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La Revue Economique de l'Afrique de l'Ouest

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EDITORIAL

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EDITORIAL

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The Effects of Budget Deficit on the Current Account Deficit of Sierra Leone

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Abstract

The Paper investigates the effect of budget deficit on the current account deficit of Sierra Leone, using annual data from 1971 to 2013. Tests for stationarity, which show that all the variables are stationary, are carried out and a model of current account deficit is estimated using the Ordinary Least Squares. The result shows that budget deficit has a positive effect on the current account deficit of Sierra Leone, with a one percentage point of GDP increase in budget deficit leading to 0.3 percentage point of GDP increase in current account deficit. The simulation results show that the budget deficit consistent with Sierra Leone's medium term macroeconomic targets for the current account deficit are 8.3 % , 6.8 % and 6.7 % of GDP for 2015, 2016 and 2017 respectively. Thus, for amelioration of the current account deficit of Sierra Leone, it is imperative for a consistent reduction of the budget deficit, which requires further expenditure rationalization and further efforts to enhance tax revenue.

Key Words: Budget Deficit, Current Account Deficit, Sierra Leone.

JEL Classification: B22, H62, E62, O40

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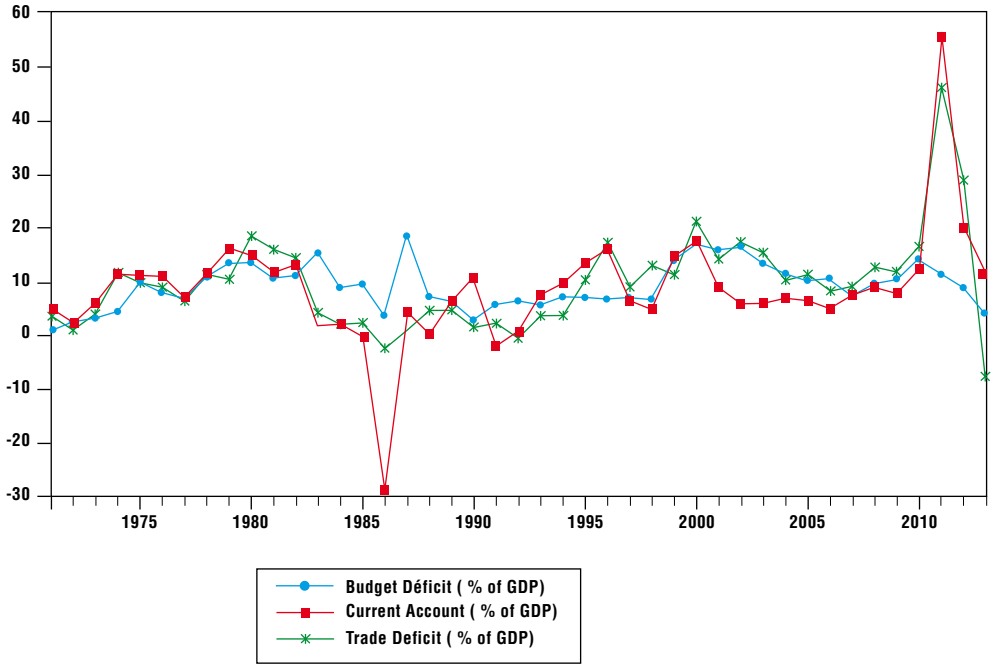
1. Introduction

Fiscal policy is a key stabilisation tool for demand management of an economy. It becomes a great concern when the deficit is huge in terms of the size of the GDP of the economy. When higher fiscal deficit translates to higher current account deficit, the twin deficit phenomenon is considered to be in existence. In addition, when increased fiscal deficit leads to higher inflation, which appreciates the real exchange rate and hurts export and the gap between import and export (trade deficit) increases, the current account worsens, ceteris paribus. In addition, from the Keynesian income determination of an open economy, fiscal deficit is financed from the private sector surplus and the surpluses of the rest of the world. This implies that if the private sector surplus is weak and less than fiscal deficit, fiscal deficit would necessarily coexist with current account deficit.

An unsustainable fiscal deficit is an economic evil to a nation. An unsustainable fiscal deficit is one that leads to unsustainable debt and unsustainable debt is one that is so high that it is difficult to service and it leads to change of fiscal structure (that is, levying higher taxes and reducing expenditure, including key areas of public service). In addition, high deficit in the current account implies that higher surplus is needed in the capital and financial account for financing the deficit. In the event that the capital and financial account is not up to the level to adequately finance the deficit, reserve depletion takes over. This has adverse consequence for exchange rate stability, inflation and a wide range of macroeconomic imbalances when it is persistent. In this light, there has been a growing interest in the issue of twin deficit phenomenon among academics and policymakers.

In Sierra Leone, during the period 1971 to 2013 fiscal deficit coexisted with current account deficit and trade deficit. However, while during this period fiscal balance was in deficit in all the years, there were few years when current account was in surplus. These years were 1986 (28.7 per cent of GDP) and 1991 (2.0 per cent of GDP). Trade deficit was in surplus only in 1986 (2.4 per cent of GDP), 1992 (0.4 per cent of GDP) and 2013 (7.6 per cent of GDP). Figure 1.1 shows the trend of fiscal deficit, current account deficit and trade deficit in Sierra Leone.

Figure 1.1: Trend of Current Account Deficit, Trade Deficit and Budget Deficit in Sierra Leone



The figure shows that current account deficit, trade deficit and budget deficit remains important challenges though in 2013, trade balance was in surplus due to the high export performance from the mining sector, driven by the discovery and mining of iron ore in Tonkolili District, for which export started in 2012. Hence by excluding the natural resource sector, trade deficit remains a challenge even by including the data for 2013. The important questions then are: (i) Does the persistent budget deficit explain the persistent current account deficit in Sierra Leone?[1] (ii) What is the quantitative effect of fiscal deficit on the current account deficit of Sierra Leone? There are a number of studies investigating the effect of budget deficit on the current account deficit, though scanty for Sierra Leone. However, while policy makers state the targets for medium term current account deficits, as in the case of Sierra Leone in the Agenda for Prosperity document (GOSL, 2013), an investigation of the fiscal adjustment needed to achieve the desired target for the current account deficit is necessary. This was not taken up in previous studies though it is essential as long as budget deficit has an impact on the current account deficit. The objective of this paper is therefore to investigate the quantitative effect of budget deficit on the current account deficit in Sierra Leone. That is to test the existence or otherwise of the twin-deficit phenomenon in Sierra Leone and consequently estimating the budget deficit consistent with meeting Sierra Leone's Medium-Term Macroeconomic Target

1 - If the answer is yes, then the twin-deficit phenomenon holds in Sierra Leone

for current account deficit. The rest of the paper is organized as follows. Section 2 is the literature review, section 3 is theoretical framework and methodology, section 4 is empirical results and section 5 is the conclusion.

2. Literature Review

2.1 Theorical Literature

The theoretical literature on budget deficit and the current account is diverse. Two of the theories predict that increased budget deficit increases the current account deficit. These two theories are the Keynesian absorption theory and the Mundell-Fleming model. The Keynesian absorption theory posits that when there is an increase in budget deficit, say through tax cut or increase in expenditure or both, absorption (the sum of consumption and investment) increases. As part of this absorption is on imports, the trade balance and hence the current account deteriorates, suggesting that from an initial deficit position the trade deficit and the current account deficit increase. The Mundell-Fleming transmission is different from the Keynesian absorption theory but their final qualitative conclusions are the same. That increased budget deficits translates to increased current account deficit, which is the twin deficit phenomenon. The Mundell-Fleming model predicts that increase in fiscal deficit increases domestic interest rate, at least when financed from domestic borrowing. The increase in interest rate thus increases capital inflow, under perfect capital mobility scenario, and the exchange rate appreciates (under flexible exchange rate regime). This reduces exports and increases imports as exports become more expensive than import, leading to increase in current account deficit through deterioration in the trade balance.

Unlike the Keynesian absorption theory and the Mundell-Fleming model which consider the twin deficit phenomenon relevant, the Ricardian Equivalence (Barro 1974) posits that increased fiscal deficit has no impact on the current account deficit. The argument is that budget deficit is paid for in the current period or the future, as the net present value of income is equal to the net present value of expenditure. Therefore, an increase in budget deficit does not affect private investment and income since the increase in expenditure leading to the deficit is saved to pay for future tax. Hence, it has no impact on the current account deficit.

Another concept in the budget deficit and current account deficit literature is the possibility for the unidirectional causality from current account deficit to budget deficit. This unidirectional causality contradicts the twin deficit phenomenon. According to Khalid and Teo (1999), this adjustment is common to developing countries. The idea is that increase in current account deficit reduces growth and the reduction in growth hinders tax performance. Thus, the budget deficit increases from an initial deficit position. Moreover, policy makers in periods of increased current account deficit can respond by injecting government funds to bail out the financial sector in an effort to reduce the effects of a recession and a financial crisis arising from large current account deficit. This therefore increases the budget deficit.

Another strand in the theoretical literature is the existence of a bi-directional relationship between the two deficits (budget deficit and the current account deficit). Summers (1988) refers to this phenomenon as the current account targeting. The idea is that budget deficit can lead to current account deficit but as long as there is a strong feedback effect, the resulting

current account deficit can lead to further budget deficit. Summers maintains that this is more relevant to developing countries with large foreign debts and current account deficit.

2.2 Empirical Literature

There is a plethora of studies on the effect of budget deficit on current account deficit. This is the case for both developed and developing countries. One of the early studies is Morgan (1979), who found within the context of a macroeconomic framework a strong link from budget deficit to the balance of payments of twelve oil exporting developing countries. While his study focused on the overall balance of payments, another early study, Zaidi(1985), explicitly considered the relationship between budget deficit and the current account deficit for twelve developing countries over the period 1970 to 1980. The result of this study was that a positive correlation exists between budget deficit and the current account deficit and in terms of causality, he found that Philippines and South Korea had a bi-directional relationship between the two variables, Thailand and Greece had a unidirectional causality from current account deficit to budget deficit and no causality was found for the case of Brazil, suggesting that the two are independent while a unidirectional causality from budget deficit to current account deficit was found to exist in the case of the other seven countries in the study.

The result that budget deficit triggers current account deficit in seven of the twelve countries in the study by Zaidi (1985) was also observed in Mansur (1989) for Philippines over the period 1970 to 1982, using a structural model in a macroeconomic modeling context with the application of simulation technique. The same result was obtained by Kelly (1982) for some industrialised countries. This was also the case in Egwaikhide (1997) for Nigeria through a small macroeconomic model and simulation exercise from 1973 to 1993. The study of Bernheim (1987) for USA, Canada, UK, West Germany, Mexico and Japan for the period 1960 to 1984 focused on the effect of budget deficit on the trade balance but not the current account or the overall balance of payments. The study found that increase in budget deficit has significant positive effect on the trade balance.

A number of recent studies also support the theoretical exposition that budget deficit has positive impact on the current account deficit, suggesting the existence of the twin deficit phenomenon. While a number of them also find no relationship, others find causality in the reverse direction, from current account or trade deficit to budget deficit. For example, Onaforowa and Owoye (2006) by using data from 1970 to 2001 for Nigeria with error correction modeling technique, Granger-Causality and Impulse response analysis, found that a positive relationship exists between budget deficit and the trade deficit. However, this study found a unidirectional causality from trade deficit to budget deficit. Piersanti (2000) used Granger-Sims Causality technique for the period 1970 to 1997 for seventeen OECD countries and found that current account deficit and budget deficit are positively correlated with causality from budget deficit to trade deficit. Leachman and Francis (2002), Baharumshah and Lau (2007) for Thailand and Hakro (2009) for Turkey and Pakistan found evidence for budget deficit having positive effect on the current account deficit as was found by Bartolini and Labiri (2006) for the OECD countries on the one hand and the OECD plus South Africa and 7 other non-African Countries on the other hand. Other recent studies such as Kim and Kim (2006), Marinheiro (2008) and Alkaswani (2000) found evidence for reverse causality with increased

current account deficit leading to higher budget deficit, which is contrary to the twin-deficit phenomenon. Other studies rejecting the existence of a relationship between the two deficits, be it directly or in reverse causation include Kaufman et.al (2002) and Berlett (1999). This implies support for the Recardian Equivalence hypothesis. The bidirectional causality, also called current account targeting (summers, 1988) is found to also hold in recent studies. This is the case of Baharumshah and Lau (2006) in nine Asian countries and Jayaraman and Choong (2007) in Some African countries.

While there are a number of studies on the impact of budget deficit on the current account deficit even in the case of developing countries, there is little on Sierra Leone. For example, Korsu (2009) investigated the effect of fiscal deficit on the external sector performance by using the real exchange rate as external sector performance, through the 2SLS and a simulation technique. His study found that increase in budget deficit deteriorates the external sector performance. However, that study did not explicitly use the current account deficit as the external sector indicator. Another study on Sierra Leone, Tarawallie (2014), applied the Bound testing approach and the Toda Yamamoto causality technique for the period 1980 to 2012. He found that budget deficit has a positive impact on the current account deficit of Sierra Leone in both the short and long run. Moreover, causality was found to run from budget deficit to the current account. This supports the twin-deficit phenomenon. However, this study was limited to the impact of budget deficit on the current account deficit, without determining the budget deficit required for achieving the medium term targets for the current account deficit of Sierra Leone.

The review of the empirical literature suggests that there have been interest in studying the effect of budget deficit on the current account deficit even before the 1980s. Moreover, there has been interest in not only testing the twin deficit phenomenon (the impact of budget deficit on current account deficit) but also in the effect of the current account deficit on budget deficit. In addition, the evidence is mixed with support for positive impact from budget deficit to the current account deficit, positive impact from the current account deficit to budget deficit, positive impact in both direction and no impact in any direction. Thus, suggesting the need for country specific case, which we explore in this paper. This study diverges from the literature by not only estimating the effect of budget deficit on the current account deficit but also explicitly estimating the budget deficit necessary for achieving Sierra Leone's medium term macroeconomic targets for the current account deficit for the periods, 2015, 2016 and 2017.

3. Theoretical Framework and Methodology

3.1 Theoretical Framework

The theoretical framework for the investigation the effect of budget deficit on the current account deficit of Sierra Leone is the simple Keynesian open-economy model. This choice draws from the fact that unlike the Ricardian equivalence hypothesis, which posits that fiscal policy does not affect the current account, it predicts that budget deficit affects the current account deficit directly. This is useful because Sierra Leone has been facing both fiscal deficit and current account deficit for over three decades. In what follows, we discuss the Keynesian open-economy model, which rests on the national income accounting framework.

In an open economy, gross domestic product (GDP) is the sum of consumption (C), investment (I), and net export of goods and non-factor services(X-M). Where X is aggregate exports and M is aggregate imports. That is:

$$GDP = C + I + X - M \quad (1)$$

Where GDP is gross domestic product, C is aggregate consumption, I is aggregate investment, X is export of goods and non-factor services, M is import of goods and non-factor services.

The addition of net factor income from abroad (Y_f) to GDP gives the gross national income (GNI). Net factor income from abroad is income from domestic economy's factors of production abroad minus income from foreign factors of production in the domestic economy (it is called net income in the balance of payments presentation). Hence:

$$GNI = GDP + Y_f \quad (2)$$

Accounting for income received as transfers, in measuring national income, by adding net transfers (TRf) to GNI gives the gross nation disposable income (GNDI). That is:

$$GNDI = GDP + Yf + TR_f \quad (3)$$

Substituting equation (1) in equation (3) gives:

$$GNDI = C + I + X - M + Y_f + TR_f \quad (4)$$

By definition, current account balance (CAB) is the sum of net exports of goods and services, factor income from abroad (net) and current transfers (net). Thus, equation (4) can be written as:

$$GNDI = C + I + CAB \quad (5)$$

Equation (5) implies that:

$$GNDI - C - I = CAB \quad (6)$$

But gross national saving (S) is the difference between GNDI and consumption. That is:

$$GNDI - C = S \quad (7)$$

Substituting equation (7) in equation (6) gives:

$$S - I = CAB \quad (8)$$

As national saving (S) is the sum of private saving (Sp) and government saving (Sg) and aggregate investment is the sum of private investment (Ip) and government investment(Ig) equation (8) can be written as:

$$(S_p + S_g) - (I_p + I_g) = CAB \quad (9)$$

Equation (9) can be written in terms of the excess of each category of saving over its investment as in equation (10).

$$(Sp - Ip) + (Sg - Ip) = CAB \quad (10)$$

By definition, budget deficit (BDEF) is the excess of expenditure over revenue of the government. This is equal to the excess of government investment (Ig) over its saving (Sg).

That is:

$$BDEF = (Ig - Sg) \quad (11)$$

Equation (10) can be written as in equation (12):

$$(S_p - I_p) - (I_g - S_g) = CAB \quad (12)$$

Substituting equation (11) in equation(12) gives:

$$(S_p - I_p) - (BDEF)) = CAB \quad (13)$$

Equation (13) , which is an identity suggests that the current account is in deficit (negative value of CAB) when budget deficit (BDEF) is greater than private sector surplus (Sp-Ip) or when the private sector also registers a deficit.

Equation (13) implies that as long as private sector surplus is lower than budget deficit, the current account would be in deficit as the left hand side of equation (13) would be negative. The implies that budget deficit could prevail with a current account surplus when the surplus of the private sector is greater than the budget deficit. In addition, when the surplus of the private sector is stable and lower than budget deficit, changes in budget deficit reflects directly on changes in the current account deficit. Hence equation (13) is a framework for an econometric model to investigate the effect of budget deficit on the current account.

3.2 Methodology

In this subsection we discuss the specification of the current account model and discuss the estimation technique as well as the simulation process used to determine the budget deficit necessary to obtain Sierra Leone's medium term macroeconomic target for the current account deficit. In addition, the data issue is discussed.

