively related to inflation. Indeed, a 10.0% increase in fiscal stance resulted in 1.1% increase in inflation. Fiscal stance is an important determinant of inflation; this is substantiated with the significance value of 3.46 at the 1% level. This finding supports the claim by Adam and Bankole, (2000) on the macroeconomics of fiscal deficits in Nigeria.

From the inflation equation result, there is the coefficient of expected inflation, which is positive and statistically significant. This implies expectations by the public over a future rise in price normally propel inflation. Evidently, a 10.0% increase in expected inflation leads to 0.8% increase in inflation. The error correction term has the expected sign and falls within the accepted region, but shows a slow adjustment towards equilibrium. Thus, a value of –0.043 implies that about 4.0% of the disequilibrium between the short run and long run is adjusted for within a year.

Table 5.10. Inflation equation regression: dependent variable-inflation

Variable	Baseline GMM		2SLS	
	Coefficient	z-Statistics	Coefficient	z-Statistics
Constant	2.151	0.19	-1.517	0.12
LnM	0.385	2.26**	-0.341	3.61***
LnY	0.408	0.55	-1.906	0.00
LnEX	0.111	3.45***	-0.011	7.09***
LnFIS	1.106	3.46***	0.096	6.23***
LnP^e	+0.08	0.36	-0.012	0.34
ECT(-1)	-0.043	1.03	-0.654	0.41

Significant at 10%; **Significant at 5%;*Significant at 1%*

Source: Author's Calculations using E-views 7.1

5.6.5. The exchange rate equation

Results for the exchange rate equation are presented in Table 5.11. Fiscal stance has a negative relationship with real exchange rate. That is, a 10.0% increase in fiscal stance leads to an exchange rate depreciation of about 2.4%. The implication of this result is that government expansionary fiscal stance leads to more money in circulation which also puts pressure on the foreign exchange market. The pressure on the foreign exchange market is as a result of more money in circulation chasing the limited supply of foreign currency. This finding supports the results of Adam and Bankole, (2000).

Apparently, the real exchange rate responds directly to nominal exchange rate and indirectly to excess supply of domestic credit, the coefficients of both variables are statistically significant. Furthermore, the results show that a nominal depreciation of the domestic currency would cause a depreciation of the real exchange rate. Thus, a 10.0% of the effective nominal exchange rate depreciation would lead to a 2.5% depreciation of the real effective exchange rate.

In addition, an increase in external debt has a depreciating effect on the real exchange rate. A 10.0% increase in external debt has 0.5% depreciation in real exchange rate. The implication of this result is that since external loan is given in foreign currency, for instance, in dollars, it therefore means that for every dollar loan given to Nigeria, there will be some depreciation in the domestic currency. It should be noted, however, that domestic credit is used as a proxy for monetary policy. An increase in domestic credit expands aggregate demand and consequently increases the domestic price level. The increase in domestic price level would result to a decrease in the real exchange rate, which is an appreciation, assuming all things being equal.

Another variable to be considered is the terms of trade. This variable has a positive effect on the real exchange rate, though, insignificant at the conventional level. Specifically, a 10.0% increase in the terms of trade leads to 0.6% depreciation in exchange rate. The positive effect of terms of trade variable represents a depreciation of the real exchange

rate, hence, the result shows that the substitution effect dominates the income effect due to changes in the terms of trade.

Also from the result, the inflation rate variable is significant in the exchange rate model. Meanwhile, the variable is negatively related to exchange rate. Precisely, a 10.0% increase in inflation resulted in 1.5% depreciation in domestic currency. Finally, with a parameter value of – 0.32, the error correction term has the expected signs and shows that exchange rate adjust by 32% towards equilibrium annually.

Table 5.11. Exchange rate equation regression: dependent variable-real exchange rate

Variable	Baseline GMM		2SLS	
	Coefficient	z-Statistics	Coefficient	z-Statistics
Constant	1.043	1.78	0.396	0.17
LnESC	0.691	2.18**	-0.104	0.26
LnTT	0.065	2.28**	-0.068	1.88*
LnEX	-25.985	1.93*	-15.909	1.22
LnFIS	-0.236	1.82*	-3.968	2.61**
LnEd	0.052	0.52*	0.042	0.27
INF	0.147	0.47	-0.104	0.26
ECT(-1)	-0.317	1.74*	-0.301	2.13**

Significant at 10%; **Significant at 5%;*Significant at 1%*

Source: Author's Calculations using E-views 7.1

5.7. Two-Stage Least Square (2SLS): Alternative estimation method for GMM

The robustness of the empirical results using an alternative estimator was discussed. This estimator is the two-stage least square estimator (2SLS). This method allows the correlation of the error terms across equations to be nonzero, so there can be feedbacks between fiscal stance and the other macroeconomic variables. Results from the alternative estimation methods confirm the previous findings and are presented in Tables 5.7–5.11.The results of the robustness analysis confirm the findings of the baseline specification.

A close examination of the estimates indicated that the signs of the coefficients for most of the variables in these two sets of estimates were not significantly different. However, variations in the signs of the variables were apparent. For instance, in the real output and investment equations, trade balance had negative sign when GMM was used in the estimation, but positive in the case of 2SLS. In addition, interest rate had a negative sign for the GMM estimate as opposed to the positive sign for 2SLS in the money supply equation. Likewise, in the exchange rate equation, both the coefficients of the terms of trade and fiscal stance variables were negative using GMM and 2SLS estimates. Finally, in the inflation equation,the coefficient of real output was positive using GMM estimator but negative for the 2SLS estimates.

Despite these differences, the statistical significance of the results were mixed. In some equations, the coefficients of the GMM have higher t-statistics than those of the 2SLS for most of the variables, while in other equations, the GMM recorded higher t-statistics. For instance, in the inflation equation, real output was fund to be significant when 2SLS was used in the estimation, but was insignificant in the case of GMM. Nonetheless, it is worth noting that there was very little difference in the signs and significance of the coefficients for most of the variables in the stochastic equations despite the use of the two different estimation techniques.

It can be concluded that fiscal stance is not beneficial for economic growth in Nigeria. The main channel through which fiscal stance affects growth remains gross investment.

Inflation has a negative effect on growth, besides the indirect effect through expansionary fiscal stance.

5.8. The SVAR model estimation and interpretation of results

In this section, the identification of the SVAR model is first established. A common approach in the literature is to apply identification restrictions that are consistent with economic theory and prior empirical research findings (see Christiano et al, 2007, Dungey and Fry, 2003 and Dungey and Pagan, 2000)[16]. In this study, to establish the identification conditions, the SVAR studies of advanced small open economies were used as a guide to obtain the appropriate restrictions to be imposed on the contemporaneous and the lagged structure of the SVAR model to examine the impact of fiscal impulse on Nigeria's macroeconomic outcomes.

The parameters of the SVAR were estimated in two stages. In the first stage, the restrictions given below were imposed on the residuals of reduced-form VAR that were obtained. As for the number of lags in the model, the standard information criteria of Akaike (AIC) and Hannan-Quinn (HQC) chose an optimal lag length of two, while Schwarz (SC) suggested lag length one for the sample period. However, the lag length identified by the information criteria is found to be inadequate to capture the underlying dynamics of the system as it is not sufficiently long to eliminate the autocorrelations present in the residual series.

Subsequently, the LM-test for residual autocorrelation was carried out (not reported here), and this test identified the lag length of four for the period under study. Hence, a common VAR (5) is used in this analysis. In the second stage, the contemporaneous matrix 0 A defined is identified using the sets of restrictions shown in Appendix 2.

[16] Alternative to this approach is to impose restrictions based on fully specified macroeconomic model. (Bernanke (1986), Sims (1986) and Blanchard and Watson (1986)).

Without imposing a number of restrictions, the SVAR cannot be identified both in the short run and the long run. Thus, to identify the underlying structural model, restrictions are made based on economic theory. For instance, the identification of the real sector (INF and LnRGDP) is obtained by assuming that monetary sector variable (LnMS) only affect the real sector even with lags. In addition, the real sector variables have no effect in identification of shocks in the monetary sector.

It is further assumed that the nominal exchange rate does not affect real GDP, while real GDP does not affect inflation contemporaneously. Both nominal and real variables have no contemporaneously effect on fiscal impulse. Thus, in identifying the short-run model, two over identifying restrictions are imposed. Table 5.12 shows the identifying restrictions of the short run model.

Apart from identification of structural shocks by the short-run parameter restrictions, there is an alternative approach of imposing restrictions on the long-run parameters for the structural disturbances. The technique of long run SVAR analysis introduced by Blanchard and Watson (1986); Blanchard and Quah (1989) based on the hypothesis that the long-run effect of particular shocks on a particular variable is restricted. The identifying restrictions for the long run model are displayed in Table 5.13. It is assumed that fiscal impulse and money supply influence real GDP, in addition, exchange rate shocks affect both real and monetary variables in the long run. Steady prices are good for long run macroeconomic stability and thus economic growth. Hence, the long run model is exactly identified.

Table 5.12. Contemporaneous restrictions

Variable	FI	LnMS	INF	LnRGDP	EXR
FI	1	0	0	0	0
LnMS	B21	1	B23	0	0
INF	B31	B32	1	0	0
LnRGDP	B41	B42	B43	1	0
EXR	B51	B52	B53	B54	1

Source: Computed by the author

Table 5.13. Long-run restrictions

Variable	FI	LnMS	INF	LnRGDP	EXR
FI	C11	0	0	0	0
LnMS	C21	C22	0	0	0
INF	C31	C32	C33	0	0
LnRGDP	C41	C42	C43	C44	0
EXR	C51	C52	C53	C54	C55

Source: Computed by the author

5.8.1. Analysis of the contemporaneous model

Following Sims and Zha (2002), the estimation procedure for short run parameters, a limited time-variation in the coefficients of the model, is used in order to observe changes in fiscal stance (fiscal impulse) and macroeconomic indicators. Table 5.14 provides the results of the contemporaneous model identified by applying some economic theory-based restrictions. It is worth mentioning that the likelihood ratio test statistic for null hypothesis of over-identifying restrictions does not reject the restrictions, implying that they are statistically valid.

From Table 5.14, the coefficient in the money supply specification with the fiscal impulse has a positive impact on money supply in the short-run. In the inflation rate equation, the coefficients have varied signs with the fiscal impulse expected to have a negative impact on inflation in the short-run, while the money supply is expected to positively affect inflation. In the real GDP equation, the coefficient on fiscal impulse is positive, and negative in the inflation specification. This implies that shocks to fiscal stance increase both inflation and real output. In general, the parameter estimates of this structural model are consistent with economic theory. The coefficients of exchange rate specification have heterogeneous signs as the results show that fiscal impulse, money supply, and inflation have negative effect on nominal exchange rate, while the real GDP exerted a positive effect on exchange rate.

Table 5.14. Estimated coefficients of contemporaneous variables

	Coefficient	Z-Statistic	Prob.
C(2)	0.0479	0.3562	0.8217
C(4)	-0.0043	-0.4029	0.7945
C(5)	0.0076	0.9865	0.4721
C(7)	0.0049	0.5601	0.4318
C(8)	0.0623	0.4192	0.7328
C(9)	-0.0275	-0.5656	0.6947
C(11)	-0.7624	-0.4673	0.5630
C(12)	-0.0081	-0.5601	0.6138
C(13)	-0.6813	-0.3628	0.6459
C(14)	0.7690	0.5373	0.6812
C(1)	0.0058	8.0000	0.0000
C(3)	0.0593	8.0000	0.0000
C(6)	0.0435	8.0000	0.0000
C(10)	0.0016	8.0000	0.0000
C(15)	0.0725	8.0000	0.0000
Log likelihood	2854.3901		
Chi-square	0.6823		
Probability	0.7143		

Source: Author's computation, using E-views 7.1

5.8.2. Long-run structural model

The long-run SVAR model estimation shows the permanent effect of money supply, inflation rate, real GDP and exchange rate on fiscal impulse. The results of the long run structural model are provided in Table 5.15. Each parameter in the exchange rate function is statistically significant and has signs predicted by theory. Fiscal impulse, money supply and inflation have a negative permanent effect on exchange rate. However, the departure from this effect is expected to come from real GDP, since it has the highest parameter coefficients. With respect to real GDP specification, the results seem to support the classical dichotomy hypothesis showing a weak link between money supply and output. In inflation specification, the coefficient shows a negative effect with fiscal impulse and money supply. However, in the money supply function, there is a positive relationship between fiscal impulse and money supply. This supports the economic theory that fiscal policy and monetary policy tools work in tandem in Nigeria.

Table 5.15. Estimated coefficients of long run variables

	Coefficient	Z-Statistic	Prob.
C(1)	0.02156	14.7521	0.0000
C(2)	0.03275	4.0786	0.0003
C(3)	-0.8675	-6.8321	0.0000
C(4)	-0.0053	-9.2740	0.0000
C(5)	-0.0064	-3.9786	0.0015
C(6)	0.0428	14.7521	0.0000
C(7)	0.0031	0.8564	0.7040
C(8)	-0.0007	-0.5397	0.4471
C(9)	0.0092	1.7904	0.0643
C(10)	0.0635	14.7521	0.0000
C(11)	-0.0324	-12.0674	0.0000
C(12)	-0.0028	-8.0956	0.0000
C(13)	-0.0067	-14.7521	0.0005
C(14)	0.7036	2.7806	0.0008
C(15)	0.0164	14.7521	0.0000
Log likelihood	2854.7261		

Source: Author's computation, using E-views 7.1

5.8.3. Impulse Response Function (IRF) analysis

A selection of key impulse response functions of the dependent variable to independent (one standard deviation) shocks is discussed in this section. Since the estimated structural shocks are assumed to have unit root variances in the structural VAR, their sizes and speed of adjustment can be inferred by analysing the associated impulse response functions. The sizes of the shocks are measured by the standard deviations of the corresponding orthogonal errors obtained from the SVAR model.

Figures 5.1a and 5.1b display the response of the endogenous variables to a positive shock from fiscal impulse[17]. The Impulse response functions (IRFs) is derived and used to examine the dynamic responses of the variables to various shocks within the SVAR system. For a covariance stationary VAR, the effect of any shock given by V_t (the reduced form innovations) dies out as some point in time in the future, which is apparent in Figures 5.1a, b. The SVAR approach assumes that the structural innovations ε_t are orthogonal, that is, the structural disturbances are uncorrelated. As the structural innovations are orthogonal, the covariance between the shocks is restricted to zero.

The effects of fiscal impulse on macroeconomic variables, especially on the target variables of real GDP, Inflation rate, money supply and exchange rate were captured more effectively by calculating the initial impulse response functions. Following Dedola and Neri (2006) and Uhlig (2005), the confidence bands are reported at the 95% confidence levels. The middle lines in Figure 5.1a represent the impulse responses. The confidence bands are reported as dotted lines. When the horizontal line falls into the confidence interval, then, the null hypothesis that there is no effect of fiscal impulse on the target macroeconomic variables cannot be rejected. Thus, including the horizontal line for the particular time period obtained in this manner is interpreted as evidence of statistical insignificance.