3.2.1 Model Specification

In order to investigate the effect of budget deficit on the current account of Sierra Leone, we estimated a model of current account deficit by explicitly introducing budget deficit excluding grant as a regressor and controlling for real GDP growth and the rate of inflation. We controlled for both on the basis that they affect the current account through changes in government investment. Thus, equation (14) was estimated.

$$CADEF_t = \alpha + \delta_i CADEF_{t-i} + \beta_i \sum_0^p BDEF_{t-i} + \lambda_i \sum_0^p RGDPG_{t-i} + \phi_i \sum_0^p INF_{t-i} + U_t$$

Where CADEF is current account deficit, BDEF is budget deficit, RGDPG is real GDP growth, INF is inflation rate and t is time subscript. We choose p to be equal to 1 in order to save the degrees of freedom.

The coefficient of budget deficit in equation (14) is expected to be positive and significant if the twin-deficit phenomenon holds, as predicted by the Keynesian absorption theory. That is, increased government expenditure increases government investment and/or decreases government saving, with an unchanged private sector surplus, the current account deficit

therefore increases from an ignition deficit position. Also, increased government expenditure increases the demand for goods and in an open economy part of it goes to imports, thus the (14) current account deficit increases.

The coefficient of real GDP growth is ambiguous. It is expected to be positive when increase in growth drives more import, thereby increasing the trade deficit and the current account deficit. On the other hand when it drives exports however, the trade deficit and the current account deficit decline, leading to a negative effect of growth on the current account. Also, when increase in income increases private investment, private sector surplus increases and the current account deficit declines. Thus, a negative effect can be expected from this channel as well.

The coefficient of inflation is expected to be positive because increase in the rate of inflation appreciates the real exchange rate, which hurts exports and the current account deficit increases through widening of the trade deficit. Another channel is, if the increase in the rate of inflation hurts private investment, private sector surplus narrows and the current account deficit widens. Thus, the current account deficit increases.

3.2.2 Estimation and Simulation

Inasmuch as estimating equation (14) with non-stationary variables leads to spurious regression when the variables are not stationary, we tested each of the variables for statioanrity. The stationarity test was done by testing for unit root in each variable using the Elliott Rothenberg-Stock DF-GLS (Dickey Fuller GLS) test, which is better than the conventional DF test in terms of sample size and power. It is implemented by applying GLS detrending to the series and consequently estimating the auxiliary regression for the DF test. We also employed the Ng-Perron test, a modified version of the Phillips-Perron test as it accounts for structural break in a series as well as small sample size. The Kwiatowski-Phillips Schmidt-Shin (KPSS) test which has the null hypothesis of variable stationarity, unlike the other tests which have the null hypothesis of non-stationarity was also applied.

Conventionally, when variables are not stationary but are integrated of order say one (I(1)), they should be tested for cointegration to determine whether a linear combination of them is stationary. If there is cointegration among them, then there is an error correction representation (Engle and Granger, 1987). If there is no cointegration, then the model should be estimated with appropriately transformed versions of the variables for stationarity. If they are stationary, then the OLS is applied without any transformation. This consideration is taking into account here.

Following the model estimation, a simulation exercise was done with respect to the medium term macroeconomic targets for the current account deficit of Sierra Leone for the periods, 2015, 2016 and 2017. These targets (% of GDP) were plugged into the estimated model and the model was solved for the required budget deficit.

3.2.3 The Data

The data for each of the variables is from 1971 to 2013 as this period is sufficient to test the existence of twin deficit phenomenon in Sierra Leone. The data on current account deficit is taken as current account balance multiplied by minus one (as a percentage of GDP). Current account balance was obtained from African Development Indicators. Budget deficit is budget deficit, excluding grants (% of GDP) and was obtained from Government Financial Statistics, International Financial Statistics and WAMA data base. Data on real GDP growth was from World Development Indicators and inflation rate is percentage change in end period consumer price index, obtained from International Financial Statistics and World Development Indicators.

4. Estimation Results

4.1 Descriptive Statistics, Correlation Matrix and Trend of Model Variables

4.1.1 Descriptive Statistics

Table 4.1 shows the descriptive statistics of the variables, which show that the mean current account deficit during the period 1971 to 2013 is 8.6 per cent of GDP, mean budget deficit is 9.2 per cent of GDP, mean real GDP growth is 2.8 per cent and mean inflation rate is 30.7 per cent. In addition, while budget deficit is a normal variable according to the Jarque-Bera test, all the other variables are not normal.

Table 4.1: Descriptive Statistics of Variables

	CADEF	BDEF	RGDPG	INF
Mean	8.618083	9.154186	2.753248	30.71207
Median	7.514057	8.890000	2.881429	16.60000
Maximum	55.50000	18.58000	26.26858	178.7000
Minimum	-28.71243	1.090000	-19.01291	-3.286000
Std. Dev.	10.53750	4.273771	7.245789	36.05477
Skewness	1.046908	0.252934	0.372588	2.183222
Kurtosis	13.52739	2.404086	6.125501	8.247617
Jarque-Bera	206.4180	1.094736	18.49724	83.49761
Probability	0.000000	0.578470	0.000096	0.000000
Observations	43	43	43	43

4.1.2 Correlation Matrix

The correlation analysis of the variables, which is shown in Table 4.2, shows that the correlation coefficient between budget deficit and current account deficit is 0.27 and is significant at the 10 per cent level. This suggests that on anecdotal basis, the twin deficit holds based on the Sierra Leone data. Real GDP growth and current account deficit have a positive correlation but this correlation is not significant. The rate of inflation is negatively correlated with the current account the correlations is significant at the 5 per cent. In addition, all the correlation coefficients between each pair of explanatory variables are insignificant and low, suggesting that multicollinearity is not an issue in the model.

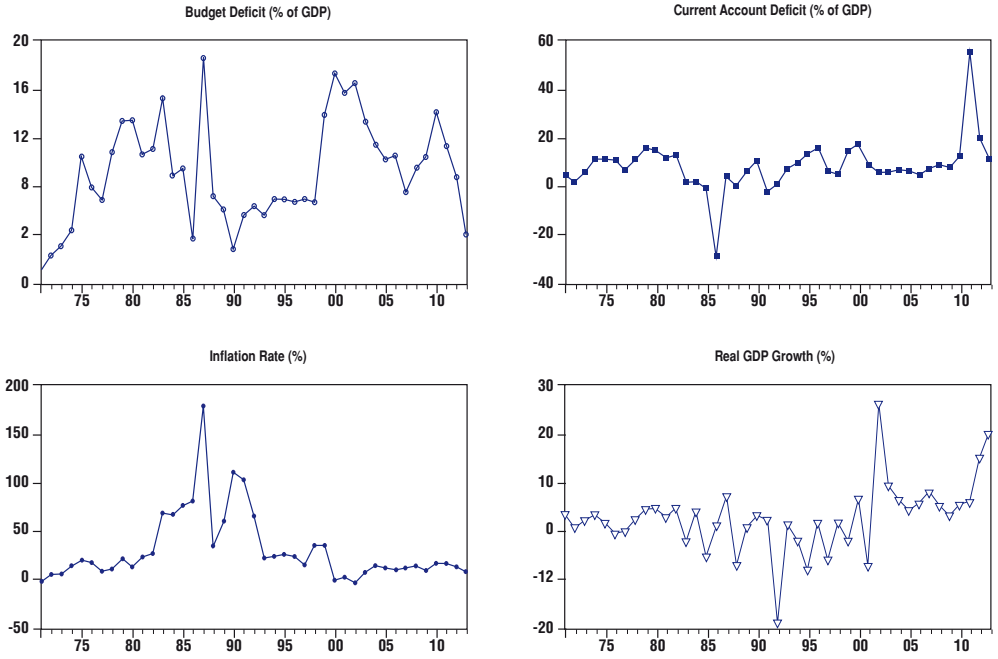
Table 4.2: Correlation Coefficients between Model Variables

Correlation (Probability)	CADEF	BDEF	RGDPG	INF
CADEF	1.000000 -----			
BDEF	**0.265722** (0.0850)	1.000000 -----		
RGDPG	**0.201746** (0.1945)	**0.214208** (0.1678)	1.000000 -----	
INF	**-0.337882** (0.0267)	**0.031100** (0.8431)	**-0.205319** (0.1866)	1.000000 -----

4.1.3 Trend of Model Variables

Figure 4.1 shows the graphs of the model variables. The figure shows that the current account deficit is stationary around its mean though there were extreme values in 1986 and 2011. The low deficit on the current account in 1986 conforms to the period of unification of the dual exchange rate regime, which took place in July 1986 by abandoning the dual exchange rate regime that had been adopted in December 1982, under the Modified Exchange Rate Arrangement. The large current account deficit of 2011 conforms to the period when there was huge import of iron ore related machinery for preparation for the mining of the discovered huge iron ore deposit, for which mining started in 2012, which led economic growth to jump from 6.1 per cent in 2011 to 15.2 per cent and 20.1 per cent in 2012 and 2013 respectively.

Figure 4.1: Trend of Model Variables



Real GDP growth also seems stationary around its mean despite very low value of -19.0 per cent in 1992 and the very high value of 26 per cent in 2002. In 1992 the decade old war (1991 to 2001) had been one year old and a military coup was in place by April 1992. Thus, the increased investment uncertainty could not be unconnected to this very high negative growth. In 2002, the decade old war was declared over and the sudden improvement in the investment climate coupled with post-war rehabilitation and construction as well as return of displaced and refugees to previous economic activities in Agriculture and other sectors, had direct positive consequence for output performance. Thus, real GDP growth stood at 26 per cent in 2002, from a negative value in 2001.

The rate of inflation also seems stationary around its mean value though there is a large value of 179 per cent in 1987 and another in 1990, a value of 111 per cent. The 1987 inflation rate is not unconnected to the large budget deficit of 18.6 per cent in 1987 with its seiniorage consequence during a period of financial repression in Sierra Leone. The one year lag effect of the 1986 unification of the exchange rate is also a force of concern in this inflationary process. The year 1990 was a year of devaluation as well as adoption of a managed floating exchange rate regime, which also had severe consequence for the high inflation rate in 1990 in spite of lower budget deficit in 1990. Budget deficit also seems stationary around its mean but the figure shows that it has the highest variability among the model variables.

4.2 Time Series Properties of Variables

Table 4.3 presents the results of the unit root tests. Inasmuch as the variables tend to be stationary along their means, the tests for unit root were done with the existence of drift in the auxiliary regression. The unit root tests show that all the variables are stationary in levels. That is, they are I(0) variables, suggesting that equation (14) can be estimated in level, as hypothesis tests and inferences can be made once the variables are stationary.

Table 4.3: Results for the Tests for Variable Stationariy.

Variable	Dickey-Fuller GLS Statistics (Zero lag)	Dickey-Fuller GLS Statistics (1 Lag)	Dickey-Fuller GLS Statistics (2 lags)	Implication
Current Account Deficit (% of GDP)	-4.333*	-3.334**	-2.160*	A Stationary Variable
Fiscal Deficit (% of GDP)	-2.591*	-1.801	-1.801	A Stationary Variable
Real GDP Growth	-4.931**	-2.374*	-1.554	A Stationary Variable
Inflation Rate	-2.857**	-1.999*	-1.442	A Stationary Variable
Variable	**Ng Perron Statistics (Zero lag) MZa**	**Ng Perron Statistics (1 Lag) MZa**	**Ng Perron Statistics (2 lags) MZa**	**Implication**
Current Account Deficit (% of GDP)	18.091**	16.958**	13.630*	A Stationary Variable
Fiscal Deficit (% of GDP)	-9.610*	-5.568	-6.919	A Stationary Variable
Real GDP Growth	-20.176**	-9.367*	-4.149	A Stationary Variable
Inflation Rate	-11.470*	-7.215	-4.064	A Stationary Variable
Variable	**KPSS Lm Statistic (Zero lag)**	**KPSS Lm Statistic (1 Lag)**	**KPSS Lm Statistic (2 lags)**	**Implication**
Current Account Deficit (% of GDP)	0.467**	0.344*	0.295*	A Stationary Variable
Fiscal Deficit (% of GDP)	0.463*	0.311*	0.246*	A Stationary Variable
Real GDP Growth	0.677**	0.597**	0.504**	A Stationary Variable
Inflation Rate	0.667**	0.415*	0.312*	A Stationary Variable

Critical Values			
	DF-GLS	Ng Perron	KPSS
1 %	-2.621	-13.8	0.739
5 %	-1.949	-8.1	0.463

4.3. The Estimated Models of Current Account

The model of current account deficit is estimated by applying OLS to the autoregressive distributed lag (ARDL) model specified in equation (14) without accounting for an error correction term since the model variables are stationary. The preferred model is arrived at from the Hendy's general-to-specific approach (Hendry, 1995). In the overparametised model of current account, none of the variables was significant. The overparametised model is shown in Table 4.4.

Table 4.4: The Overparametised Model of Current Account Deficit

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
CADEF_1	0.278023	0.1825	1.52	0.1370	0.0639
Constant	4.35134	5.303	0.821	0.4176	0.0194
BDFE	0.804741	0.5133	1.57	0.1262	0.0674
BDEF_1	-0.321884	0.5642	-0.571	0.5721	0.0095
RGDPG	0.0151690	0.2479	0.0612	0.9516	0.0001
RGDPG_1	-0.00951003	0.2493	-0.0382	0.9698	0.0000
INF	-0.0479052	0.07046	-0.680	0.5012	0.0134
INF_1	-0.0340683	0.07034	-0.484	0.6312	0.0069

sigma	10.0399	RSS	3427.179
R^2	0.262702	F(7,34) =	1.731 [0.135]
log-likelihood	-152.034	DW	2
no. of observations	42	no. of parameters	8
mean (CADEF)	8.71024	var (CADEF)	110.674

AR 1-2 test:	F(2,32)	=	0.036364 [0.9643]
ARCH 1-1 test:	F(1,32)	=	0.095309 [0.7595]
Normality test:	Chi^2(2)	=	33.424 [0.0000]**
Hetero test:	F(14,19)	=	0.18280 [0.9989]
RESET test:	F(1,33)	=	2.1376 [0.1532]

Following model reduction in order of high t-probability from the overparametised current account model to remove the insignificant variables the parsimonious model was obtained. Table 4.5 shows the parsimonious model of current account deficit. This is the idea of the Hendy's general-to-specific model (Hendry, 1995).

The parsimonious model shows that budget deficit and the previous value of current account positively explain the current account deficit of Sierra Leone. When budget deficit increases by 1 % point of GDP, current account deficit increases by 0.30 percentage point of GDP. The positive effect of budget deficit on the current account deficit of Sierra Leone implies that the twin deficit phenomenon holds in Sierra Leone and the positive effect of previous year's current account deficit on current year's current account deficit suggests that there is persistence in the current account deficit of Sierra Leone. Hence the twin deficit phenomenon holds in Sierra Leone. The null hypothesis of residual normality is rejected while those for all the other residual diagnostic tests are not rejected. In this light, checking for large residuals (more than 2 standard errors) was done and the result shows that 2011 has a large residual. Thus impulse dummy was introduced for this period and was included in the modeling process, the subsequent estimation and outlier test also shows that 1986 had a large residual. The inclusion of a 1986 dummy was also considered. The subsequent estimation reveals a model result free from non-normal errors as well. Appendix Figure 1 shows the actual and fitted values of the current account model, which shows that they are close and turning points are tracked. Table 4.6 shows the final preferred parsimonious model which passes all the diagnostic tests. Appendix Figures 2 and 3 show the graphs of the recursive coefficients and one-step-ahead recursive residuals respectively, which are within the 5 % band, suggesting that the model is stable. The R-squared shows that about 85 % of the variations in the current account are explained by the model variables and the variables are jointly significant based on the F-statistic.

Table 4.5: The Current Account Model Without Correction for Residual Non-normality

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
CADEF_1	0.368477	0.1429	2.58	0.0138	0.1457
Constant	-1.01591	3.985	-0.255	0.8001	0.0017
BDEF	0.703588	0.3682	1.91	0.0634	0.0856

sigma	9.74122	RSS	3700.76075
R^2	0.203846	F(2,39) =	4.993 [0.012]*
log-likelihood	-153.647	DW	1.96
no. of observations	42	no. of parameters	3
mean(CADEF)	8.71024	var(CADEF)	110.674

AR 1-2 test:	F(2,37)	=	0.52833 [0.5940]
ARCH 1-1 test:	F(1,37)	=	0.085081 [0.7722]
Normality test:	Chi^2(2)	=	51.943 [0.0000]**
Hetero test:	F(4,34)	=	0.018493 [0.9993]
Hetero-X test:	F(5,33)	=	0.079847 [0.9949]
RESET test:	F(1,38)	=	1.7259 [0.1968]

Table 4.6: The Final Parsimonious Current Account Deficit Model with Correction for Residual Non-normality

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
CADEF_1	0.262327	0.06464	4.06	0.0002	0.3080
Constant	3.37879	1.862	1.81	0.0778	0.0817
BDEF	0.298921	0.1694	1.76	0.0859	0.0776
dummy2011	45.4863	4.428	10.3	0.0000	0.7404
dummy1986	-33.0994	4.563	-7.25	0.0000	0.5872

sigma	4.35526	RSS	701.825987
R^2	0.849014	F(4,37) =	52.01 [0.000]**
log-likelihood	-118.732	DW	1.59
no. of observations	42	no. of parameters	5
mean(CADEF)	8.71024	var(CADEF)	110.674

AR 1-2 test:	F(2,35) =	1.4588	[0.2463]
ARCH 1-1 test:	F(1,35) =	0.17970	[0.6742]
Normality test:	Chi^2(2)=	2.3740	[0.3051]
Hetero test:	F(6,30) =	0.52088	[0.7878]
Hetero-X test:	F(7,29) =	0.43701	[0.8707]
RESET test:	F(1,36) =	0.0013828	[0.9705]

4.4 Required Budget Deficit for Sierra Leone's Medium Term Target for Current Account Deficit

A policy simulation is done in this subsection. We asked the question "What is the required budget deficit necessary to meet Sierra Leone's Medium Term target for the current account deficit?" Following the estimation of the current account model, we investigated the budget deficit necessary for meeting Sierra Leones's Medium term target for the current account deficit by given recourse to *The Agenda for Prosperity Document of the Government of Sierra Leone* (GOSL, 2013). From The Agenda for Prosperity Document of the Government of Sierra Leone, which is the Country's third generation poverty reduction strategy paper, the targets for current account deficit (including grant), % of GDP for the periods 2014 to 2017 are given as 10.8, 7.6, 7.4 and 7.3 for 2014, 2015, 2016 and 2017 respectively. However, in 2014, the actual current account deficit was 6.6 % of GDP and budget deficit (excluding grant) was 7.4 % of GDP. These values are plugged into the parsimonious model of the current accountl and the required budget deficits are consequently solved for. Table 4.7 shows the results of the simulation. The result shows that given that the data for 2014 is actual, the required budget deficit, excluding grant, for meeting the medium term targets of the current account deficit in the years, 2015, 2016 and 2017 are 8.3 %, 6.8 % and 6.7 % of GDP respectively. According to Sierra Leone's third generation poverty reduction strategy paper, *the Agenda for Prosperity*, the medium term budget deficit targets are 7.0 %, 6.8% and 6.5% of GDP respectively, for 2015, 2016 and 2017 respectively. A comparison suggests that the gap between our simulated results and the targets set by policymakers, based on *the Agenda for Prosperity* are 21.7 %, 0 % and 3.0% of our simulation results for 2015, 2016 and 2017 respectively.