[17] The results of the accumulated responses are shown at the appendix Figure 5.1.(b)

Considering the test results of the IRF in Figure 5.1a, it is discerned that one standard deviation in fiscal impulse has statistically significant, contemporaneous, and positive effects on itself (4.43). The significant and positive effects persist, it becomes insignificant after the second quarter. It oscillates in between the fourth and tenth quarter with an average response of 2.18.

The response of money supply to the shock from fiscal impulse in the first period was positive (0.002) but not significant, and the effect dies off after the fourth quarter. As regards the response of inflation rate to the shock from fiscal impulse, the effect is also positive and significant contemporaneously (8.5), it falls and becomes negative in the second, third, and fourth quarter, the value stood at -0.51, -0.62, and -0.67 respectively. Expectedly, however, the response becomes positive but insignificant (1.50) at the fifth period. Nonetheless, towards the ninth and tenth quarters, the response tails off.

The real GDP response to the shock from fiscal impulse, although positive, which may be due to the parallel increase in government expenditure, is largely non-significant in the first period after the shock. However, the response becomes negative after the third quarter and dwindled at the fourth quarter which lingered till the tenth period. Finally, exchange rate was insignificant though yields positive and persistent effect in the first three periods after the shock, it becomes negative after the fourth period. The fifth and sixth periods show positive responses (3.4 and 3.2) respectively. Admittedly, however, the seventh quarter becomes negative. At the ninth period, the response was infinitesimal, but positive and eventually becomes nil at the tenth quarter.

With the exception of fiscal impulse and inflation shocks, which are notably different from the other responses, the sizes of the rest of the orthogonal shocks in the SVAR system appear to be similar. The dynamic impulse responses of money supply, inflation, real output, and exchange rate with respect to the identified shocks are consistent with the results of variance decomposition analysis presented hereafter.

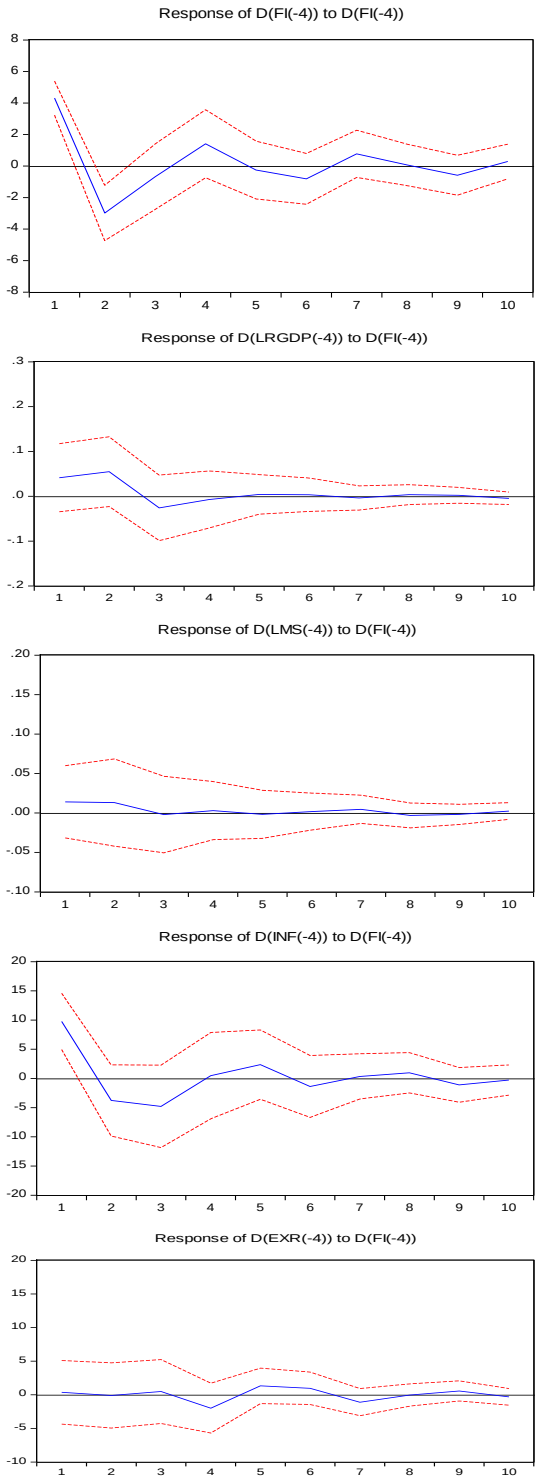

Figure 5.1(a). Impulse Response Functions: Response of endogenous variables to shock from fiscal impulse

5.8.4. Empirical results of variance decompositions

This section presents the results of the forecast error variance decomposition. The interactions between the variables over the impulse response horizon were examined. Tables 5.16-5.20 report the proportion of the variations of the five variables, explained by other variables in the SVAR model. The variance decomposition of the first- ten periods horizon into the future are reported. Since SVAR assumes recursivity, variance decomposition depends on the ordering. Tables 5.16-5.20 correspond to the following ordering of equations: *FI, LnMS, INF, LnRGDP, and EXR.*

5.8.4.1. Variance decomposition of fiscal impulse (FI)

The fiscal impulse variance decomposition analysis in table 5.16 reveals that in the first period, all the variations in fiscal impulse is explained by own shock (this account for 100 per cent). The implication of this is that a variation in fiscal impulse is hardly affected by other variables in the first period. Furthermore, the contributions of other variables remain insignificant throughout the ten periods. It is striking in the result that the variation in fiscal impulse contributed by*LnMS, INF, LnRGDP and EXR* though marginal but follows an increasing trend.

Table 5.16. Variance decomposition of fiscal impulse (FI)

Period	S.E	D(FI(-4))	D(LMS(-4))	D(INF(-4))	D(LRGDP(-4))	D(EXR(-4))
1	0.38	100.00	0.00	0.00	0.00	0.00
2	0.62	99.48	0.07	0.05	0.31	0.10
3	0.75	98.55	0.33	0.12	0.71	0.29
4	0.81	97.55	0.85	0.16	0.94	0.49
5	0.82	96.68	1.58	0.16	0.97	0.61
6	0.83	95.91	2.29	0.18	0.98	0.64
7	0.83	95.10	2.79	0.29	1.18	0.63
8	0.84	94.15	3.01	0.55	1.16	0.66
9	0.85	93.12	3.06	0.90	2.16	0.75
10	0.86	92.13	3.02	1.29	2.68	0.88

Source: Author's calculation, using E-views 7.1

5.8.4.2. Variance decomposition of log of money supply (LnMS)

It is obvious in table 5.17 that the forecast-error variance explained by own innovation (LnMS) in the first year is about 99.9 percent. The remaining variation in LnMS is accounted for by FI with about 0.07 per cent. The variation in LnMS that is attributed to its own shock dampened over time. From the second quarter, most of the variations come from real GDP. From period three to the last period, however, negligible amount of variation in money supply originate from fiscal impulse, inflation and exchange rate, which averaged 0.27, 0.29 and 2.94 per cent respectively.

Table 5.17. Variance decomposition of log of money supply (LnMS)

Period	S.E	D(FI(-4))	D(LMS(-4))	D(INF(-4))	D(LRGDP(-4))	D(EXR(-4))
1	0.14	0.07	99.96	0.00	0.00	0.00
2	0.16	0.18	87.36	0.07	10.34	2.05
3	0.16	0.23	86.41	0.18	11.05	2.13
4	0.16	0.26	85.61	0.17	11.02	2.92
5	0.16	0.27	85.38	0.22	11.21	2.92
6	0.16	0.27	85.26	0.32	11.20	2.94
7	0.16	0.29	85.24	0.33	11.19	2.95
8	0.16	0.32	85.21	0.33	11.18	2.96
9	0.16	0.31	85.20	0.33	11.17	2.95
10	0.16	0.32	85.19	0.34	11.16	2.95

Source: Author's calculation, using E-views 7.1

5.8.4.3. Variance decomposition of inflation rate (INF)

Looking at the variance decomposition of inflation rate in Table 5.18, it is apparent that half of the variation experienced by inflation rate is attributed to its own shock (50.9 percent) in the first period. However, the remaining 49.1 percent variation is explained by fiscal impulse. Nonetheless, the contribution of fiscal impulse follows a decreasing trend and stood at 20.57 percent in period ten. Meanwhile, LnRGDP, LnMS and EXR do not contribute anything in the first period to the innovation. The contribution of inflation to its own shock in the remaining nine periods follows an increasing order. LnRGDP, LnMS and EXR contribute 0.35%, 0.51% and 0.05%, respectively to the variation in inflation rate in period two. The contribution of both LnRGDP and LnMS to the shock in inflation rate averaged 0.85 and 8.79 percent respectively for the remaining periods. Innovation from EXR between periods two and ten fluctuated throughout the periods, its maximum contributions is observed in the tenth year (0.20 percent). The effect of exchange rate to the variation in inflation tracked 0.05 percent and reaches its nadir in the second period.

Table 5.18. Variance decomposition of inflation rate (INF)

Period	S.E	D(FI(-4))	D(LMS(-4))	D(INF(-4))	D(LRGDP(-4))	D(EXR(-4))
1	1.12	49.11	0.00	50.88	0.00	0.00
2	1.99	43.86	0.51	55.22	0.35	0.05
3	2.69	38.39	1.76	58.97	0.76	0.12
4	3.22	33.38	3.62	61.89	0.95	0.17
5	3.60	29.16	5.87	63.82	0.95	0.19
6	3.88	25.97	8.24	64.75	0.85	0.18
7	4.07	23.71	10.51	64.83	0.77	0.17
8	4.21	22.18	12.51	64.33	0.81	0.16
9	4.31	21.19	14.17	63.47	0.97	0.17
10	4.38	20.57	15.45	62.55	1.23	0.20

Source: Author's calculation, using E-views 7.1

5.8.4.4. Variance decomposition of log of RGDP (LnRGDP)

Table 5.19 shows the innovations to the LnRGDP. The variance to the variable is significantly explained by own variation, which accounts for about 94.5 per cent in the first period, the contribution records a declining trend which stood at 95.3, 92.6, 86.2 and 81.3 per cents in the second, fifth, eighth and tenth periods respectively. However, the contribution of LnMS to the variation in LnRGDP is 0 per cent in the first quarter, this becomes increasingly significant throughout the remaining periods. The peak of its contribution was observed in the tenth quarter which stood at 9.61 per cent. The contribution of fiscal impulse averaged 1.46 percent over the periods. The effect of Exchange rate is insignificant and therefore might not be expected to have some impact on the variations in real GDP. However, this submission is at variance with the empirical result of Berument et al., (2003) on the impact of real GDP, terms of trade and real exchange rate which is direct and significant.

Table 5.19. Variance decomposition of log of RGDP (LnRGDP)

Period	S.E	D(FI(-4))	D(LNMS(-4))	D(INF(-4))	D(LRGDP(-4))	D(EXR(-4))
1	0.01	2.37	0.00	3.15	94.48	0.00
2	0.02	1.32	0.26	3.09	95.32	0.01
3	0.03	0.69	0.81	3.24	95.25	0.01
4	0.03	0.61	1.60	3.52	94.26	0.00
5	0.04	0.89	2.60	3.87	92.61	0.02
6	0.05	1.27	3.77	4.26	90.62	0.08
7	0.06	1.56	5.08	4.64	88.47	0.25
8	0.06	1.69	6.51	4.50	86.23	0.56
9	0.06	1.69	8.04	5.31	83.87	1.09
10	0.07	1.61	9.61	5.56	81.32	1.90

Source: Author's calculation, using E-views 7.1

5.8.4.5. Variance decomposition of exchange rate (EXR)

Variance decomposition of exchange rate in Table 5.20 shows that apart from its own variation which amount to about 55 percent in the first period. The largest source of variations among the other variables comes from inflation which contributes about 36 percent to exchange rate variation in the first quarter. The contribution of inflation decreases to about 33.0 percent in the second period, the diminution continues until it reaches 29.0 percent in the tenth quarter. The contribution of money supply follows that of inflation rate in terms of magnitude which accounts for about 6.7 percent in the first period, declining to 2.5 percent in the fifth period, the minimum value stood at 1.56 percent and is recorded in the tenth period. The contribution of LnRGDP to exchange rate variation is about 0.17 percent in period one, rising gradually to an average of 0.48 percent over the remaining nine periods. It can be deduced from the analysis of Table 5.20 that inflation is the major variable that significantly affects exchange rate fluctuation in Nigeria. This result is compatible with the empirical evidence of bidirectional causality between exchange rate and inflation by Estrada et al., (2004).

Table 5.20. Variance decomposition of exchange rate (EXR)

Period	S.E	D(FI(-4))	D(LMS(-4))	D(INF(-4))	D(LRGDP(-4))	D(EXR(-4))
1	0.43	1.72	6.72	36.32	0.17	55.06
2	0.81	0.76	5.30	32.95	0.23	60.75
3	1.18	0.36	4.11	30.84	0.30	64.40
4	1.56	0.39	3.19	29.55	0.35	66.51
5	1.93	0.65	2.54	28.84	0.38	67.58
6	2.31	0.96	2.09	28.52	0.41	68.01
7	2.68	1.22	1.80	28.46	0.44	68.08
8	3.05	1.40	1.62	28.55	0.47	67.96
9	3.43	1.51	1.54	28.72	0.51	67.71
10	3.80	1.56	1.53	28.95	0.55	67.40

Source: Author's calculation, using E-views 7.1

5.9. Robustness analysis of SVAR results

This sub-section examines the robustness of the main results. In order to validate the SVAR specification, there is need to discuss a set of estimates that were performed for the robustness of the inferences. A five-variate SVAR set up might be too much to ask from the data as its time span is too short for Nigeria. Therefore, the model could be considered as over-parameterised. With the intention of accounting for this, the VAR is re-estimated under a number of alternative settings. First is the reduction of the lag length of the SVAR specification from four lags to two lags. Second, we consider a two-variable set up that was sub-divided into real sector and monetary sector. For the third specification, it was assumed that oil price captures the real exogenoeus influence stemming from global macroeconomic developments which follows its own dynamics as in the SVAR specification. The results of the robustness analyses are shown in Figures 5.2 to 5.4.

Based on the impulse responses of the robustness tests, the response of the real gross domestic product (RGDP) to the shock from fiscal impulse is shown in Figure 5.2. The magnitudes of the first and second periods were -0.007 and -0.0085 respectively. The implication of this result is that, there is no positive response to fiscal impulse from real GDP in the first- two periods. The value became positive, though not significant after the third period. This continues till the eighth period, the average value of the impulse was 0.002. However, the values dwindled and reached zero at the ninth and tenth periods. Intuitively, shocks emanating from fiscal stance do not have any positive effect on real GDP in Nigeria.

By comparing the benchmark analysis with the robustness test of the response of RGDP to fiscal impulse, it can be established that the first-two periods of the benchmark analysis and robustness analysis were at variance. The magnitude was positive in the benchmark analysis and negative in the robustness analysis. Nevertheless, the two analyses recorded non significant values in these periods. The responses of RGDP to the shock from fiscal impulse in the remaining periods of both analyses were positive and therefore gave similar results.