Table 4.7: Results of the Simulation

Year	Policy Target for Current Account Deficit (% of GDP)	Simulated Required Budget Deficit (% of GDP)	Policy Target for Budget Deficit, excluding grant (% of GDP)	Variance of simulated required budget and policy target of Budget Deficit (% of simulated required budget deficit)
2015	7.6	8.3	7.0	21.7
2016	7.4	6.8	6.8	0.0
2017	7.3	6.7	6.5	3.0

5. Conclusion

The current account deficit is financed from the capital and financial account and when the latter cannot adequately finance the former, foreign reserve depletion takes over. This has adverse consequences for exchange rate stability when it is persistent. This also has a number of macroeconomic implications, including high inflation rates and real exchange rate appreciation and further widening of the deficit. When revenue consistently lags behind government expenditure, often due to weak tax performance, the ensuing budget deficit is expected to deliver among others a deficit in the current account when private sector surplus is weak. Thus, persistent budget deficit is expected to trigger persistent current account deficit and severe awkward macroeconomic consequences of the current account deficit. In respect of this, the paper sought to investigate the quantitative effect of budget deficit on the current account deficit of Sierra Leone. This is motivated among others by the persistent budget deficit in Sierra Leone and only few periods of current account surplus in the economy in the last four decades.

The methodology employed was the estimation of a model of current account deficit (% of GDP) by explicitly including budget deficit, excluding grant, in the model and controlling for real GDP growth and the rate of inflation. Tests for unit roots were carried out using various methods.Using aggregate annual data from 1971 to 2013, the results show that all the variables are stationary and there was therefore no need for cointegration test. The model was then estimated in level by the application of OLS in an autoregressive distributed lag context. The estimation was in the context of Hendry's general to specific modeling (Hendry, 1995), where only significant variables are maintained in the parsimonious congruent model. The result shows that increased budget deficit leads to increased current account deficit, suggesting the existence of the twin-deficit phenomenon in Sierra Leone. Specifically, when budget deficit, excluding grant (% of GDP), increases by 1.0 percentage point, current account deficit (% of GDP) increases by 0.3 percentage point.

The budget deficit consistent with the medium term macroeconomic targets for the current account deficit of Sierra Leone for the periods, 2015, 2016 and 2017 are respectively 8.3 %, 6.8 % and 6.7 % of GDP respectively.

The evidence suggests that having a consistent rationalization of expenditure and stable revenue mobilization strategy, which reduces budget deficit, remains useful for ameliorating current account deficit in Sierra Leone. In addition, efforts to meet Sierra Leone's medium term current account targets requires the authorities setting revenue and expenditure targets based on fiscal deficits of 8.3 per cent of GDP for 2015, 6.8 per cent of GDP for 2016 and 6.7 per cent of GDP for 2017. However, given the existence of other policy objectives of the Sierra Leonean Authorities and conflicting objectives of policy makers, it is important to gauge the importance of meeting current account targets with other policy objectives such as poverty reduction and inclusive growth.

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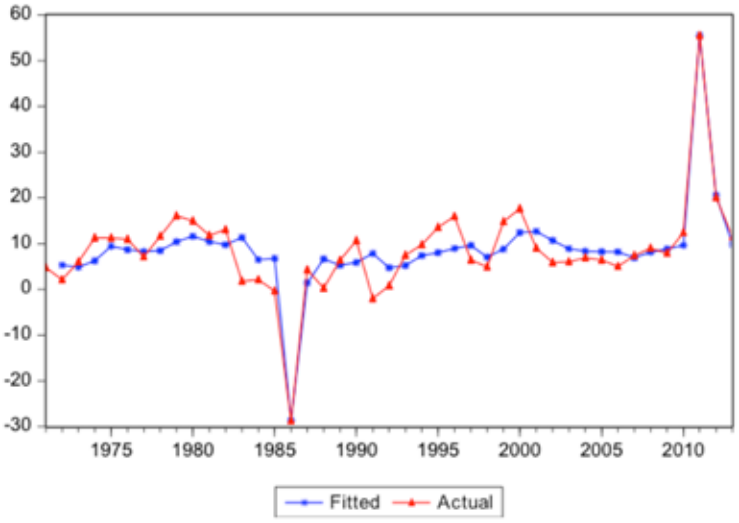
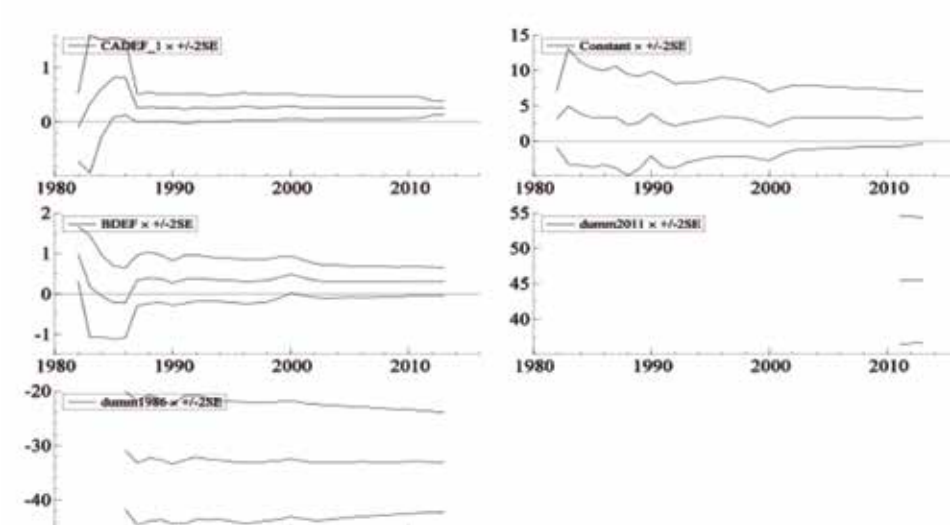
Appendix

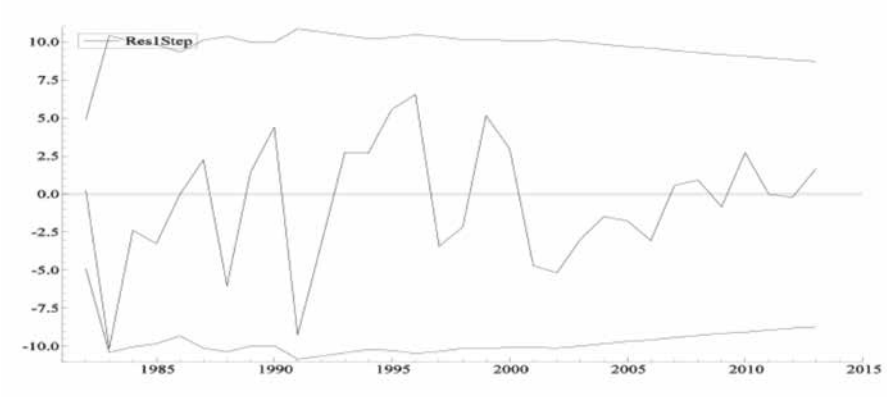
Appendix Figure 1: Actual and Fitted Values of Current Account



Appendix Figure 2: Recursive Coefficient Stability Tests for the Current Account Deficit Model



Appendix Figure 3: One Step ahead residual stability from the Current Account Deficit Model



Asset Price Fluctuations and Monetary Policy in Nigeria

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Abstract

This study examines the size of asset price fluctuation and its impact on monetary policy in Nigeria. An investigation is made in the light of the severe consequences of over-heating of the domestic economy caused by the spillover effects of alternative monetary policy actions in advanced economies such as quantitative easing. The All-share index (ASI) is used as proxy for asset prices and a generalized Autoregressive Conditional Heteroscedasticity, (GARCH) model was fitted to estimate its volatility. Also, Structural Vector Autoregressions was applied to uncover the interaction between asset prices, volatility and monetary policy. We find evidence of relative volatility episodes in asset prices, while results from the impulse response functions reflected slight transmission from volatility in asset prices to inflation. The results from the variance decomposition indicate that, MPR accounts for the largest component in the variation of ASI returns followed by exchange rate and then financial system instability. On the whole, our results show that the size of asset price volatility rises in periods of banking crisis demonstrating the dominance of the sector on the capital market. As monetary growth could fuel asset price boom and bust, monetary policy should respond in a counter-cyclical manner to minimize asset price fluctuations by smoothing liquidity.

Key Words: *Monetary Policy, Asset Price, Interest Rate, Stock Market, Bond Yields*

JEL Classification: E52, N20, G18

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1. Introduction

The debate on the appropriateness of considering asset price movements in the conduct of monetary policy has attracted much attention in recent years. Some have suggested that the failure to consider the price behavior of asset markets played a contributing role to the economic malaise suffered during the past ten years[2]. More recently in some developed countries, rapidly rising prices of equities and other assets have heightened concern about inflation prospects and behavior of other macroeconomic variables. In addition, distortions that have characterized many economies globally especially in macroeconomic indicators had been linked to large asset price volatility. In Nigeria, despite the fair share Nigeria witnessed particularly during the 2007 - 2009 global financial crises, it is not immediately obvious what impact asset price fluctuations have on the price level and what the response of monetary policy should be when such fluctuations feed into the domestic economy.

A number of studies have been conducted on the relationship between inflation and the asset prices in Nigeria; these studies document several important findings. For example, Sunday et al (2012) concluded that monetary policy responds weakly to asset price fluctuations in Nigeria and that the effects of such response take long periods in manifesting. Omotor (2010) submitted that there was a significant and positive relationship between both variables; Abraham (2011) concluded that monetary policy would be effective in improving the performance of the Nigerian stock market, by achieving stable exchange rates and altering the MPR. CBN (2010) showed that monetary shocks could alter financial asset portfolio but did not translate to inflation. These outcomes naturally raise the question, what is the size of asset price volatility in Nigeria? Does asset price volatility produce permanent or transitory shocks on the price level? Can monetary policy curtail asset price volatility in Nigeria?

We consider an investigation into these questions in the light of the severe consequences of over-heating caused by the spillover effects of alternative monetary policy actions in advanced economies such as quantitative easing. In Nigeria, capital flight out of the Nigerian Stock Exchange collapsed the market and produced panic that gave rise to a precipitous depreciation of the exchange rate. In spite of the intervention arrangements and measures adopted by the CBN, the magnitude of volatility was less evident, and it is still unclear how it has evolved over the years. Also, the stock market has been significantly impacted by various reforms such as the 2004-2005 consolidation exercise, episodes of banking crisis and the aftermath supervisory/ regulatory reforms such as the jettisoning of the universal banking model, as well as the contractionary effect of monetary policy. These developments alter what we know about asset prices and the possible reaction of monetary policy to fulfil the objective of price stability. Such anecdotal evidence requires further empirical investigation for a small open economy like Nigeria.

In view of the above and using the all-share index as proxy for asset prices, this paper specifically has, as its objectives, to; (1) Determine the size of asset price volatility in Nigeria; (2) Investigate whether asset price volatility produces permanent or transitory effects on inflation; and (3) Determine whether monetary policy can stem asset price volatility in Nigeria.

Following the introduction, section 2 presents the literature review. In section three, we discussed the stylized facts relating to the relationship between asset price fluctuation, the price

2 - See for example *Ogbulu M*. et. al. (2011) and it references

level and monetary policy in Nigeria. Section 4 gives the methodology, section 5 discusses empirical findings. We conclude the paper in section 6.

2. Literature Review

2.1 Theoretical Literature

In the Tobin's Q theory of investment, the market value of firms is expressed as a ratio of the replacement cost of capital. According to Tobin, a high Q suggests a higher market price for the firm relative to the replacement cost of capital. When Q is high, the cost of new investments in plants/equipment is inexpensive relative to the industry and vice versa. In that regard, the theory predicts a re-arrangement of asset portfolio with monetary policy easing, as a possible money overhang lowers interest rates, induces a higher demand for equities. The attendant hike in equity prices due to demand pressures makes bonds unattractive, providing incentives for companies to offer new issues of their stocks to put in new investments.

In Modigliani Life-cycle Income Hypothesis, though not improbable, it is incontrovertible that decisions by optimizing economic agents could stoke volatility in asset prices. This arises due to the wealth effect of a rise in stock prices on the households and the attendant consumption decisions eventually reflecting in a rise in the value of financial assets that reflects consumers' lifetime resources.

Other frameworks underlying the asset price-monetary policy actions are the Monetarist and Keynesian views. Both views posit a strong relationship between changes in interest rates and equity prices. The monetarists aver that the influence of monetary policy on asset prices cuts across a wide range of markets for financial assets and durable goods, noting that such an impact in these markets is symbiotic. Keynesians postulated that the fall in interest rates as a result of expansionary monetary policy would make equities relatively more attractive than bonds and deposits, thereby causing a rise in equity prices. A monetary contraction would, however, raise interest rates and make equities less attractive than bonds.

Much later, Kent and Lowe (1999) developed a theoretical framework that analysed the role of monetary policy in responding to asset-price bubbles. They demonstrated that there may be circumstances where monetary policy should be tightened in response to an emerging asset-price bubble, in order to burst the bubble before it becomes too large. This would, however, mean that expected inflation is below target in the short run. They noted that the adverse effects of large asset price swings on financial system stability could be more appropriately moderated through financial system regulation and supervision. Nevertheless, there remains a role for monetary policy provided that the effects of large asset-price fluctuations on the economy are not entirely eliminated.

The overriding view emerging from the theoretical underpinning of asset price volatility is that fluctuation could arise from the interaction of complex activities of the household and monetary policy actions producing significant spillovers to the macro economy (see chart 1.0). Thus, the transmission mechanism of monetary policy occupies an essential role in an economy, since a change in interest rates brought about through monetary policy influences also the price level of other assets in the economy. The transmission of these impulses is dealt with in literature,

for example Tobin's Theory of Investment, F. Modigliani's Life-Cycle Theory and the related literature. The empirical literature has therefore been focused in uncovering how monetary policy should react to tackle asset price fluctuations in order to dissipate its distortionary effects on macroeconomic indicators (Silvia Gantnerová (2004) BIATEC, Volume XII).

2.2 Empirical Literature

Igbinosa and Obayagbona (2012) examined the relationship between monetary policy and financial and real asset prices in Nigeria and specifically evaluating the causal relationships between the monetary policy variable, interest rate, and financial/real assets' (stocks and real estate) prices. They found that monetary policy reacts weakly to asset price fluctuations in Nigeria and that the effects of such response take long periods to manifest and that monetary policy is actually weakening in its effect on real asset prices in Nigeria.

Abaenewe and Ndugbu (2012) investigated the impact of monetary policy developments on equity prices in the Nigerian Stock Market. They ran Ordinary Least Square regression on five monetary policy variables and their results showed a weak link between monetary policy and equity prices. Monetary Policy impulses had not been significantly transferred by the stock market to the real economy and could therefore not be considered as a good transmission channel for monetary policy implementation in Nigeria.

Abraham (2011) examined the relationship between the stock market and selected macroeconomic variables in Nigeria. He used the all share index (ASI) as proxy for the stock market, inflation, interest and exchange rates for the selected macroeconomic variables. Employing error correction model, he found that a significant negative short run relationship existed between the stock market and the monetary policy rate (MPR) and that exchange rate stability, in the long run, improves the performance of the stock market. Thus, achieving stable exchange rates and altering the MPR, monetary policy would be effective in improving the performance of the Nigerian stock market.

Kenneth Kuttner (2011) investigated how appropriate it was to use monetary policy to dampen asset price booms, in an apparent response to Bernanke and Gertler (1999). He found that there was no marked association between interest rates and stock and property prices across countries during the years leading up to the global financial crisis. While agreeing to the BG prescription that monetary policy could create instability when used to counteract large stock price booms, he submitted that financial stability considerations may require a shift towards a policy that attenuates financial booms.

In his study, Frederic Mishkin (2011) investigated the desirability or otherwise for monetary policy to 'lean against the wind' of asset price movements. His findings questioned the effectiveness of a direct response from monetary authorities when there are potentials for large upside upswings in asset prices or only after a bust of a bubble in asset prices in order to stabilise both output and inflation. He concluded that financial market imbalances were much stronger than large asset price fluctuations and as such, the focus of monetary authorities should be on credit market conditions rather than asset prices.

Guglielmo and Soliman (2010) conducted further analysis on the relationship between movements in stock prices, the demand for money and monetary policy in the UK, US and

Germany using cointegrated VAR models. The evidence showed a significant influence of stock price movements in the demand for money in the three countries and a reduction in the short-term interest rate (monetary contraction) created a lull in both asset prices and demand for money in all countries under study. These findings appear consistent with an earlier work on these economies by Bordo, Dueker and Wheelock (2007) which suggested that the stock market booms and busts in the United States, United Kingdom, and Germany were closely associated with inflation and monetary policy actions to halt inflation or speculation.

The study by Singh and Pattanaik (2010) also contributed to the debate on whether monetary policy should be more reactive to asset price movements as an antidote to prevent buildup of bubbles. They examined India data focusing on the interactions between monetary policy and housing and stock prices given their pro-cyclical nature. The research outcomes suggests that interest rate changes cause changes in stock prices but reverse causality does not hold thereby suggesting that monetary policy in India does not respond to asset prices, but the asset price channel of monetary policy transmission exits.