The analysis of the next robustness test is represented in Figure 5.3, that is, the response of money supply to fiscal impulse. The responses to the shock in the first-two periods are positive but insignificant (0.0008 and 0.0006 respectively). When these values are compared with the benchmark analysis, the results of both tests were analogous. The response of money supply to fiscal impulse became negative from the third period to the eight periods which averaged -0.0009. This response dies off after the ninth period.

The third robustness specification is the response of oil price to the shock from fiscal impulse. This is shown in Figure 5.4. Oil price is measured by using world oil prices in US dollars. Oil price is used in order to capture the influence of the real exogenous variable stemming from global macroeconomic developments on fiscal impulse. It is observed that negative responses occurred in the first and second periods which stood at -0.97 and -0.78 respectively. The values became positive after the third period and this continues till the tenth period. Intuitively, a shock from fiscal stance has a statistically significant effect on oil supply which has the tendency to increase or decrease both oil production and world oil prices.

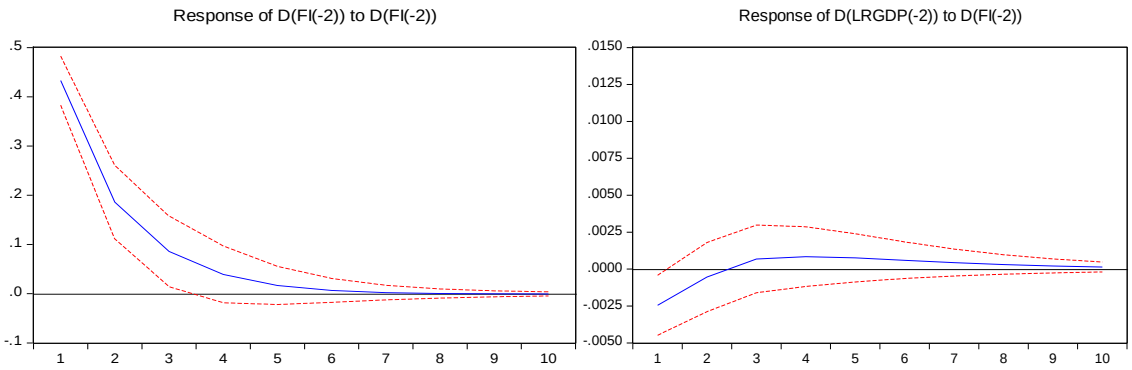

Figure 5.2. Robustness analysis of fiscal impulse and real GDP

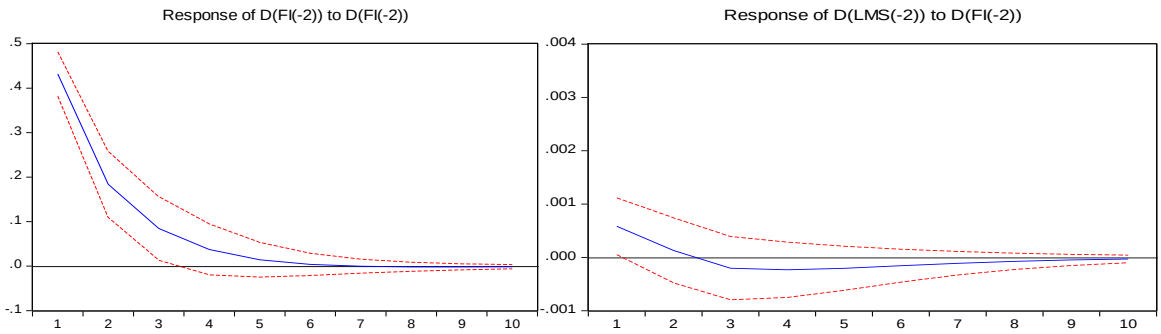

Figure 5.3. Robustness analysis of fiscal impulse and money supply

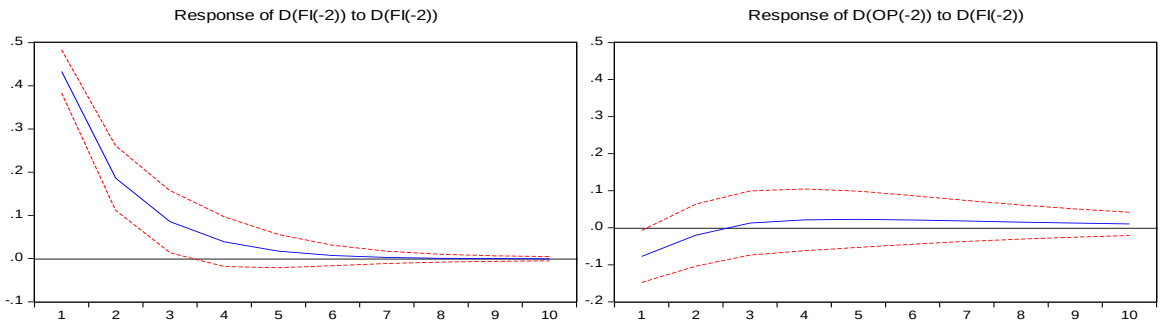

Figure 5.4. Robustness analysis of fiscal impulse and oil price

CHAPTER SIX

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

6.1. Introduction

This chapter delineates the summary of the key findings and conclusions. The lessons for policy are also drawn. These are followed by an agenda for future research. The findings summarized here are those emanating from the estimation results of the macro-econometric and structural vector autoregressive (SVAR) models. Section 6.2 highlights the summary findings on the relationship between fiscal stance and macroeconomic indicators in Nigeria. The baseline results using a generalized method of moment (GMM) technique were compared with the robustness analysis of two-stage-least square (2SLS) technique. Findings of the impact of fiscal impulse on macroeconomic aggregates were summarized. The comparisons of the robustness analysis with the baseline analysis of SVAR were also encapsulated. Appropriate Policy Implications of Findings and recommendations were made. This is done in section 6.3. Section 6.4 highlights the limitations of the study, while section 6.5 brings to light some suggestions for future research. Finally, in section 6.6, the chapter ends with general conclusions for the entire study.

6.2. Summary of findings

The first objective of this study sought to establish the impact of fiscal stance on macroeconomic and policy aggregates like real GDP, inflation rate, investment, money supply, and exchange rate in Nigeria from 1970 to 2008. A small open macro-econometric model that captures the salient channels of fiscal policy transmission in Nigeria was developed. The model was organized into five blocks, namely, the output block, the investment block, the inflation block, the money supply block, and the exchange rate block. The model has linkages within and across blocks, and hence has the advantage of evaluating the direct and indirect effects of fiscal policy stance on real output, investment, money supply, inflation and exchange rate. In spite of its simplicity, the model captures

the essential dynamics of the Nigerian economy and hence transmission mechanism of fiscal policy stance.

Stationarity and cointegration tests were performed on the variables and short-run error correction mechanism of the stochastic equations were then estimated. Given that the model consists of a system of simultaneous equations, in which some right hand side variables of the model were correlated with the error term, the generalised method of moment (GMM) estimation technique was used on annual data to estimate the parameters. Tests statistics showed that the data set were normally distributed and the model was internally consistent and can be relied upon for policy formulation.

Some key findings are discernible. It was apparent from the results that fiscal stance has a positive relationship with output growth. However, its influence on output growth was not statistically significant in Nigeria. Also, gross investment was positively driven by fiscal stance. This result confirms the relevance of the theory that a country's fiscal stance in periods of economic depression can lead to higher private investment, because it leads to higher government spending and output growth. Furthermore, it was found that expansionary fiscal stance would lead to increased money supply in Nigeria. This result was not surprising since Nigerian government usually finances its huge fiscal deficit (expansionary fiscal stance) by borrowing from the central bank (money creation). This result is consistent with the basic multiplier approach to money supply determination. Another important result was that fiscal stance was found to be a significant determinant of inflation in Nigeria.