In their study, Bernanke and Kuttner (2006) analyzed the relationship between monetary policy and equities market. According to them, a proper understanding of the policy transmission mechanism was largely premised on adequate knowledge of the links between monetary policy and asset prices. They measured and analyzed responses of the stock market to monetary policy actions both at the aggregate and industry portfolio levels. Applying the VAR methodology, they found out that the reaction of the market to unanticipated changes in the funds rate was fairly strong, but was largely unchanged when changes are anticipated. This view is similar to Donald L. Kohn (2006) that a monetary authority should respond to stock prices, home values, and other asset prices only when they have implications for future output and inflation over the medium term. In essence, if policymakers suspect that stock (or asset) prices are likely to, say, rise for a time before collapsing, the implications of that possibility for future output and inflation need to be folded into their deliberations.

Earlier studies such as Nouriel Roubini (2005), Semmler and Zhang (2004), Rigobon and Sack (2001), and Filardo (2001) hold similar views that the response of monetary policy to asset price fluctuations should not be arbitrary, but only to the extent the perceived movement can distort the macroeconomic conditions, particularly, inflation, output and financial stability Thus, optimal monetary policy should be pre-emptive, timely and contingent to deal with asset bubbles rather than just mop up the mess that they cause after they burst.

Thus, in the context of monetary policy design strategy, with similar concerns for the effect of asset prices on the objectives of monetary policy, Bernanke and Gertler (1999) argue principally that within the context of short-term monetary policy management, central banks should view price stability and financial stability as highly complementary and mutually consistent objectives. As a confirmation, Goodhart and Hofmann (1999) has shown that asset prices significantly affect future demand conditions in G7 countries and a positive correlation existed between real interest rates, property and equity prices. They posited that this may arise if the central bank reacts to fluctuations in asset prices in order to stabilize the output gap.

Clearly, the extant literature have pointers that monetary policy should respond to fluctuations in asset prices but whether the response is direct or otherwise has continued to be a debate especially in advanced economies. Also, while the focus of these studies has been what the

authorities should do, what is still unclear is the size of volatility and how monetary policy can effectively react to restore normalcy. The experience from the 2007 – 2009 financial and economic crises is quite illustrative of the difficulty of matching size of response to size of volatility.

3 Methodology

3.1 Estimation Technique

Modelling Asset Price Volatility

In order to evaluate the volatility measure of asset prices, we follow the Generalized Autoregressive Conditional Heteroskedasticity (GARCH p,q) process. The (1, 1) in GARCH (1, 1) refers to the presence of a first-order autoregressive GARCH term (the first term in parentheses) and a first-order moving average ARCH term (the second term in parentheses). An ordinary ARCH model is a special case of a GARCH specification in which there are no lagged forecast variances in the conditional variance equation i.e., a GARCH (0, 1). This happened to reflect the characteristic of the data as suggested by the initial test for ARCH effects. The analytical representation of the model is as shown in the equation below:

$$Y_t = X_t' \theta + \varepsilon_t \quad (1)$$

$$\sigma_t^2 = \omega + \alpha\epsilon_{t-1}^2 + \beta\sigma_{t-1}^2 \quad (2)$$

Where ω is defined as the constant term; ϵ_{t-1}^2, the ARCH term and σ_{t-1}^2 is the GARCH term.

Structural VAR Model

The structural VAR founded on the VAR model as first proposed by Sims (1980a) as an alternative to traditional large scale dynamic simultaneous equation models. The SVAR model however, differs in its orientation as theoretical underpinnings can well be captured through the use of identifying restrictions. The SVAR model is rich in applications and essentially applied to study the average response of the model variables to a given one-time structural shock. In addition, it facilitates the construction of forecast error variance decomposition that quantifies the average contribution of a given structural shock to the variability of the data. More so, the SVAR model assist in providing historical decompositions that measure the cumulative contribution of each structural shock to the evolution of each variable over time. Finally, forecast scenarios conditional on hypothetical sequences of future structural shocks can be constructed using the SVAR.

The basic framework of the SVAR is as follows:

Let y_t be a k-dimensional time series (k*1) vector of endogenous variables, $y_t = y_{1t},...,y_{kt})$, and ξ_t be a (k*1) vector of structural innovation with zero mean. The pth-order VAR model is described as:

$$Ay_t = A_1^* y_{t-1} + A_2^* y_{t-2} + ... + A_p^* y_{t-p} + B\xi_t \quad \text{.....(2)}$$

Compactly, equation can be written as;

$$Ay_t = \sum_{i=1}^{p} A_1^* y_{t-1} + B\xi_t \quad \text{.....(3)}$$

For simplicity, constant terms, deterministic terms, and exogenous variables are ignored. Matrix $A(k*K)$ is invertible, and it summarizes the contemporaneous (instantaneous) relationship among the variables. The $A_i^{*}'s(i=1,...,p)$ are $A(k*K)$ coefficient matrices. Structural shocks are properly identified from the error terms of the estimated reduced form with the appropriate identifying restrictions. Non-zero off diagonal elements of matrix B(k*k) allow some shocks to affect more than one endogenous variable in the system directly. is a vector of structural disturbance postulated to follow a white-noise process. Their linear combinations are assumed to be white-noise processes with zero mean and constant variances, and are serially uncorrelated individually. The variance-covariance matrix of ξ_t is usually restricted to be diagonal.

The reduced form (corresponding to the structural form) is obtained by pre-multiplying with A^{-1}, provided that A is non-singular:

.....(4)

Where;

$A_j = A^{-1}A_j^*(j=1,...,p)$. $U_t = A^{-1}B\xi_t$ describes the relation between the reduced form disturbances (U_t) and the underlying structural shocks (ξ_t). Thus, we obtain:

$$E(U_t U_t^{'}) = A^{-1}BE(\xi_t \xi_t^{'})B^{'}A^{-1} \quad \text{.....(5)}$$

Moreover, assuming that the variance of each disturbance is standardized, and substituting population moments with the sample moments, we have:

$\hat{\sum}_u$ contains $\frac{k(k+1)}{2}$ different element, so $\frac{k(k+1)}{2}$ is the maximum number of identifiable parameters in matrices A and B. Therefore, a necessary condition for identification is that the maximum number of parameters of A and B should be equal to $\frac{k(k+1)}{2}$. In order words, the number of equations should equal the number of unknowns in equation (see equation 4). Here, the total number of elements of the structural form matrices A and B is $2K^2$. Thus;

$$2K^2 - \frac{k(k+1)}{2} = k^2 + \frac{k(k+1)}{2} \quad \text{.....(6)}$$

Restrictions should be imposed for identification. If one of the matrices A and B is an identity matrix, then, $\frac{k(k+1)}{2}$ restrictions are left to be imposed. Hence, identification necessitates the impositions of some identifying restrictions on the parameters of A and B, and we have three cases: under-identification, just-identification and over-identification. The validity of an over-identified case is examined by the statistic distributed as X^2(chi-square) with a number of degree of freedom equal to the numbers of over-identifying restrictions.

3.2 The Data

The data for this study span 1985Q1 to 2013Q2 and obtained from various sources including the CBN Statistical Bulletin, Annual Reports and other internal sources. The variables used are: money supply, monetary policy rate (MPR), prime lending rate (PLR), All-Share Index (ASI), real Gross Domestic Product (rgdp), Consumer Price Index (CPI) and All-Share Index (ASI) as a proxy for asset prices. The conditional standard deviation derived from a General Autoregressive Conditional Heteroscedasticity (GARCH 1, 1,) of ASI was used as a variable (CSD) that measures asset price volatility. Logarithm transformation was carried out on the money supply, All-Share Index (ASI), real Gross Domestic Product (rgdp) and Consumer Price Index (CPI). While the money supply, All-Share Index (ASI), real Gross Domestic Product (rgdp) and Consumer Price Index (CPI) entered the model as growth variables reflecting their stationary property, the interest rate variable was used in its percentage point.

We examine the time series properties of the variables using descriptive analysis; unit root testing particularly the Augmented Dickey Fuller (ADF) and Phillip Peron tests; correlation analysis and granger causality test.

4. The Results

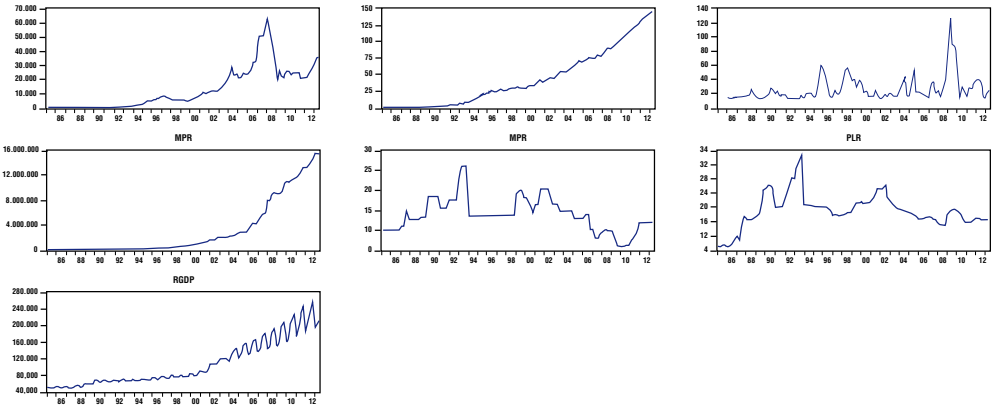
4.1 Establishing the Existence of Trend and Intercept in Variable

Before empirical analysis, we show the chart for each variable. From these charts, we can find whether trend and intercept exist in each variable, The series' exhibited various properties when viewed on a line graph. While the All-share index (ASI), Money Supply (M2), Real Gross Domestic Product (RGDP) and Consumer Price Index (CPI) exhibited trends, the Monetary Policy Rate (MPR), Prime Lending Rate (PLR) and Interbank rate (IBR) exhibited volatile movements.

Summary Statistics on Monetary and Asset Prices Variables

Summary Stats	LASI	LCPI	LM2	LRGDP	IBR__CALL _	MPR	PLR
Mean	8.350709	2.489079	12.93233	11.37622	13.71715	13.08269	17.91406
Median	8.777135	3.252438	12.90594	11.22816	13.48500	13.25000	18.04833
Maximum	11.05115	4.987708	16.56721	12.48249	26.29000	26.00000	34.86667
Minimum	4.730921	-0.829156	9.461294	10.70091	1.500000	6.000000	8.833333
Std. Dev.	1.910023	1.897158	2.277389	0.495320	6.152865	4.358497	5.284760
Observations	114	130	130	130	70	130	130

The MPR witnessed a sharp reduction from 10 per cent to 6 per cent at the peak of the crises in mid-2008, as the CBN adopted measures to cushion consequent liquidity crunch. This followed progressive increments in the rate during the previous years in response to the banking sector being awash with liquidity. Subsequently, during 2009 – 2010, the MPR was consistently slashed in an attempt to stabilize the banking system as well as boost credit to the private sector. It was, thereafter, jerked-up in 2011 as excess liquidity returned to the banking system. The PLR also followed the trend exhibited by the MPR, reaching a high at the peak of the crises, falling when the official rate was slashed, rising again with the huge increase of MPR in 2011 but has moderated and stabilized since then. The inflation rate in Nigeria during the entire period was high especially in the early part of the crises – in double digits, but has moderated and returned to single digit over the last year.



M2 experienced a steep rise after the banking consolidation with a resultant rise in CPI, as evidenced in the upward trending graphs. RGDP data showed a repetitive seasonal pattern. This could be attributed largely to the data generation process, probably used by the National Bureau of Statistics (NBS) to create a quarterly series. All the variables exhibited drift which was applied during the unit roots tests.

The trend shows an increase in the ASI from 2007 to 2008 informed by the enhanced activities in the capital market. The development which was buoyed by the 2005 banking sector reforms became significantly subdued in early 2009 reflecting the impact of the global financial crisis on an already fragile banking system that was heavily exposed to the oil and gas sectors and margin loans. Though the lull in the index persisted over the period 2009 – 2011, it rebounded in 2012.

From the figures above we can see that every variable has its own trend and intercept. This result meets the requirement of stationary test. Next, we will test variables for the presence of unit root

4.2 Time Series Properties

Unit Root Analysis

The unit root test using the Augmented Dickey Fuller (ADF) and Phillip Peron (PP) tests as presented in Table 1 suggests that all variables exhibit non-mean reverting properties at level. This implies that once their equilibrium is disturbed as a result of any shock they do not revert to their mean levels. This by implication means that their first differences which are the respective growth levels are stable.

It is common in the SVAR methodology for the stationary property to be achieved for a more intuitive policy analysis. Consequently, in the unrestricted VAR, the variables are used in their stationary state to ensure the stability of the VAR estimates from which the structural factorization is derived.

Table 1: Results of Unit Root Tests

Variable	AD F				PP			
	Level	1st Diff		Order of Integration	Level	1st Diff		Order of Integration
All Share Index	-1.054597	-8.49557*	Intercept & trend	I (1)	-1.05536	-8.51578*	Intercept & trend	I (1)
Money Supply	-1.962538	-11.0749*	Intercept & trend	I (1)	-2.27332	-11.0655*	Intercept & trend	I (1)
Consumers Price Index	-2.012464	-3.27443**	Intercept & trend	I (1)	-0.74607	-7.61942*	Intercept & trend	I (1)
Real GDP	-1.533	-4.25474**	Intercept & trend	I (1)	-5.61838	-17.0241*	Intercept & trend	I (1)
Monetary Policy Rate	-2.451166	-9.8744*	Intercept	I (1)	-2.40897	-10.1658*	Intercept	I (1)
Prime Lending Rate	-2.714569	-9.88529*	Intercept	I (1)	-2.82051	-9.88529*	Intercept	I (1)

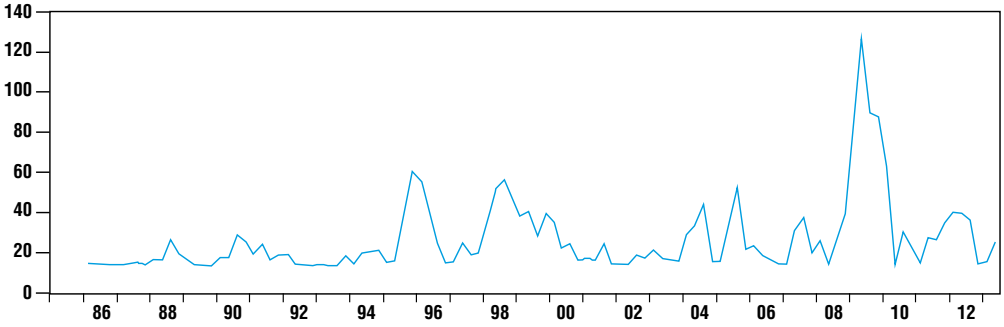
The critical values for the ADF test at 1%, 5% and 10% level of significance are -4.042042, -3.45044 and -3.150549, respectively. * shows significance at 1%, ** at 5% and *** at 10% levels of statistical significance.

Asset Price Volatility

In terms of volatility of the all-share index, the initial estimates of a GARCH (1, 1) process for the growth of All Share Index (glasi) shows that the variance process reverts to the mean with the ARCH and GARCH terms summing to less than one. However, due to non-normality of the errors and with the GARCH term statistically insignificant, a special case GARCH (1, 0) model was fitted. From the results, it could be deciphered that the coefficient of the ARCH effect was less than one implying that the variance process was mean reverting. Since this was near one at 0.83, it shows that the volatility was persistent and process of returning back to the mean was slow. This also shows that the shock is temporary as the sum of GARCH coefficients is less than 1.

An important source of this volatility is market liquidity captured by the growth in Money supply (glm2). This highlights the importance of liquidity as a potential source of risk and vulnerability to the market and financial system stability. This result is intuitively appealing since the major periods of volatility were most typical of the episodes of liquidity crisis associated with the banking and capital markets. While the market treasures volatility, which engenders strong market activity, extreme volatility in financial markets can lead to significant boom and bust cycles that undermines the objectives of monetary policy. Thus, it was inappropriate to suggest that a dormant market was an ideal market, since without movement in stock prices, collapses the efficacy of price mechanism in driving productive investments. It is apparent that a lull in investment can further repel capital from the domestic economy. It stands to reason that within the overall policy mix, monetary policy can play a counter cyclical role in eliminating the destabilizing effect of volatility.

Figure 1: A Measure of Asset Price Volatility, 1986 - 2013



A quick look at the volatility of the All Share Index (conditional standard deviation) as shown in Figure 1, indicate that there is a close link between the most volatile periods with the pockets of distress in the banking sector that hallmarked the liquidity strain which most banks suffered. In 1989, a good number of banks that failed were liquidated, extending to 1994 when the next banking crisis occurred. Later in 1998, some banks were resolved and liquidated by the NDIC, while in 2004-2005, mergers and acquisition as a result of the consolidation exercise occurred following the fragility of the banking industry. Also, between 2008 and 2010, the period that saw the crystallization of the global economic and financial crises in Nigeria,

created significant drying-up of liquidity, intensified volatility of the all share index (CSD) measured as the conditional standard deviation GARCH estimates. This has moderated since 2011 following the various regulatory efforts to mitigate the impact of the global crisis.

Relationship between Asset Price fluctuation and the Price Level

The pair-wise Granger causality results reveal a weak unidirectional causality flowing from ASI to M2 and another from M2 to CPI, as revealed from Table 2. The results also showed a unidirectional causality from CPI to ASI as well as from PLR to ASI (Appendix 4).

Table 2: Pairwise Granger Causality Tests

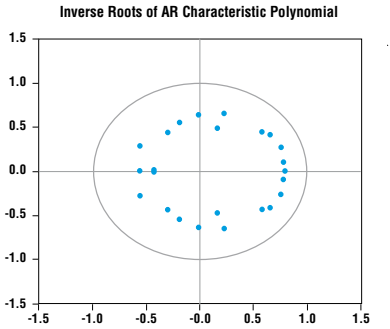
		LCPI	LM2	LRGDP	IBR_CALL	MPR	PLR
LASI	LASI Granger Cause Variables	0.2761 (0.7593)	2.3584 (0.0995)	2.4853 (0.0881)	2.6960 (0.0753)	1.0878 (0.3406)	1.2231 (0.2984)
	Variables Granger Cause LASI	2.5758 (0.0808)	0.1116 (0.8945)	0.8159 (0.4449)	0.2682 (2.6960)	1.2622 (0.2872)	2.3686 (0.0985)

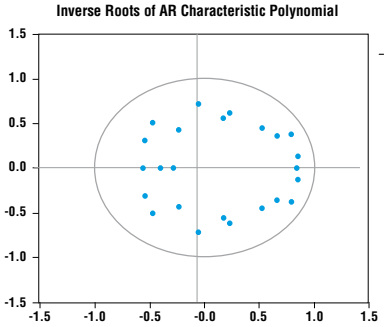
* P-values appear in parentheses

4.3 Analysis of Structural VAR Results

Estimation Diagnostics

In order to ascertain the robustness of the SVAR for the analysis of structural shocks, we carried out a battery of diagnostic tests which revealed that the VAR model was stable as none of the roots lie outside the unit circle. The result was similar for alternative models that either used asset price volatility or the All-share index as proxy for asset prices in the estimation. The autocorrelation LM test indicated that there were no similarities between the observations over the time horizon. In the same vein, the white heteroskedasticity test indicated that errors are uncorrelated and normally distributed, and their variances do not vary with the effects being modelled. These fulfill a priori expectations for the models to be utilized for further analysis.





As a pre-cursor to imposing structural factorization, the variables in both VAR models (i.e. with ASI and CSD, respectively) were ordered in a recursive manner i.e. arranged in a way as to specify what impulse the various variables should respond to. Matrices for the short and long run were constructed, in which restrictions on the models were placed on the lower triangular matrix.

Long-run pattern matrix

$$\begin{pmatrix} a_{11} & 0 & 0 & 0 & 0 & 0 \\ a_{21} & a_{22} & a_{23} & 0 & 0 & 0 \\ a_{31} & a_{32} & 0 & a_{34} & a_{35} & 0 \\ a_{41} & a_{42} & a_{43} & 0 & a_{45} & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 0 & 0 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & a_{66} \end{pmatrix}$$

Afterwards, two VAR models were estimated using ASI and its volatility (CSD) as proxies for asset price, respectively. In order to determine the most appropriate lag for our estimation, the lag selection criterion was used. Various lag lengths were suggested by the different criteria as being optimal for estimation of the Vector Autoregression model. However, the lag length at 4 produced a more stable model and was adopted. A time term and dummy variables to capture unstable periods in the various series were also included in the VAR model.

Impulse Response Analysis

Estimates of asset price fluctuations reflect developments that are associated with fundamentals and other factors. In particular, the fragile banking industry which collapsed following the drying up of liquidity in the wake of the global financial crisis showed extreme volatility in the measure of price-return index of assets. Also, prior to the collapse, there was a build-up of liquidity in the wake of reforms that included consolidation among banks that left most of the exposed to the oil and gas industry, created asset mismatch and the penchant for profligacy in margin loans. It meant that financial stability was risk laden, exploding due to liquidity shocks occasioned by large non-performing credits and capital reversals. The sudden collapse of the market and the absence of strong buffers and erosion of confidence dramatically caused a precipitous depreciation of the naira with implications for price stability.

While volatility in the earlier years was relatively mild, it was nevertheless significantly informed by the emergence of new listings and a resurgent bonds market following reforms to

the capital market. The market has witnessed improvements in infrastructure, discipline, depth and regional integration which have attracted foreign listings.

The palpability of these developments meant that monetary policy has a sufficient role in stabilizing the market and sustaining macroeconomic and financial stability due to asset price volatility. Evidence from structural factorization with long run restriction as shown in Figure 2, suggest that monetary policy rate responds strongly (about 77 basis points) to a one standard deviation shock in asset price volatility with a lag. It however, declines by about 20 basis points in the second quarter, easing gradually before returning to steady states. This helps in dampening the feed-back effect of a shock to volatility in accentuating price pressures. Consequently, the prime lending rate moves in tandem with adjustments in the MPR due to asset volatility shock.

There is, however, a disconnect between the policy rate and money supply, with the channel of transmission feeding into the lending rate lowering prices. Given the nature of liquidity, liquidity measures such as intervention schemes which the CBN funded, eased liquidity conditions and pushed money supply to levels that were sufficient enough to maintain the growth trajectory for the economy. The long run response of growth in money supply to a one standard deviation shock in asset price volatility is approximately 3 percentage points, while real GDP growth responds by as much as 2.1 percentage points reflecting the role of a higher velocity of money. Improved growth with a tightening of monetary conditions keeps inflation subdued. Similarly, an alternative specification of the SVAR, replacing asset price volatility with the all share index, produced results that essentially gave the same direction of response to movement in asset price.

In the light of the limit of monetary policy, a menu of policy instruments proves potent in achieving the objective of price stability in the presence of asset price volatility shock. From a short run perspective, the response of the policy rate to asset price fluctuation is neutral and confirms the reason for the delayed response of the policy rate to asset price volatility. The short run responses suggest a rather transitory and insignificant impact of volatility on monetary policy and other economic indicators.

5. Conclusion and Policy Implications

5.1 Conclusion

In this paper, we have shown that the size of volatility is higher in periods of crisis and an important source of this volatility is market liquidity captured by the growth in Money supply. This highlights the importance of liquidity as a potential source of risk to the market and financial system stability. In Nigeria, it was reflected by a collapse of the fragile banking industry following the drying up of liquidity in the wake of the global financial crisis. It meant that financial stability was risk laden, exploding due to liquidity shocks occasioned by large non-performing credits and capital reversals. The sudden collapse of the market coupled with the absence of strong buffers and consequent erosion of confidence caused a precipitous depreciation of the naira with implications for price stability.

We also show that asset price volatility produces far-reaching consequences which are long-lasting if not aggressively tackled. Extreme volatility in financial markets can lead to significant boom and bust cycles that undermine the objectives of monetary policy. In addition, our findings suggest that monetary policy rate has asymmetric responses to asset price volatility; responding strongly with a lag (about 77 basis points) to a one standard deviation shock. It however, declines by about 20 basis points in the second quarter, easing gradually before returning to steady states. This helps to dampen the feed-back effect of accentuating price pressures from a shock to volatility. Consequently, the prime lending rate moves in tandem with adjustments in the MPR due to asset volatility shock.

The palpability of these developments meant that monetary policy has a sufficient role in stabilizing the market and sustaining macroeconomic/financial stability that arise from asset price volatility. In the light of the limit of monetary policy, a menu of policy instruments proves to be potent in achieving the objective of price stability in the presence of a shock to asset price volatility.

5.2 Policy Implications

Insights from the results have raised a number of policy issues:

- The size of asset price volatility rises in periods of banking crisis demonstrating the dominance of the sector on the capital market. Thus, while the monetary policy rate is an important tool in normalizing volatility, a healthy banking sector is necessary towards reducing volatility and improving the efficacy of monetary policy. This could also require coordinated efforts from the fiscal and monetary authorities as has been shown by the experience of interventions in most economies following the global financial crisis;
- Monetary policy can and should respond to volatility in asset prices with a view to smoothening liquidity in order to stabilize the market and minimize the inflationary pressures it creates. Pre-emptive and timely measures could be taken to avert extreme volatility that can threaten macroeconomic stability;
- The asset price channel and the interest rate channel are intertwined given the increasing role of banks in the economy and as such, cannot be viewed in isolation. The periods of crisis produces high volatility in the market because of the possible liquidity effect; and
- Monetary growth can result from sources that are not immediately managed using demand management policies such as a monetary policy tightening. The result has shown that keeping the growth of money and its velocity is important for growth.

Following the empirical result, the paper recommends the following;

i. An internally consistent liquidity adjustment framework should be put in place. A rule that establishes how much reaction from monetary policy will sustain market liquidity conditions.

ii. stabilize the market without distorting monetary policy objectives such as stable prices;

iii. set-up asset price volatility threshold that will trigger remedial liquidity actions as part of the macro-prudential indicator tools;

iv. pre-emptive policies and coordination of all fiscal and monetary policies that can smooth the bubbles in the market.

v. a combination of monitoring, unconventional and traditional instruments of monetary policy as well as a further deepening of the market are useful signposts to addressing asset volatility challenges.

vi. Finally, demand management policies can also be used depending on the prevailing economic conditions.

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Appendices

Appendix 1: Dependent Variable: GLASI

Method: ML - ARCH (Marquardt) - Normal distribution
Sample (adjusted): 1986Q1 2013Q2
Included observations: 110 after adjustments
Convergence achieved after 28 iterations
GARCH = C(3) + C(4)*RESID(-1)^2

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	19.36211	4.749141	4.076970	0.0000
GLM2	0.310504	0.163390	1.900381	0.0574
Variance Equation				
C	190.6727	43.55861	4.377382	0.0000
RESID(-1)^2	0.832272	0.266075	3.127956	0.0018
R-squared	-0.010153	Mean dependent var		20.20938
Adjusted R-squared	-0.019506	S.D. dependent var		32.21257
S.E. of regression	32.52523	Akaike info criterion		9.181218
Sum squared resid	114252.2	Schwarz criterion		9.279417
Log likelihood	-500.9670	Hannan-Quinn criter.		9.221048
Durbin-Watson stat	0.300640			

Appendix 2: Arch LM Test

Heteroskedasticity Test: ARCH

F-statistic	2.826195	Prob. F(1,107)	0.0957
Obs*R-squared	2.804934	Prob. Chi-Square(1)	0.0940

Appendix 3: Test Equation:

Dependent Variable: WGT_RESID^2
Method: Least Squares
Sample (adjusted): 1986Q2 2013Q2
Included observations: 109 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.849200	0.152977	5.551148	0.0000
WGT_RESID^2(-1)	0.159978	0.095161	1.681129	0.0957
R-squared	0.025733	Mean dependent var		1.008963
Adjusted R-squared	0.016628	S.D. dependent var		1.262101
S.E. of regression	1.251564	Akaike info criterion		3.304843
Sum squared resid	167.6061	Schwarz criterion		3.354226
Log likelihood	-178.1139	Hannan-Quinn criter.		3.324869
F-statistic	2.826195	Durbin-Watson stat		1.991342
Prob(F-statistic)	0.095655			

Appendix 4: Pairwise Granger Causality Tests

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LCPI does not Granger Cause LASI	112	2.57582	0.0808
LASI does not Granger Cause LCPI		0.27609	0.7593
LM2 does not Granger Cause LASI	112	0.11161	0.8945
LASI does not Granger Cause LM2		2.35843	0.0995
LRGDP does not Granger Cause LASI	112	0.81596	0.4449
LASI does not Granger Cause LRGDP		2.48534	0.0881
IBR__CALL_ does not Granger Cause LASI	68	0.26820	0.7656
LASI does not Granger Cause IBR__CALL_		2.69604	0.0753
MPR does not Granger Cause LASI	112	1.26215	0.2872
LASI does not Granger Cause MPR		1.08784	0.3406
PLR does not Granger Cause LASI	112	2.36862	0.0985
LASI does not Granger Cause PLR		1.22309	0.2984

Figure 2: Short Run response of selected indicators to asset price volatility

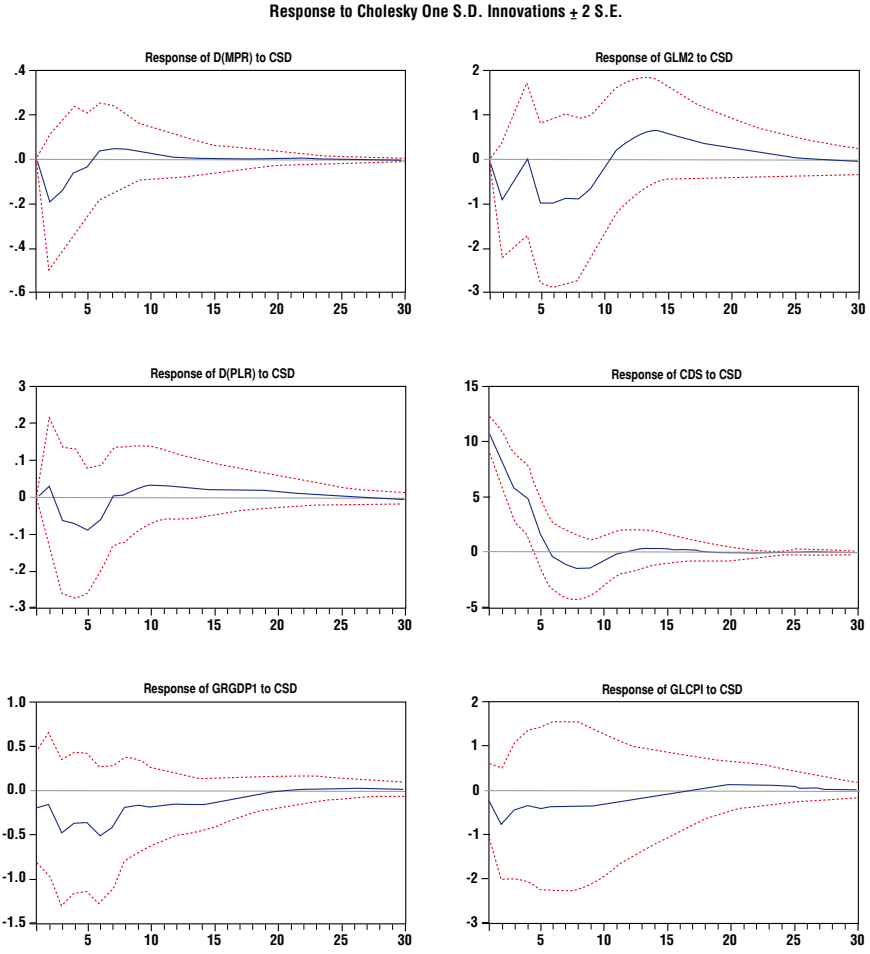


Figure 3: Long run response of selected indicators to All-share Index

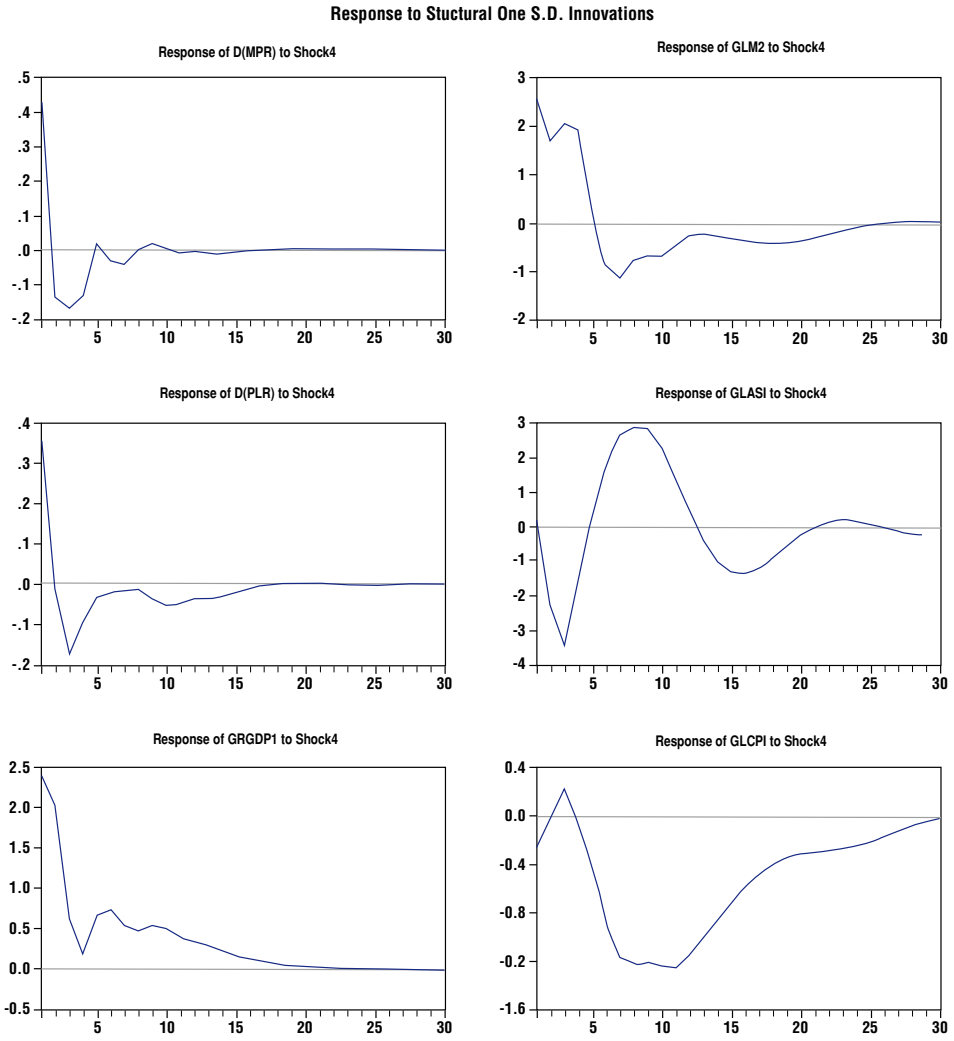
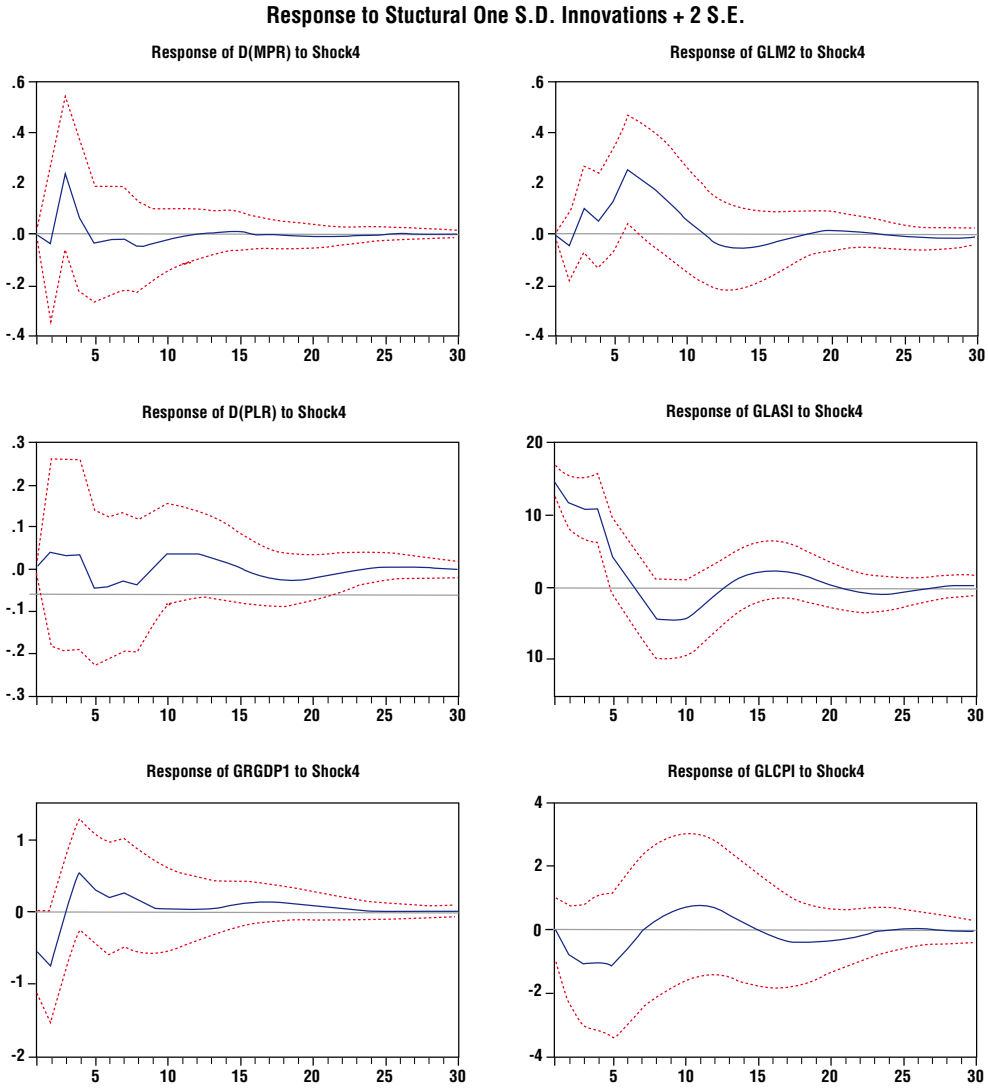


Figure 4: Short Run response of selected indicators to All-share Index



Political Institutions and Fiscal Management in Nigeria: Do State Governments Matter?