However, the relationship between fiscal stance and exchange rate was negative. This implies that government expansionary fiscal stance leads to more money in circulation which puts pressure on the foreign exchange market. Suppose there is an increase in money supply, while the quantity of goods and services that are subject to transactions is considered invariable, the issuing of money in order to finance budget deficit (expansionary fiscal stance) has in the fore-ground as a result an increasing level of prices and subsequently leads to a depreciation of the exchange rate.

The results from the alternative estimation technique (2SLS) confirm the findings from the baseline specification (GMM). It is insightful to know that the signs of the coefficients for most of the variables in these two estimates were not significantly different. Another important insight from the analysis was that reduction in fiscal stance through a decrease in government expenditure significantly reduces money growth, inflation and real output. The results posit that the financing of government fiscal policy through an expansionary fiscal stance drives money growth, inflation and output in Nigeria.

Fiscal policy is expansionary (contractionary) when the change in fiscal stance is negative (positive). To assess whether fiscal policy is countercyclical (procyclical), the link between changes in the real output, inflation, money supply, exchange rate and the change in fiscal stance (fiscal impulse) were also examined.

To address the objective of establishing the effects of a change in fiscal stance (fiscal impulse) on macroeconomic outcomes using a five-variate SVAR, involving fiscal impulse,money supply, inflation, real GDP and exchange rate on quarterly data between 1970 and 2008. The contemporaneous version of these five-variate SVAR model restrictions was used as a requirement for over identification, however, the long run type was utilized for exact identification. The Impulse response function (IRFs) and variance decompositions (VDCs) were also employed to examine the dynamic responses of the variables to various shocks within the SVAR system.

In the impulse response function (IRFs), one standard deviation in fiscal impulse has statistically significant and positive effects on itself and on inflation. The fiscal impulse does not impose statistically significant effects on money supply, real GDP and exchange rate. The results of the variance decompositions (VDCs) test indicate that innovations in the variables were mostly explained by their own shocks, except inflation rate which is explained strongly by fiscal impulse (about 49 percent). It can also be deduced from the analysis of SVAR that both IRFs and VDCs gave similar outcome. That is, the impulse responses of money supply, inflation, real output, and exchange rate with respect to the

identified shocks (innovations) were consistent with the results of variance decomposition analysis.

In order to substantiate the results of the SVAR specifications, a set of estimates were performed for the robustness of the inferences. Since a five-variate SVAR set up might be too much to ask from the data as its time span might be too short for Nigeria. The model could therefore be considered as an over-parameterised. With the intention of accounting for this, the VAR was re-estimated under a number of alternative settings. First, is the reduction of the lag length of the SVAR specification from four lags to two lags. Second, a two-variable set up that was sub-divided into real sector and monetary sector was considered. For the third specification, oil price was also assumed to capture the real exogenoeus influence stemming from global macroeconomic developments which follows its own dynamics as in the SVAR specification.

The results of the robustness tests showed that the magnitudes of the first and second periods were negative. The implication of this result is that, there is no positive response to fiscal impulse from real GDP in the first- two periods. However,the responses of money supply to the shock from fiscal stance in the first-two periods were positive but insignificant. Shock from fiscal stance has an indirect statistically significant effect on oil price through an increased oil supply.

The responses of RGDP and money supply to the shock from fiscal impulse in both baseline and robustness analyses gave similar results. However, a shock from fiscal impulse has a statistically significant effect on oil supply in Nigeria which has the tendency to increase or decrease both world oil production and world oil prices. Finally, the results of the robustness test show that the main conclusions of the baseline SVAR analyses remain valid.

6.3. Policy implications of findings

The findings of this enquiry have important policy lessons. In this study, a standardized and simple approach to a "sustainable fiscal benchmark" to measure the fiscal policy position in Nigeria is used. The fiscal stance (as measured by the cyclically-adjusted fiscal balance) fairly assesses the actual experiences as the evidence has indicated. The government's fiscal stance should be based on cyclically standardized budget balances rather than the conventional budget deficit approach. In countries like Nigeria, where public spending occupies a larger share of the economy, increase in spending will almost by definition increase the cyclical component of output, and this may well produce financing pressures in addition to cyclical pressures.

The prominence of the investment channel was apparent as the main route through which fiscal stance influenced the real sector. In consequence, the government should improve the investment space of the economy by restructuring and scrutinizing its expenditure profile so as to enhance growth and promote an enabling environment for both private and public sector development. Besides, a suitable and enabling macroeconomic environment is needed to increase private sector capital spending. Therefore, redirecting public spending towards infrastructure would have a favourable impact on private sector investment in order to ease supply bottlenecks in the economy.

Also, since it is clear from the analysis that expansionary fiscal stance is ineffective in Nigeria, it is imperative that the government cuts down its expenditures, especially on activities that have no direct positive impact on output growth. It is further recommended that government should provide sufficient funds for infrastructure operations and maintenance. This will enhance and promote increased productive capacity. Consequently, output growth will be enhanced. Also, tilting the overall composition of public expenditure toward more productive uses is particularly important for boosting growth.

A strong connection between fiscal and monetary policies was reported. Financing of government budget deficit through borrowing from theCentralBank of Nigeria (CBN) was inflationary and greatly impedes the objective of monetary policy. Thus, the objectives of

monetary policy should be in consonance with that of fiscal policy in order to achieve macroeconomic stability consistent with low inflation and sustainable growth. In this regard, there should be a framework for effective co-ordination of fiscal and monetary policy.

The Nigerian government can come up with selective monetary and fiscal policies to increase the benefits derivable from export earnings. For instance, money supply and government spending could be so designed as not to be tied to export earning fluctuations, and surpluses could be accumulated during the periods of an export boom in preparation for the inevitable occurrence of a shortfall in output.

The result also reveals an important lesson for policy makers. There is need for a sustained reduction in the fiscal stance of Nigeria as this helps in achieving reduction in money supply and low price level, which has real exchange rate appreciation and improvement in the balance of payments as ultimate external sector benefits. This requires sound fiscal policy from the point of view of both revenue generation and expenditure.

Based on this empirical analysis, appropriate policies can then be drawn given insight to how fiscal stance can perform its roles without necessarily leading to inflation. In order to achieve high and sustained long-run economic growth when fiscal stance is used as fiscal policy instrument, then, monetary policy, industrial policy and commercial policy must be strengthened to act as checks and balances in Nigeria.

Relevant measures to enhance policy coordination among various arms of government should be put in place. Most especially, monetarypolicy should be made to complement fiscal policy measures. Also fiscal discipline should be strongly adhered to at every level of government. Since inflation has been established as monetary phenomenon in Nigeria, for fiscal stance to beeffective, some fundamental changes in the productive base of the economy need be made.

There is need for policy cohesion and coordination on fiscal stance and macroeconomic aggregates in Nigeria. Lastly, sound monetary, exchange rate and macroeconomic policies that will help manage shocks emanating from both internal and external sectors which influence fiscal stance in Nigeria is required.

6.4. Limitations of the study

The macro-econometric model provided a reasonable framework within which the effects of fiscal stance on macroeconomic performance are examined. However, the interactions between these variables and fiscal stance were not adequately captured due to various techniques used in the literature to compute fiscal stance which are some times mechanical and difficult to apply to developing countries.Also, the total effects (direct and indirect) decomposition of the endogenous variables on the other dependent variables in the system are not included in the analysis. This total effect is used to determine the contribution of each variable to the change in the dependent variable. Following the path of each effect allows identification of the channels through which fiscal policy stance affects growth.