Abidemi C. Adegboye*

Abstract

This study investigated the role of political institutions in fiscal policy in Nigeria by incorporating state governments in the democratic era as strong agents whose rent seeking increase during periods of revenue boom. Data covering the period 1970 to 2012 were segregated into different sub-periods, including the recent democratic era (1999-2012). The OLS and GMM estimation techniques were used in the empirical analysis to determine the cyclical properties of fiscal policy, the effects of institutions on the cyclical stance of fiscal policy and the countercyclical effort of fiscal policy in Nigeria. The results showed that fiscal policy responds symmetrically to output cycles. More importantly, the study found that fiscal dependence (state government dependence on oil resources for fiscal activities) is the strongest institutional factor promoting fiscal procyclicality in Nigeria. This effect is more pronounced during the democratic era – fiscal deficits to income ratio have responded more positively to state government dependence on the fiscal pool since 1999.

Keywords: Political Institutions, fiscal policy, state government, Nigeria, GMM

JEL Classification: E62 H5 H77

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1. Introduction

For many developing countries, public debate on macroeconomic fiscal policy management has not only focused on the output growth outcomes, but also fundamentally on its effectiveness in business cycle stabilization. The consensus in this regard is that in developing countries fiscal policy is highly procyclical, owing mainly to the effects of political economy factors. The proposition is that while developed countries are equipped with strong institutions and political systems, developing countries rarely have strong, healthy and stable institutions (Gavin and Perotti, 1997; Lane, 2003; Kaminsky, Reinhart and Vegh, 2004; and Talvi and Vegh, 2005). These problems with developing countries are intensified by the predominance of resource dependence. Barnett and Ossowski (2002) and Asfaha (2007) have shown that countries that rely on oil and other nonrenewable resources for a substantial share of their revenue face certain unique fiscal challenges: the revenue stream is exhaustible, uncertain, volatile, and largely originates from abroad. This has led to implications that resource-rich developing economies have not performed well relative to their developed counterparts.

While this may be true in the case of Nigeria, additional forces may be at work, persistently rendering fiscal stabilization efforts to be at risk. In this direction, Auty (2001) noted that the inferior performance of resource-rich countries is usually attributable to the fact that competition for the rent tends to engender "extractive" political states. This is because rent extraction is more attractive to governments than wealth creation since rent extraction confers immediate (often personal) economic and political gains, whereas wealth creation delays gains and by expanding competition it also shrinks the scope for rent-seeking activity.

The difficulties posed by a volatile, unpredictable, and exhaustible source of fiscal revenue to fiscal management have been compounded in a number of cases by institutional weaknesses and complex political dynamics (IMF, 2007). In reality however, complex political dynamism tends to hold a strategic and powerful influence on the success and sustainability of fiscal management in Nigeria. For instance, the Fiscal Responsibility Act was introduced in 2007 to ensure that oil price shocks are not transmitted directly into the Nigerian economy. The essence was to adopt a medium term expenditure framework which should put fairly long term revenue streams into consideration when pursuing current expenditure measures and by using an oil price benchmark in budgetary operations. However, dynamic political factors surrounding Nigeria's fiscal setup have persistently derided the effectiveness of such framework and have put into serious question the sustainability of the ideals of the Fiscal Responsibility Act. In 2003 a judicial injunction compelled the fiscal authorities to share excess oil revenue between the states and the federal government which made the Act less effective since state governments had better leverage in which to participate in fiscal operations.

Apparently, fiscal institutions would be more successful in aiding fiscal stabilization when there is broad political support for pursuing fiscal objectives. In the same vein, the federal structure of government in Nigeria may present a strong incentive for weakening fiscal policy. Increased access to oil funds by all tiers of government during periods of rising prices will definitely lead to spending patterns that are not consistent with a medium term expenditure structure. Essentially, we argue in this study that weak institutional set-ups affect quality of fiscal management in Nigeria. Procyclical fiscal policy and disproportionate increases in government spending during oil booms in the country can be a manifestation of weak institutions that lead

to weak fiscal management. Could the interaction between different institutional setups and fiscal mechanisms, such as expenditure composition and size, the financing decision, and the reaction to an external shock in oil revenues, explain the weak fiscal stabilization outcomes in Nigeria?

This study aims at providing answers to the questions posed above and also to employ empirical means to shed more light on the benefits of improving the quality of institutions in terms of fiscal management in Nigeria. The rest of the study is organised thus, section two presents the review of relevant literature. Section three of the study analyzes the position and trends in sub-governmental fiscal management in Nigeria. Section four is the theoretical framework and methodology – including model specification and data issues, while the empirical analysis of the study is performed in section five and section five concludes.

2. The Literature

Beginning with North (1990, 1992), there has been an increasing number and depth of studies on the effects of institutions on economic performance. Most of these studies show positive benefits of improved quality of institutions in general output and growth outcomes (for instance, Kaufman et al, 2003; Acemoglu, Johnson, and Robinson, 2005; Rodrik, Subramanian, and Trebbi, 2002; Akpan and Effiong, 2012). Clearly, most of these studies channel institutional influences on economic performance through policy analysis. This is because, institutional factors in the economy come to bare when issues of use and redistribution of common pool resources are involved. Institutional structures are a necessary condition for economic activity to flourish since incentives and price signals cannot function properly without them. 'Markets require institutions because they are not self-creating; self-regulating; self-stabilising, or self-legitimising' (Rodrik, 1998). Monetary and fiscal policy institutions are necessary to provide an enabling environment in which private investment can flourish. The minimization of risk is vital if entrepreneurs are to take informed, long-term investment decisions.

In an influential study, Rodrik (1999) made a direct link between greater exposures to external shocks, the quality of conflict resolution institutions, and growth. Large external shocks usually trigger distributional conflicts. Therefore, if conflict management institutions are weak this can exacerbate the economic costs of terms of trade shocks. The country's productivity diminishes, argues Rodrik (1999), and the institutional weakness leads to delays in needed policy adjustments. One of the main insights drawn from this study is that in open economies, as in the case of oil exporting countries, output is more prone to terms of trade shocks, but when institutions are sufficiently strong to ensure that ex post distributions follow the "rule of law" rather than opportunistic grabs by social groups, the severity of the shocks might not play a role in determining the overall performance of an economy.

A well defined procedure for weak institutions in delivering debilitating fiscal management process (and the attendant poor economic effects) is presented through the voracity effect. Lane and Tornell (1998) developed the voracity effect explanation for poor fiscal outcomes in resource-rich developing countries by analysing the role of multiple powerful groups in an economy that lacks a strong legal-political institutional infrastructure. They endogenised the extent of discretionary fiscal redistribution to more fundamental characteristics of a country,

namely the existence of powerful groups, physical rates of return, and institutional barriers to discretionary redistribution. Powerful groups dynamically interact via a fiscal process that effectively allows open access to the aggregate capital stock. In equilibrium, this leads to slow economic growth and a "voracity effect," by which a shock, such as a terms of trade windfall, perversely generates a more than proportionate increase in fiscal redistribution and reduces growth. They also showed that a dilution in the concentration of power leads to faster growth and a less procyclical response to shocks. The unique result from the study that relates to our current analysis is that the effects on economic performance of democratization in a developing economy the effect on growth depends 'on the effect that the shift has on the ability of powerful groups to extract transfers.' Lane and Tornell (1998) showed that a movement into democracy that eventually relaxes restrictions on the behaviour of the powerful groups in a society, may actually intensify the redistribution struggle in these countries causing poorer adjustment to windfalls. Thus, the strengthening of institutions is what aids democracy to achieve improvement in growth performance and adjustment to windfalls.

Svesson (1996) developed a game-theoretic model of public policy in a developing country in order to explain a number of empirical regularities. He showed that under conditions of large rent-seeking interest groups and weak bureaucracy, an increase in government revenue will be completely crowded out by increased rent dissipation, leaving the provision of public goods unaltered.

In the case of fiscal policy in developing countries, Lledó et al, (2009) profiled cyclical patterns of government expenditures in sub-Saharan Africa since 1970 and explains variation between countries and over time. Controlling for endogeneity, he finds government expenditures to be slightly more procyclical in sub-Saharan Africa than in other developing countries. However, the role of institutions on fiscal performance was unclear because changes in political institutions had no impact on procyclicality. Within the context of a micro founded analysis of business cycle stabilisation, Leith and Wren-Lewis (2006) analysed fiscal policy and showed that a critical barrier to the use of fiscal instruments may be political economy concerns. In his paper, Aliyev (2012) analyzed fiscal policy procyclicality in resource-rich countries and modeled political economy problems as the disutility from having a budget surplus. Under an imperfect institutional environment, high resource revenues (or budget surplus) create pressure on the government to increase spending which leads to fiscal policy procyclicality. In the case of Nigeria, Obadan and Adegboye (2013) investigated the linkages between unstable oil prices, fiscal operations and the pursuit of macroeconomic stabilization in Nigeria within a dynamic framework and found that fiscal policy has delivered less output stabilisation impact in the economy than expected. They attributed the poor performance of fiscal stabilization to the unstable revenue inflow over the years.

The major difference between the previous studies on institutional factors in output determination and our current study is that this study is particularly localized and is embarked within the Nigerian context. This is the main contribution of the paper to empirical literature. Previous research had used large scale cross-country data to investigate institutional effects on growth. However, institutional factors can be country-specific. For instance, apart from the apparent effects of poor governance and corruption on economic performance in Nigeria, other institutional factors like the federal system, resource allocations, and the arms of government exert strong effects on fiscal and economic behaviour (Olomola, 1999, 2012; Wantchekon and

Asadurian, 2002; and Eifert et al, 2002). Moreover, this study focuses on the linkages between institutions, fiscal policy and macroeconomic stabilization in Nigeria.

3. Review of Sub-Governemnt Fiscal Management in Nigeria

What has been the role of state governments in the development of the Nigerian public finance? This analysis is effectively viewed from the perspective of the fiscal federalism structure in Nigeria. According to Kalu (2011), Fiscal Federalism in Nigeria is synonymous with revenue allocation and "resource control". There has always been controversy on the appropriate formula that should be used to share resources in Nigeria. Various commissions have been set up to work out acceptable and equitable revenue allocation formula for the country. The commissions include:

- The Phillipson commission of 1946
- The Chicks -Phillipson commission of 1951
- The Chicks commission of 1953
- The Raisman Commission of 1958
- The Binns Commission of 1964
- The Dina Interim Revenue Allocation committee of 1968
- The Aboyade Technical Committee of 1977
- The Okigbo Presidential Commission of 1979
- The T.Y Danjuma Fiscal Commission of 1988

In agreement with the voracity postulations, Kalu (2011) noted the perception that the position of the various commissions tend to shift to suit particular constituencies and that their analyses are not informed by logic but preconceived self or sectional interests rationalized and justified by theories.

As state governments have a considerable ability to conduct a stabilising fiscal policy - especially in a federal system- (Gavin and Perotti, 1997), it is important to have an idea about the size and evolution over time of state governments in the country. Here again there are many possible dimensions along which the issue can be analysed. Table 1 reports overall averages of the main aggregates. One would immediately notice the small shares of each of the components in GDP. For instance, the share of total expenditure of states in GDP for the two sub periods after SAP is very low when compared with that of the federal government for the corresponding periods. While the shares were 18.8 percent and 15.8 percent respectively for the federal government (see Table 2), it was 6.12 percent and 9.07 percent respectively for the state governments. This shows the dominance of the central government in fiscal operations in Nigeria. The share of state government spending in GDP however increased by about 3 percent during the democratic era, perhaps, due to mounting pressure from the states to get more access to the national resources. This outcome tends to support to the argument that voracity may heighten in democracratic settings where institutions are weak and the component groups are relatively powerful (Lane and Tornell, 1998; El Anshansy and Katsaiti, 2010; Elbadawi and Soto, 2012; and Torvik, 2012).

The ratio of state government expenditure to federal government expenditure actually fell by 27 percent between the 1970-1986 period and the 1987-1998 period. This shows that federal government did most of the fiscal participation during the period immediately after SAP. This gap fell drastically during the democratic era as the ratio increased by as much as 35 percent over the previous period. This reflects very clearly the move towards decentralization in Nigeria's fiscal policy. Indeed, the judicial injunction in 2003, compelling the fiscal authorities to share excess oil revenue between the states and the federal government gave the state governments a better leverage in which to participate in fiscal operations. Moreover, the ratio of capital expenditure to total own expenditure by states seems relatively impressive and steady over the years. This suggests that states exert a large proportion of their total expenditures in capital spending.

Table 1: State Governments Fiscal Applications

	Value (%)			
	1970–2012	*1970–86*	*1987–98*	*1999–2012*
Own fiscal balance/GDP	-2.64	-5.61	- 0.39	-0.03
Total Own expenditure/GDP	10.0	12.9	6.12	9.07
State govt. expenditure/ fed. govt. total expenditure	53.1	59.0	32.3	67.9
State govt. own revenue/ state govt. total revenue	17.8	19.8	19.3	12.4
Capital expenditure/total own expenditure	39.6	42.0	36.2	39.4
Total federal transfers to states/total state expenditure	54.4	46.0	63.6	56.7

Source: Underlying data obtained from CBN Statistical Bulletin (various issues)

The ratio of own revenues to total revenues of the state governments has declined over the years. The ratio dropped by 7 percent during the 1999-2012 period over the previous period. This indicates that the fiscal autonomy ratio (see Jimoh, 2003) has not improved in the democratic era. It is clear that as the scope of state governments in Nigeria has expanded over time, they have relied increasingly on transfers from the central government to finance their operations. The ratio of federal governments transfer to states to total state governments' expenditures buttresses the fiscal dependency status of the state governments. Over the entire period, the ratio was 54.4 percent and the ratio was even higher than the entire period average between 1999 and 2012. The reverse side from this position is the concentration of fiscal resources at the federal level. In Table 2 the proportion of federal government spending in total spending of all tiers of government was 65.7 percent on average over the entire period. The ratio has however, reduced to 59 percent in the democratic era (perhaps due to strong state government agitations), but it is still relatively high.

Table 2: Relative Size of Federal Government Fiscal Operations

	Value (%)			
	1970-2012	*1970-86*	*1987-98*	*1999-2012*
Total fiscal balance/GDP	-4.01	-3.55	-5.89	-2.79
Total revenue/GDP	26.3	22.4	25.4	33.8
Total expenditure/GDP	19.3	21.6	18.8	15.8
Primary expenditure/GDP	16.2	20.1	13.5	12.8
Fed. Govt. exp./Total exp. of all tiers of govt.	65.7	64.0	75.8	59.0

* Studies on the fiscal stance often exclude interest payments, as they reflect past policies (public debt) and financial conditions

Source: Underlying data obtained from CBN Statistical Bulletin (various issues)

Certain basic facts are presented in the analysis above: state governments fiscal revenue drives has been less than impressive; fiscal dependency by the states is still high; and federal government dominance in the fiscal space needs to be reduced.

4. Theoretical Framework and Methodology

4.1 Theoretical Framework

Two main issues are investigated in the empirical analysis. First we show that fiscal outcomes are procyclical in Nigeria based on the oil boom-bust cycles, and then the effects of institutional factors are investigated. The main institutional indicator used in the study is political institutions. We focus on the set up of fiscal federalism with respect to annual revenue and expenditure outcomes between the federal government and the states. The measurement of these effects are based on the level of concentration of spending powers with the central government and the extent of decentralization or state's fiscal dependence on the central government resources (see Jimoh, 2003 for further explanation).