Another major caveat arising from the use of SVAR technique is that, caution should be taken when VAR techniques are employed as a forecasting tool in economic analysis especially in the short-run. In this respect, our results, mainly those stemming from real and monetary sectors, are broadly consistent with a standard Keynesian view of the functioning of the economy. However, their accuracy declines at longer horizons. Therefore, the conclusions obtained regarding the long-term responses to fiscal impulse, in general have to be interpreted with caution. Furthermore, dynamic responses are used to describe the impact of fiscal policy variable (fiscal impulse) on macroeconomic and policy variables. When computing these responses, the response of macroeconomic quantities to fiscal policy is usually obtained without decomposing fiscal policy into its endogenous and exogenous components.

6.5. Agenda for future research

The methods used in this study have the advantage of allowing for further developments in the future. They could include: (a) the analysis of the impact of fluctuations in relative prices on government finances and (b) a more refined assessment of the impact of the business cycle on expenditure and revenue items that are currently not cyclically adjusted, such as government consumption, public investment, interest payments, subsidies and pensions. In addition, efforts could be devoted to find a more satisfactory instrument to assess the cyclical position of the economy. Further work could also be done with respect to the harmonisation of the data used, to develop the econometric estimation of fiscal elasticities. Furthermore, there is room for future research. The model is highly aggregated. Thus, a study involving fairly disaggregated model would be desirable for future research. Finally, additional research is needed to further disentangle the transmission channels through which fiscal policy stance affects macroeconomic growth. For instance, external sector channel can be disentangled into exchange rate block, import demand function, export supply function and trade balance, while monetary sector can be unraveled into money supply, money demand and private sector credit equations.

6.6. Conclusions

This study examined the economic effects of fiscal stance in Nigeria by using a small macro-econometric model and SVAR methodology. The cyclically adjusted budget balance is used in this study which is adjudged as the appropriate measure of the fiscal stance in an oil-based economy.The overall fiscal balance is a widely used indicator to assess the government's net financing need—or accumulation of net financial assets—and its fiscal vulnerability. When there is a high degree of correlation between oil prices and the headline fiscal balance, as it is the case in Nigeria, the volatility of oil prices creates a misleading picture of the underlying fiscal position and possible structural imbalances. Therefore, the primary budget balance, provides a better indication of the Nigeria's underlying fiscal stance. Furthermore,since the actual fiscal balance reflects cyclical—or temporary—effects on the government budget, as well as structural—or permanent—influences, it is important to refine the measurement of the fiscal position further by constructing a cyclically adjusted budget balance as a percentage of non-oil potential

GDP, which reflects revenues and expenditures adjusted for the impact of the economic cycle.

The cyclical adjustment of budget balances is a useful tool for assessing fiscal policies in both developed and developing countries. The method used in this study has some advantages when compared with the other approaches. In particular, it accounts for composition effects stemming from unbalanced growth. Moreover, it is based on a more precise selection of the budget items to be cyclically adjusted and treats individual government revenue and expenditure items in a more consistent way. Lastly, the models used demonstrated good forecasting capacity and versatile potential for policy simulations, economic planning and debt sustainability analysis.

Fiscal stance as a measure of fiscal policy depreciated the exchange rate and improved the real GDP growth and investment, and raised money supply in Nigeria. The prominence of investment was the main route through which fiscal stance influenced the real sector of the economy. Fiscal stance seems to be inflationary and reliance on financial market for government financing would lead to increases in interest rate, which may lead to an increase in loan supply and banks may cut back credit supply due to adverse selection and moral hazards problems.

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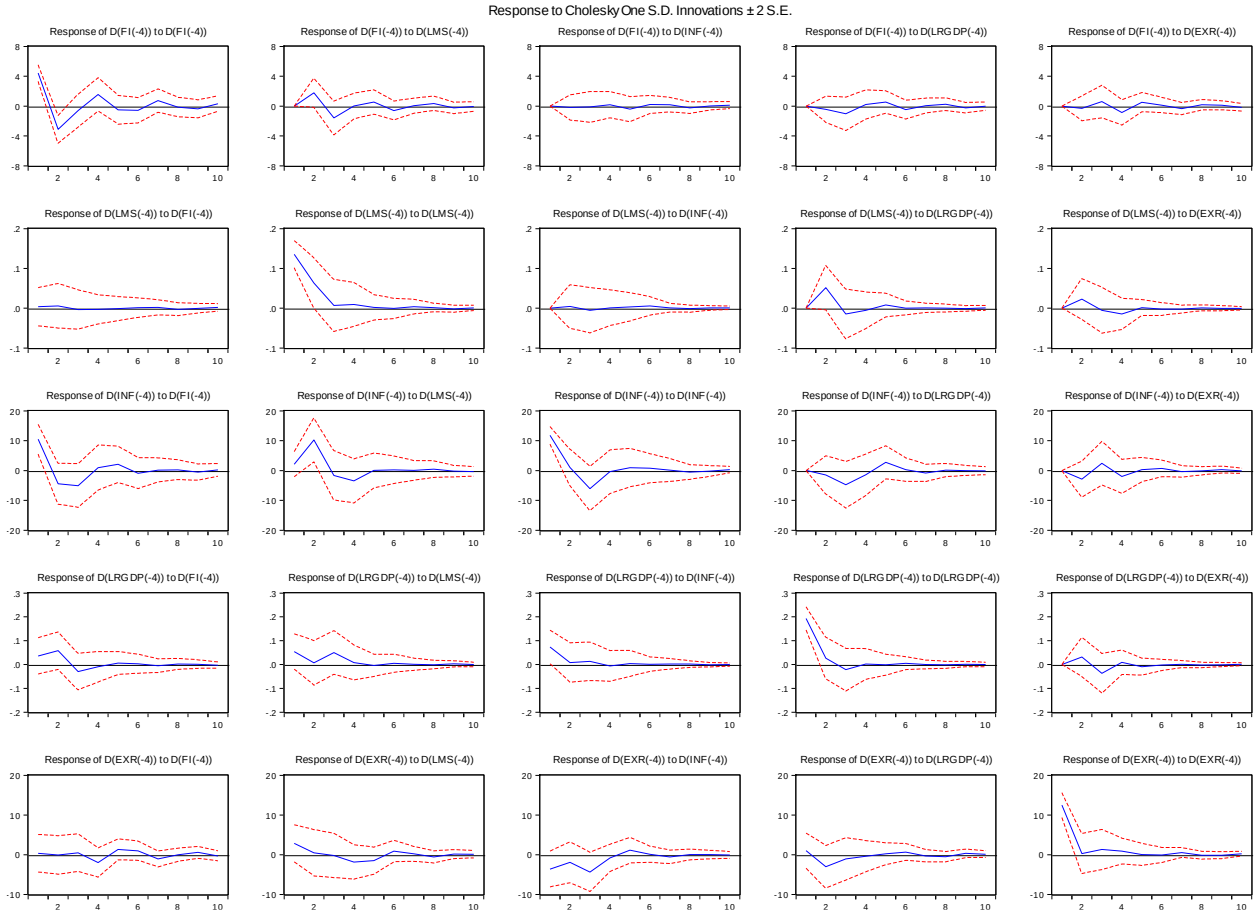
APPENDICES

Appendix 1.Accumulated SVAR impulse response to shocks with 95 percent confidence interval



Source: Author's computations, using e-views 7.1

Appendix 2. The restrictions placed on the SVAR model based on Economic Theory.

D(FI(-4)) = C(1)*U1

D(LNMS(-4)) = C(2)*D(FI(-4)) + C(3)*U2

D(INF(-4)) = C(4)*D(FI(-4)) + C(5)*D(LNMS(-4)) + C(6)*U3

D(LNRGDP(-4)) = C(7)*D(FI(-4)) + C(8)*D(LNMS(-4)) + C(9)*D(INF(-4)) + C(10)*U4

D(EXR(-4)) = C(11)*D(FI(-4)) + C(12)*D(LNMS(-4)) + C(13)*D(INF(-4)) + C(14)*D(LNRGDP(-4)) + C(15)*U5

Source: Author's computations, using e-views 7.1

Appendix 3. Description of variables

Variable code	Description	Variable Type	Source(s)	Period
FIS	Fiscal stance	Endogenous	CBN	1970-2008
FI	Fiscal impulse	Endogenous	CBN	1970-2008
Md	Money demand	Endogenous	CBN/IFS	1970-2008
Y	Total output (Real GDP)	Endogenous	CBN	1970-2008
G	Government expenditure	Endogenous	CBN	1970-2008
C	Government consumption	Exogenous	IFS	1970-2008
I	Total investment	Endogenous	CBN	1970-2008
X	Total export	Endogenous	CBN/IFS	1970-2008
M	Total import	Endogenous	CBN/IFS	1970-2008
r	Interest rate (lending)	Exogenous	CBN/IFS	1970-2008
e	Real effective exchange rate	Exogenous	CBN	1970-2008
Rp	Relative Prices	Exogenous	WDI	1970-2008
N	Population	Endogenous	WDI	1970-2008
TB	Trade balance	Endogenous	CBN	1970-2008
INF	Inflation	Endogenous	CBN	1970-2008
H	High-powered money	Endogenous	IFS	1970-2008
BD	Budget deficit	Endogenous	CBN	1970-2008
NFA	Net foreign asset	Exogenous	IFS	1970-2008
OA	Other asset	Exogenous	IFS	1970-2008
EX	Nominal exchange rate	Exogenous	CBN	1970-2008
P^e	Expected inflation	Exogenous	CBN	1970-2008
ESC	Excess supply of domestic credit	Endogenous	CBN/IFS	1970-2008
TT	Terms of trade	Exogenous	CBN	1970-2008
Ed	External debt	Exogenous	CBN	1970-2008
OP	Oil price	Exogenous	BPRWE	1970-2008

Source: Author's compilation

Appendix 4: Summary of major empirical findings on fiscal stance and macroeconomic performance

Author	Methodology, type of data and scope	Variables used	Major Findings
Landau (1983)	Annual data based on sample of 96 developing countries	GDP, fiscal deficits, Government consumption, inflation, population	Strong evidence of fiscal deficit affecting GDP, inflation and consumer consumption
Ram (1986)	VAR model. Quarterly data	Real GDP, Money supply, fiscal deficit	Growth in general is positively correlated with the rate of change in total public expenditure, it is negatively correlated with the level of such expenditure.
Grossman (1988)	Vector error correction model. Quarterly data	Real GDP, fiscal deficits, money supply, inflation rate	Positive relationship between government fiscal deficits and economic growth
Renelt (1992)	Cross country data, Error correction model. Quarterly data	Budget deficit, GDP, inflation	Increase in budget deficit leads to a rise in prices, but accounting little for output fluctuation
Easterly and Rebelo (1993)	Regression analysis with cross-section time series data drawn from some developed and developing countries	Fiscal deficit, real GDP, money supply, inflation rate	The evidence from the cross country data suggests that the response by money supply, inflation rate to fiscal deficit is weak
Kouassy and Bohoum (1993)	Disaggregated model of OLS estimation technique was used to estimate the four structural equations	Fiscal deficits, private sector savings, public investment, tax rate	Public investment is positively linked with fiscal deficits
Ekpo (1994)	A modified Denison-style growth accounting methodology, annual data, 1960 and 1992	Public investment, fiscal deficits, government expenditure, Real GDP, private expenditure	Government spending on infrastructure like transport and communication as well as investments in agriculture crowd in private investment while public spending on manufacturing and construction crowds out private investment

Jappelli and Meana (1994)	Structural reduced form VAR; quarterly data	Public expenditure, investment, consumption, real GDP	Specific spending promotes growth; that is, specific revenue sources can be allocated to specific expenditure which in turn promotes output growth.
Ariyo (1993)		Consumer revenue, government expenditure, real GDP	The excess expenditure over and above the budgeted estimates was not anchored on any macroeconomic target. It also reports large revenue and expenditure variances which suggest the absence of any positive learning effect over the years.
Osoro (1997)	Macroeconomic model (OLS) estimation technique. Quarterly data	Public expenditure, real GDP, fiscal deficits, tax revenue	The growing public spending was the cause of large public deficits
Amin-Ajab (1998)	A derivative of the Denison growth accounting model	Public spending, GDP, private investment	The results show some evidence of causality running from infrastructure to private investment to growth
Yekini (2001)	Structural quantitative approach. Annual data, 1970 to 1998	Growth of government revenue, government expenditure, instability of government expenditure	The growth of government revenue, instability of government revenue and control of government over expenditure are of budget deficits in Nigeria
El-Khouri (2002)	Traditional IS-LM aggregate supply and aggregate demand model	Fiscal deficit, output, prices, current account of the balance of payment, exchange rate, money supply	Primary investment of fiscal policy-tax policy, expenditure policy and overall budgetary policy can effect a country's long-term growth
Njeru and Randa (2002)	Easterly, Rodriguez and Schmidt Hebbel framework	Fiscal deficit, real GDP, money supply, inflation rate	Fiscal policy has clearly had important effects on external balance, not only because of the size of the deficits but also because of the constraints that the government is facing in financing the deficits

Adeoye (2006)	A derivative of the Denison growth-accounting model which is a prototype of the one applied by Ekpo (1994). Annual data, 1970-2002	Full employment output, private capital, public capital, human capital, fiscal deficit, company income tax	The impact of fiscal policy variables, in particular fiscal deficit and customs and excise duties on output growth are negative.
Adam and Bankole (2000)	Two stage least square (2SLS). Annual data, 1970-1999	Money supply, income, price, fiscal deficit investment	A reduction in federal government presence in the economy, lower interest rates and increased fiscal decentralization are crucial to deficit reduction and improvement in investment, growth and macroeconomic performance.
Egwaikhide (1991)	A log-linear specification model. Annual data	GDP, inflation, government budget deficit, government revenue, economic development	The major factors responsible for the growth of fiscal deficits in the 70s and early 80s in Nigeria were the slow growth of government revenue, inflation and unproductive investment
Ndebbio (1998)	Structurally-based model with simulation. Annual data, 1970-1992	Fiscal deficit, inflation, money supply, imports	Simulation experiment using two scenarios-increasing and decreasing money stock (M2) by 10% were carried out. When the model was disturbed by increasing M2 by 10%, we had substantial increase in price level and government expenditure and moderate increase in government revenue and imports, and with a 10% decrease in M2, a decrease in most of the endogenous variables was observed.

Villafuerte et al (2010)	Cross country analysis. 2003-2008	Real GDP, oil price, non-oil primary balance, cyclical non-oil primary deficit, fiscal impulse.	Fiscal policy has been procyclical and has hence exacerbated the fluctuations in economic activity. The degree of fiscal policy procyclically has been, on average, negatively related to the income level.
Clarida et al (1999)	Exactly identified structural VAR approach. Cross country study, Quarterly data	Real GDP, exchange rate, fiscal stance, primary budget balance	The real exchange rate overshoots and actually depreciates relative to its initial level prevailing before the fiscal shock. The adjustment also tracks the fiscal cycle that was documented for the dynamic response of the primary budget balance to a structural fiscal shock.
Gemmell (2001)	Endogenous growth theory	Taxes, public expenditures, budget deficits, output	Fiscal policy has long-run effect on economic growth rates where some taxes distort investment decisions in the private sector and/or where some 'productive' public expenditures compliment private investment.

Source: Author's compilation