These measurements particularly follow Lane and Tornell (1998) voracity arguments to fiscal procyclicality in resource-rich countries. They argued that economic and fiscal performance could be reduced when there are powerful groups, especially in a system with weak institutional barriers to discretionary redistribution. This is because the 'non-cooperative powerful groups generate a redistribution struggle' which often ends up in wasteful and inefficient use of the resources. Lane and Tornell (2008) made an intuitive presentation of the voracity effect model by considering an economy populated by infinitely lived groups and formed by two sectors: a high-return formal sector and a less efficient shadow economy. The shadow economy can be identified with the state governments in acountry where oil revenue forms the main pool of resource allocation. In this setting, the state governments are assumed to be less efficient in the use of oil revenue, especially in periods of windfall. If powerful groups exist, each group is able to extract fiscal transfers which – in the case of federal-state relations often results in fiscal deficits. The government in turn must finance such transfers by levying taxes on the formal sector or through inefficient borrowing. This interaction is repeated for an infinite horizon.

Within a dynamic framework, appropriations by groups would engender productivity shocks that can affect the intensity of rent-seeking activity in future. The outcome of the powerful groups' struggle would initially lead a reduction in power concentration and reduce discretionary redistribution which may raise the average rate of return in the economy. Next, as the number of powerful groups increases, two conflicting effects operate. On the one hand, there are more groups with the ability to extract subsidies. On the other hand, each group knows that it must ask for a smaller subsidy if the formal sector is to offer a satisfactory after-tax rate of return to the other groups. In equilibrium, the second effect dominates. Lane and Tornell argue that the result is analogous to the result in industrial organization that the Cournot equilibrium converges to the perfect competition outcome as the number of sellers increase. More importantly however, when there are groups with the power to extract subsidies and there do not exist institutional barriers to discretionary redistribution, a positive shock to the terms of trade induces an increase in redistribution and a reduction in the growth rate.

In the same analysis, the researchers showed that a reduction in power concentration through increasing the number of powerful groups would ensure better economic performance. We intend to provide empirical tests for these arguments for the Nigerian case.

4.2 Methodology

4.2.1 The Model

The initial modeling that is pursued in this section seeks to exhibit the procyclical behaviour of government fiscal stance in Nigeria. The methodology involves the use of an autoregressive model to estimate a "cyclical fiscal policy," reflecting the systematic response of the fiscal balance to the business cycle. A major indicator of fiscal performance used in literature is the relationship between fiscal policy and the business cycle. In the estimation, the fiscal balance-GDP ratio is adopted as a measure of fiscal policy. This measure is used because it reflects more appropriately government's extension of current spending over revenue and the tendency of government to embark on debt-based fiscal management.

Procyclicality of fiscal policy is considered as an indicator of poor fiscal policy whereas countercyclical fiscal policy indicates better fiscal management. Here, a measure of cyclicality of fiscal policy is constructed following Alesina and Tabellini (2005), who in turn adapt Gavin and Perotti's (1997) specification. Moreover, reverse causality from government spending to output is certain once fiscal policy is effective (Debrun and Kapoor, 2010), and this can introduce bias to the estimation of the fiscal cyclicality parameter (β). To alleviate this problem, an instrumental variable (lagged output gap) is introduced in the estimation to represent the output gap. Our measure of procyclicality is the coefficient β from the following regression equation estimated for the Nigerian economy:

$$\Delta FP_t = \alpha + \beta YGAP_{t-1} + \gamma OPN_t + \delta I_t + \varphi FP_{t-1} + \epsilon_t \qquad (1)$$

Where,

FP = fiscal policy (measured as overall fiscal balance to GDP ratio);

YGAP = measure of the business cycle, i.e, real output growth gap;

OPN = trade openness;

I = measure of institutional quality;

FPt-1 = lagged fiscal policy;

$\in$ is unobserved error terms; and t subscripts denote years.

In measuring the responsiveness of fiscal policy to the business cycle, it is important to note that fiscal policy and real output growth can trend (see Lee and Sung, 2005), hence there is need to estimate the output gap from its long-run trend. The Hodrick-Prescott (HP) filter is used to obtain a smooth estimate of the long-term trend component of a series and is applied to derive the smooth long run output growth gap. The AR (1) term in equation (1) accounts for persistence of budget imbalances and tends to reduce first order autocorrelation in the initial estimations (see Debrun and Kapoor, 2010).

The fiscal policy cyclicality is captured by β, the short-term response of fiscal policy to the output gap. A positive value implies that fiscal policy is symmetric; a cyclical boom is associated with an increase in the government spending meaning that the behaviour of fiscal policy is procyclical and that government actions are systematically destabilizing. On the other hand, a negative coefficient on YGAP implies that on average, the government seeks to increase the counter-cyclical bend of fiscal policy through discretionary measures.

Following Jimoh (2003) two measures of institutional quality are used in the empirical analysis based on the fiscal federalism structure of the political system in the country:

Fiscal dependency ratio = federal allocated revenue as a percentage of total expenditure of states; and

Fiscal concentration ratio = share of federal government expenditure in the total expenditure of all tiers of government.

The second analysis involves estimating output stabilization equation where institutional factors exert extensive effects. The model follows a simplified voracity effects analysis where institutional setups form the rent-seeking groups in the country. Instead of instrumenting for fiscal procyclicality from the estimated fiscal cyclicality equation (as in Anshansy and Katsaiti, 2010), we use the GMM method and identify instruments as the lags of the fiscal outcomes. This is akin to estimating an instrumental variables regression model using GMM (demonstrated in Cambell and Mankiw, 1990). The stylized output gap function may be considered as

$$Y_t = \delta_0 + \delta_1 \Delta FP_t + \delta_2 OPN_t + \delta_3 I + u_t \quad (2)$$

$$= \delta' z_t + \varepsilon_t \quad (3)$$

Where Yt denotes the output growth gap, FP denotes fiscal policy as measured by fiscal balance-GDP ratio, OPN denotes trade openness (which corrects for omitted variable problem), I refers to measure of institutional factors and z is the usual instrument set. Given that Y_t, ΔFPt and *I* are all stationary and that $\{\varepsilon_t, St\}$ is also a stationary mean-reverting Martingale difference sequence (MDS) where denotes the observed information set at time t. It can be

seen that the variables ΔFP and I are likely to be contemporaneously correlated with ε_t and so the least squares estimates of δ are likely to be biased and inconsistent. Because $\{\varepsilon_t, S_t\}$ is a stationary and time-invariant MDS, $E[\varepsilon_t | S_{t-1}] = 0$ (see Green, 2004). This implies that any variable in S_{t-1} is a potential instrument (Imbens, 1998). Furthermore, for any variable $x_{t-1} \subset I_{t-1}$ is a potential instrument, $\{x_{t-1}\varepsilon_t\}$ is an uncorrelated sequence. The instruments are therefore the lags of each of the institutional variables as well as the lag of fiscal policy.

$$S_t = \{Y_\lambda, \Delta FP_\lambda, I_\lambda\}\ \lambda = {}^{0}_{t} \qquad (4)$$

4.2.2 The Data and Procedure

Data used in this empirical analysis are annual time series data covering the period 1970 to 2012. All the data are sourced from the CBN Statistical Bulletin, 2013 Edition. In order to present more robust results, the econometric estimates are broken into sections with regard to economic episodes in the country. Thus, the estimations are categorized into period before SAP (1970-1986), period after SAP (1987-1998), and the democratic era (1999-2012). The reason for this data set-up is to allow for different institutional effects on fiscal policy during the non-democratic and the democratic eras. The robustness checks for the data are reported in the appendix. The test for structural break based on the CUSUM squared chart indicates a clear structural break in the fiscal policy-output gap relationship between 1987 and 2000. The unit root results also indicates that all the series (except fiscal concentration) are stationary in levels (note that the data are all in ratios), which eliminates persistence in the time series. The segregation of the data and use of OLS apparently follow statistical investigation and provides ground for avoiding the use of dummy variables in the study.

5. Empirical Analysis

The preliminary argument that fiscal policy is procyclical in Nigeria is demonstrated in Figure 1 where the scatter plot for the relationship between oil revenue and federal and state governments spending are plotted along with the regression line and equation. It can be seen that the slopes for each of the charts is rather steep and positive; as oil revenue rises, spending automatically rises too. It should be noted that oil boom episodes that witness less than proportionate increase in government spending reflects the success of fiscal policy management restraint or fiscal institution success. However, periods that witness more than proportionate increase in spending as a result of an oil boom is a sign of existence of voracity effect in which the government is under pressure to increase spending (Dabla-Norris et al, 2010).

In comparison, the R squared for the 1999-2012 period is lower than that of the entire period suggesting that more factors, other than federal allocations, now explain government spending at both tiers. However, the slope coefficient for the states relationship is greater than one, indicating that the states tend to increase spending more than proportionately to the rise in oil revenue inflow. Also, even though the R squared has reduced after 1999 (for the states) the slope coefficient has actually increased, indicating that state governments have mounted higher pressure on the pool resources of government since democracy was restored. This phenomenon can actually prevail when a nation transits into democracy but the institutions are not strengthened (Tornell and Lane, 1998).

Fig. 1a: Oil Revenue and Federal Government Spending, 1990-2012

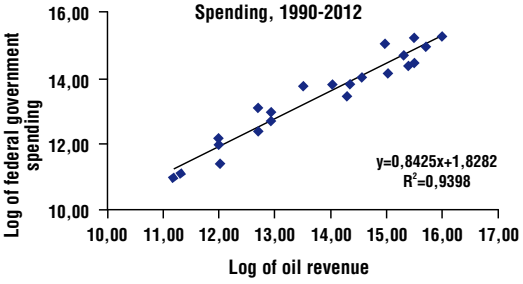


Fig. 1b: Oil Revenue and State Governments Spending, 1990-2012

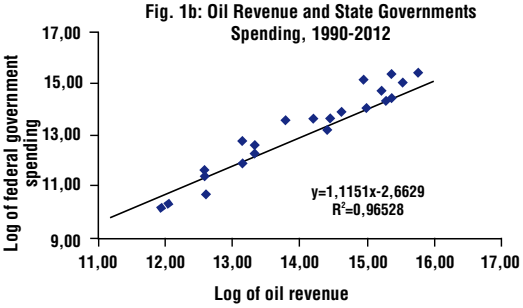


Fig. 1c: Oil Revenue and Federal Government Spending, 1990-2012

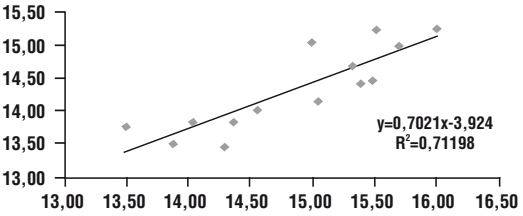
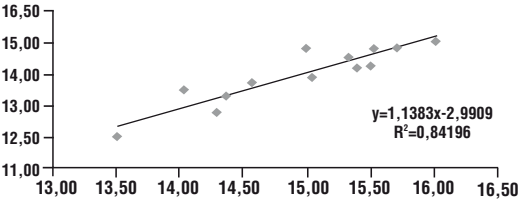


Fig. 1d: Oil Revenue and State Governments Spending, 1999-2012



Source: Underlying data obtained from CBN Statistical Bulletin, 2013

5.2 Political Institutions and Fiscal Cycles

Next, we consider the effects of the constructed political institutions factors in this study on the fiscal stance of government. In Table 3 the baseline model for accessing fiscal procyclicality is reported for the different sub-periods in the analysis. The real output growth gap was positive and almost unity for the entire period, while it was not significant for the 1999-2011 period. The coefficient was highest for the 1971-86 period when it was greater than one and also significant at the 5 percent level. The positive coefficient indicates that fiscal deficit rises when output rises and falls during output downturn. This implies a highly procyclical fiscal stance of government for the entire period which intensified during the period before SAP and has lessened over the democratic years. Surprisingly, the coefficient of real output growth gap (which shows the fiscal stance indicator) was negative for the 1987-1998 period, suggesting that government tended to demonstrate more fiscal restraint during that period. This pattern of fiscal behaviour during the period may be rationalized by considering the fact that the political system was more autocratic. The concentration of fiscal power implied that government could easily take countercyclical fiscal actions since there was little resistance from the states. However, it was only in the 1987 – 1998 period that the lag of fiscal balance was significant, suggesting persistence in any form of fiscal imbalance over time.

Table 3: Cyclical Properties of Fiscal Policy

	Dependent Variable is Overall Fiscal Balance			
	1971-2012	*1971-86*	*1987-1998*	*1999-2012*
Real output growth gap	0.997**	1.613*	-1.428*	1.004
	(2.95)	(2.93)	(-2.47)	(1.42)
Openness	0.015	0.150	0.106	0.023
	(0.37)	(0.96)	(1.98)	(0.22)
Lag of overall fiscal balance	0.235	-0.067	0.559*	0.067
	(1.63)	(-0.27)	(2.85)	(0.19)
R Squared	0.347	0.473	0.715	0.318
F	6.57	3.59	6.68	1.39

** indicates significance at 1 percent; * indicates significance at 5 percent; t-ratios are in parentheses below coefficients

Source: author's compilations

The result of the influence of institutions on fiscal procyclicality in Nigeria (presented in Table 4) tends to consolidate the preceding results. In the result, the real output growth gap is positive for the entire period and for each of the sub-periods. However, the coefficient of the gap variable is higher and more significant when only fiscal dependence ratio is included as an institutions variable. This suggests that fiscal dependence of states tends to intensify procyclicality of fiscal policy. The fiscal dependence coefficient is negative for the entire period but is notably positive and significant for the 1999-2012 period. Thus, fiscal dependence worsened fiscal deficits during the democratic era but had no significant effect on the deficits before democracy. It seems that voracity emanates from the ability of state governments to increase their access to oil revenue in the country in recent years, following the democratization of the political system.

Table 4: Institutions and Fiscal Procyclicality

	Dependent Variable is Overall Fiscal Balance					
	Fiscal Dependence effect only		Fiscal Concentration effect only		Combined Effect	
	1971-12	1999-12	1971-12	1999-12	1971-12	1999-12
Real output growth gap	1.135**	1.580*	0.949**	0.081	1.057*	0.537
	(3.30)	(2.69)	(2.84)	(0.18)	(2.89)	(1.03)
Openness	0.057	-0.084	0.055	0.073	0.065	0.013
	(1.16)	(-0.91)	(1.12)	(1.17)	(1.27)	(0.18)
Fiscal Dependence	-0.331	1.412*			-0.212	0.652
	(-1.54)	(2.66)			(-0.75)	(1.49)
Fiscal Concentration			-0.732	-2.818**	-0.423	-2.236*
			(-1.49)	(-4.44)	(-0.66)	(-3.16)
Lag of overall fiscal balance	0.142	0.066	0.237	-0.097	0.177	-0.064
	(0.13)	(0.24)	(1.67)	(-0.48)	(1.08)	(-0.33)
R Squared	0.388	0.637	0.385	0.803	0.395	0.850
F	5.69	3.52	5.64	8.15	4.57	7.96

** indicates significance at 1 percent; * indicates significance at 5 percent; t-ratios are in parentheses below coefficients
Source: author's compilations

Another notable point in the results is the negative and significant fiscal concentration coefficient for the 1999-2012 period. Given its definition as the share of federal government spending in the consolidated expenditure of all tiers of government, it suggests that federal government may have more effectively pursued countercyclical fiscal policy during the democratic era. This outcome is underscored by the insignificant real output gap coefficient for the period. The negative coefficient of the fiscal concentration variable indicates that more concentration of fiscal activities in the centre has tended to lower or minimize a procyclical stance of fiscal policy in Nigeria. When the two institutional variables were combined, fiscal policy became less procyclical for the democratic period, and fiscal dependence became insignificant in the equation. Fiscal concentration remained negative and significant. This result follows our earlier assertion that increased fiscal federalism that confers more weight on the states tends to weaken the ability of fiscal policy to act in a countercyclical manner when output varies. Given that democracy guarantees this pattern of institutional setup, it can be argued that democracy tends to ensure inefficient fiscal policy in Nigeria.

The results for the GMM estimation of the output gap equation are reported in Table 5 below. Fiscal policy coefficient is positive and significant at the 1 percent level for each of the estimations. From this result, it is seen that expansionary fiscal policy – by increasing the fiscal deficits- tends to widen the fiscal gap. We have already confirmed this in the fiscal cyclicality results, namely, that fiscal policy is generally procyclical. We have instrumented for fiscal policy in this estimation and the results still shows that fiscal policy does not respond asymmetrically to the business cycle. The elasticity of output gap with respect to fiscal policy is highest in the fiscal dependence equation and the coefficient of fiscal dependence is positive and significant at the 10 percent level in the equation. This suggests that increased dependence on the fiscal

pool by the states tends to worsen the output gap and make fiscal management difficult. Fiscal concentration fails the significance test when added alone and with fiscal dependence, suggesting that concentration invariably does not lead to output gap in the country.

Table 5: Institutions and Output Stability (GMM Estimates)

	Dependent variable is real GDP growth gap		
	Fiscal Dependence effect only	Fiscal Concentration effect only	Combined Effect
Fiscal Policy	0.74** (4.56)	0.619** (4.87)	0.687** (5.00)
Openness	-0.047 (-0.67)	0.06 (0.81)	-0.017 (-0.24)
Fiscal dependence	0.484a (1.78)		0.552* (2.42)
Fiscal Concentration		0.071 (0.11)	-0.636 (-0.96)
J-statistic	0.318	2.722	0.002
Probability	0.57	0.10	0.96

** indicates significance at 1 percent; * indicates significance at 5 percent; a indicates significance at 10 percent; t-ratios are in parentheses below coefficients

Source: author's compilations

For the GMM estimation the over identifying restrictions test is also performed. The J-statistic for each of the equations fail the significance test at the 5 percent level indicating that we cannot reject the null hypothesis that the overidentifying restrictions equal zero. Consequently, we cannot reject the specification of model since it is well specified and the instruments seem to be appropriate.

6. Conclusion

In this study, the role of fiscal and political institutions in promoting the efficiency of fiscal policy in Nigeria was examined. Efficient fiscal policy, it is argued, should respond asymmetrically to the business cycle by contracting during booms and expanding during recession. In a natural resource-dependent economy like Nigeria, this fiscal policy stance can be difficult to pursue or attain because of the peculiar nature of the supply side elements – revenue is largely dependent on external factors and is therefore highly unpredictable. Because of this, fiscal policy has been found to be procyclical (fiscal balance tends to rise during booms and fall in recession). We sought to investigate the role of institutions in either fostering or ameliorating this pattern of fiscal policy in Nigeria. Data used covered the period 1970 to 2012 and it was segregated to different sub-periods, including the recent democratic era (1999-2012). The OLS and GMM estimation techniques were used in the empirical analysis to determine the cyclical properties of fiscal policy, the effects of institutions on the cyclical stance of fiscal policy and the countercyclical effort of fiscal policy in Nigeria. First, the results showed that

fiscal institutions were rather weak (they do not provide the expected formidable guard against procyclical fiscal management) and still react based on oil price development in directing fiscal policy in Nigeria. The influence of political factors in fiscal operation may be blamed for these inefficient fiscal institutions.

Secondly, it was found that fiscal policy is procylical for the entire period in the sample, but that procyclicality has lessened in recent times. More importantly, the study found that fiscal dependence (defined as the level of state governments' dependence on the central oil resource revenue for their fiscal operations) was the strongest institutional factor promoting fiscal procyclicality in Nigeria. This effect was more pronounced during the democratic era, confirming, Tornell and Lane's argument that when institutions are weak voracity may heighten in a democratic dispensation that gives more power to the rent-seeking groups in the country. In Nigeria the evaluation is more a problem of the pattern of fiscal federalism and claims to resource sharing. The ability to run large budget surpluses in good times is severely hampered by political pressures, which–although always present–get exacerbated in times of plenty. As a result, fiscal resources (oil revenue) are being channeled to, among others, states and local governments, and rent-seekers rather than being used to accumulate during a fall in revenue.

To ensure improved countercyclical fiscal performance therefore, the institutional framework of fiscal policy has to be strengthened. Easy access to the fiscal pool during period of plenty should be limited by constitutional provisions. The enactment of the Sovereign Wealth Fund Act is a good starting point to ensuring this purpose. Also, elements of budgetary management should be improved by granting strong powers to the Ministry of Finance and other professional contributors to the budget on legal initiatives with budgetary impact and in budget decisions, especially regarding other government levels. Also, budgetary planning should command a high technical capacity in order to limit benchmarking and forecasting errors.

Finally, state governments should strive to absorb and adjust to output shocks through other means than the statutory allocations from the federal government. This calls for improvement in internally generated revenue by the states as a means of ensuring more sustainable fiscal policy and output growth patterns in the long run.

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Appendix

Fig. 1: CUSUM Squared Test of Structural Break

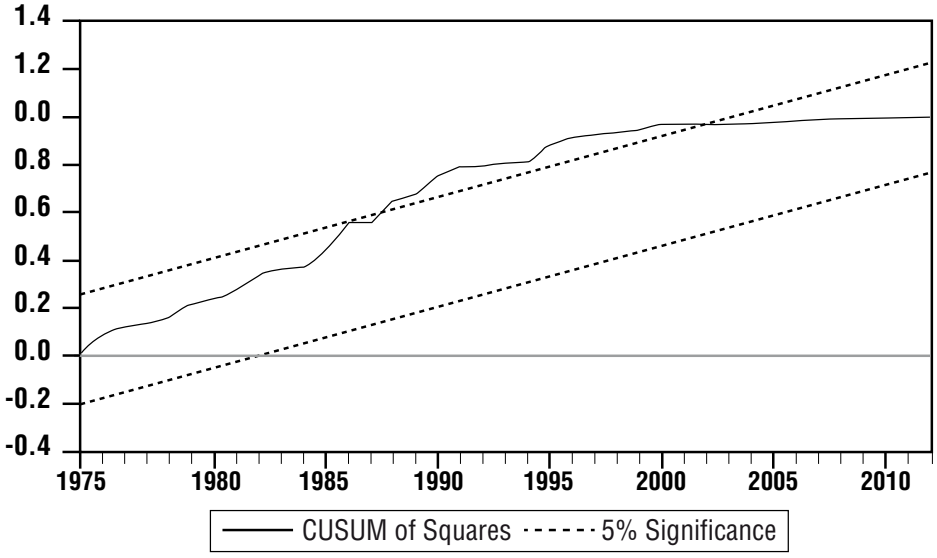

Table 1: ADF Test of Stationarity for Variables in Levels

Variable	ADF Statistic	Critical Value	Integration
FP	-4.070	-2.933	I[0]
YGAP	-3.902	-2.933	I[0]
OPN	-2.968	-2.933	I[0]
FDR	-3.112	-2.933	I[0]
FCR	-2.033	-2.933	I[1]

Investissements Directs Étrangers et Croissance économique en Afrique de l'Ouest

Adama Diaw* et Guidime Detondji Camille**

Résumé :

Cet article analyse les effets des investissements directs étrangers (IDE) sur la croissance économique des pays d'Afrique de l'Ouest en utilisant des données de panel sur la période 1995-2010. A partir du modèle de croissance, les méthodes de Moindres Carrés Généralisés (MCG) et l'estimateur des doubles moindres carrés de Baltagi ont été retenus pour les estimations. Les IDE influencent directement la croissance économique mais aussi indirectement les capacités absorptives à travers, l'investissement domestique et le développement du secteur financier. Etant donné que le dynamisme économique est une pré-condition pour observer un effet positif des IDE sur la croissance économique, la qualité des IDE reçus n'en demeure pas moins importante.

Mots clés : Investissement direct étranger, croissance économique, relation endogène, CEDEAO, UEMOA, Pays Moins Avancés.

Abstract:

This article analyzes the effects of foreign direct investment (FDI) on economic growth of West African countries using panel data over the period 1995-2010. Relying on growth model, methods of Generalized Least Squares (GLS) and EC2SLS Baltagi were used for the estimates. FDI directly affects economic growth but also indirectly the absorptive capacity. These include domestic investment and development of the financial sector. Given that economic dynamism is a pre-condition for the effect of FDI on economic growth, the quality of FDI received remains important.

Keywords: Foreign direct investment, economic growth, endogenous relationship, ECOWAS, WAEMU, Least Developed Countries.

JEL : F21, O11, C23.

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1. Introduction

Les Investissements Directs Etrangers (IDE) sont devenus une source importante de financement des économies des pays en développement. C'est pourquoi, l'afflux des IDE a plus de conséquences positives (création d'emploi, transfert de technologie, formation du capital humain, etc.) sur les pays d'accueil. Cependant, une ambigüité des effets est fournie dans la littérature économique. Glais (1975) le fait remarquer déjà quand il écrit «l'entreprise multinationale peut être à la fois la meilleure et la pire des choses». Cette nature ambivalente de la firme multinationale indique ce que pourraient être les effets des investissements directs étrangers dans les économies d'accueil.

En effet, les IDE sont un catalyseur de la croissance économique dans le pays hôte car ils influencent la production nationale, et la croissance s'accélère à cause des activités productives nouvellement créées qui renforcent le potentiel économique du pays. A cela s'ajoute le transfert de technologie qui permet de réduire l'écart technologique (Dunning, 1993 ; Graham et Krugman, 1993). Ainsi, l'efficacité globale de l'économie augmente non seulement du fait de la concurrence qui est stimulée par l'arrivée de nouvelles entreprises mais également du fait de la diffusion des techniques de gestion. La formation du capital humain et ses accumulations créées par les IDE diffusent favorablement des effets sur la croissance économique. Par ailleurs, la balance commerciale du pays hôte pourrait s'améliorer du fait des produits exportés par la firme multinationale et la réduction d'importation de ces mêmes produits, puisque désormais produits sur place. Le développement des IDE entraîne également une intégration plus poussée des pays aux échanges internationaux et devrait avoir pour effet de faciliter leur accès aux marchés internationaux. Cependant, les investissements directs étrangers ont des effets pervers dans la mesure où ils engendrent par exemple un phénomène d'éviction des firmes locales par les multinationales, etc (Alaya et al , 2009 ; Lahimer, 2010).

Depuis les années 90 avec la mise en œuvre des programmes d'ajustement structurel, les pays en développement en général et ceux d'Afrique de l'Ouest en particulier, multiplient des initiatives pour attirer davantage d'IDE. Les facilités accordées à travers les codes d'investissement nationaux en sont une illustration. Ainsi, en moyenne ces pays ont reçu 1853,95 millions de dollars US en 1995, 25865,70 millions de dollars en 2008 (Diaw et Guidime, 2012). Aussi, dans l'espace Union Economique et Monétaire Ouest Africaine (UEMOA), les flux d'IDE ont augmenté en moyenne annuelle de 3,5 % sur la période 2000-2005 à 18,8 % sur la période 2006 – 2011 (BCEAO, 2013). La libéralisation et la promotion de l'investissement sont restées les éléments dominants des récentes politiques en matière d'investissements (WIR, 2011). Ainsi, les ventes à l'étranger, l'emploi et les actifs des sociétés transnationales, ont progressé en 2010 lorsque les conditions économiques se sont améliorées (WIR, 2011). Les activités des firmes multinationales tant à l'étranger que dans leur pays d'origine, de par le monde ont dégagé une valeur ajoutée d'environ 16 000 milliards de dollars en 2010, soit un quart environ du PIB mondial (WIR, 2011). Toutefois, bien que les perceptions des effets théoriques des IDE sur la croissance économique des pays soient connues, les travaux empiriques ne sont pas unanimes quant à un effet absolu, encore moins, pour ce qui concerne les pays en développement et les pays moins avancés (Olakounlé, 2004 ; Ayanwale, 2007, Alaya et al., 2009). De plus, les différences de résultats de l'effet des IDE sur la croissance économique seraient dues aux spécificités des pays et des périodes d'étude (Asiedu, 2002, 2006). A cela s'ajoute le fait qu'une relation d'endogénéité qui existerait entre les IDE et la

croissance économique est relativement prise en compte dans les travaux empiriques. En fait, les IDE peuvent impacter positivement la croissance économique d'un pays ayant une taille de marché large, lequel marché est un déterminant des IDE. Aussi, un élément important à intégrer dans l'étude empirique de la relation entre IDE et croissance économique dans les pays en développement –contrairement à Olakounlé (2004)- est la capacité de ces pays à absorber qualitativement les IDE (Borensztein et al., 1998 ; Alaya et al., 2009). Il existe, en Afrique de l'Ouest, peu de travaux sur la relation entre les IDE et la croissance économique à part à notre connaissance deux études, respectivement, menées sur le Nigéria (Ayanwale, 2007) et le Ghana (Frimpong et Oteng-Abayie, 2006) à notre connaissance. Une étude en panel pour l'Afrique de l'Ouest fait défaut dans la littérature économique.

Deux importantes questions se posent alors : quels sont les effets des IDE sur la croissance économique des pays d'Afrique de l'Ouest ? Quels sont les facteurs de capacité absorptive des pays de l'Afrique de l'Ouest qui sont catalyseurs d'effets favorables des IDE sur la croissance économique ?

L'objectif de cet article est d'analyser les effets des IDE sur la croissance économique des pays de l'Afrique de l'Ouest. Plus spécifiquement, il s'agit d'identifier les facteurs facilitant un effet favorable des IDE sur la croissance économique de ces pays.

Le reste de l'articule est structuré comme suit : une revue de littérature sur les effets des IDE sur les économies d'accueil est effectuée dans la section 2 ; quelques faits stylisés sur les flux d'IDE et la croissance économique dans les pays d'Afrique de l'Ouest sont présentés dans la section 3 ; la méthodologie d'analyse empirique des effets des IDE sur la croissance économique dans les pays d'Afrique de l'Ouest est décrite dans la section 4 ; les résultats des estimations économétriques sont discutés avec leurs implications de politiques économiques dans la section 5 ; la conclusion constitue la section 6.

2. Revue de littérature

La croissance économique implique plusieurs facteurs (économiques, sociaux et politiques) qui interagissent. Aussi bien les modèles théoriques néoclassiques de la croissance (Solow, 1956 ; Swan, 1956) que les modèles de croissance endogène développés par Romer (1986), Lucas (1988), Barro (1991), présentent le cadre théorique conceptuel pour l'analyse de la relation entre les investissements directs étrangers et la croissance économique. Les modèles de Solow (1956) et Swan (1956) accordent une place importante au changement technologique dans la croissance économique. Le changement technologique proviendrait des investissements directs étrangers. Ainsi, l'augmentation des investissements étrangers impacte positivement la croissance économique.

Contrairement au modèle théorique classique, la contribution des investissements directs étrangers à la croissance économique ne s'effectue pas seulement à travers le transfert de technologie (Blomstrom et Kokko, 1996), mais aussi à travers l'augmentation du niveau de la connaissance par l'apprentissage et l'acquisition de la compétence. Les investissements directs étrangers augmentent le stock de capital national et renforcent l'accumulation de capital humain tout en accélérant les progrès technologiques dans les pays hôtes (De Mello, 1999). En revanche, d'autres facteurs importants laissent diffuser l'effet des investissements directs

étrangers sur la croissance économique. L'ouverture commerciale qui est une manifestation de l'extension du marché est une source de production. La densité des échanges permet une meilleure spécialisation qui améliore l'efficacité de la production. De plus, le financement dans les infrastructures facilite la circulation de l'information, des personnes et des biens – ce qui améliore la productivité des firmes- (Barro, 1990). Toutefois, une condition importante pour la réussite de cet effet est que le financement des dépenses publiques n'empêche pas le financement du secteur privé (Borensztein et al, 1998). Les marchés financiers jouent, également, un rôle prépondérant dans la diffusion des effets des investissements directs étrangers sur le développement économique. Le faible développement des marchés financiers locaux peut défavoriser la capacité de l'économie à tirer profit des effets de l'IDE (Alfaro et al., 2003). Le modèle mathématique de base de l'introduction des investissements directs étrangers comme catalyseur et facteur explicatif de la croissance économique est celui de Borensztein et al. (1998). Ces auteurs considèrent une économie où le progrès technique résulte de l'approfondissement du capital dans la forme de l'augmentation du nombre de variétés de bien d'équipement (moyen de production) disponible, lesquelles variétés résultent des IDE.

Dans la littérature empirique, la controverse du lien entre IDE et croissance économique est développée, en particulier, pour ce qui concerne les pays en développement. Les modèles néoclassiques et les modèles de la croissance endogène sont utilisés pour étudier ce lien. Cependant, quel que soit le type de modèle utilisé, ou même le type d'effets mesuré (effets directs vs effets indirects), la controverse demeure (Borensztein et al., 1998 ; Olakounlé, 2004 ; Li et Liu, 2005 ; Alaya et al , 2009).

Dans leur analyse des IDE en Chine, Berthelémy et Démurger (2000) concluent que ces derniers ont un impact positif sur la croissance économique de ce pays. Ayanwale (2007) quant à lui, s'inspirant du modèle de Lim (2001) trouve un effet positif des IDE sur la croissance économique au Nigéria sur la période 1970 – 2002.

Choe (2003), Srinivasan et al. (2010), Hansen et Rand (2004) trouvent une causalité bidirectionnelle entre ces deux variables. Par contre, Zhang (2001) établit que ce sont les IDE qui causent la croissance économique en présence des conditions spécifiques aux pays d'accueil des IDE telles que le régime commercial et la stabilité macroéconomique.

A l'opposé, Chakraborty et Basu (2004) utilisent une technique de co-intégration et un modèle à correction d'erreurs pour examiner le lien entre IDE et croissance en Inde. Ils trouvent que la croissance n'est pas causée au sens de Granger par les IDE mais que la causalité va beaucoup plus de la croissance vers les IDE. Ce résultat est identique à celui de Ludosean (2012), qui utilise une modélisation VAR (Vecteurs AutoRegressifs) et montre que la croissance économique n'est pas causée par l'IDE en Roumanie, mais qu'elle est sensible à la mobilisation des IDE.

Par ailleurs, les tests économétriques souvent utilisés pour l'analyse du lien direct entre IDE et croissance sont soit le test de causalité de Granger (Choe, 2003 ; Zhang, 2001), soit l'estimation Vecteur AutoRegressif (Ludoșean, 2012), ou encore l'estimation d'un modèle néoclassique tel que celui de Barro et Sala-i-Martin (1995) et Lim (2001) où l'IDE est considéré comme une variable exogène (Ayanwale, 2007 ; Alaya et al., 2009). Les critiques apportées à ces techniques sont d'une part, l'absence d'autres variables explicatives importantes et d'autre part, la non prise en compte de l'existence des problèmes de simultanéités entre les deux variables IDE et croissance économique. De mello, 1999). Olakounlé (2004), Li et Liu (2005) mettent en

évidence dans leurs travaux respectifs la présence d'endogénéité des IDE par rapport à la croissance économique et suggèrent de considérer le modèle de croissance endogène pour estimer l'effet des IDE sur la croissance économique.

Les effets indirects des IDE sur la croissance économique sont également développés. Les auteurs montrent comment les IDE agissent de façon indirecte sur la croissance économique, grâce à l'insertion internationale accrue ou l'amélioration des niveaux de qualification de la main-d'œuvre locale (Borensztein et al., 1998 ; Alaya et al., 2009). Les IDE ont donc un effet positif sur la croissance économique si le pays d'accueil a suffisamment de capacité d'absorption des technologies avancées disponibles à l'étranger. Il se dégage donc que les caractéristiques des pays d'accueil sont déterminantes pour que l'effet positif des IDE sur la croissance économique soit observé. Blomström et al. (1994) montrent quant à eux que les IDE n'ont d'effet positif sur la croissance que pour les pays les plus développés. Olakounlé (2004) confirme que parmi les pays en développement, ce sont ceux qui ont une performance économique remarquable qui connaissent un effet positif de l'IDE sur la croissance économique. Le dynamisme des économies d'accueil serait donc une pré-condition à un impact positif des IDE sur la productivité.

Toutefois, si pour Borensztein et al. (1998), la capacité d'absorption s'observe à travers la formation du capital humain, l'apprentissage, l'accumulation de la connaissance, l'acquisition de nouveaux procédés managériaux et de nouveaux modes organisationnels, pour d'autres auteurs , elle réside dans des variables telles que la capacité institutionnelle, le capital humain, le gap technologique, le développement du secteur financier. Olofsdotter (1998) considère la capacité d'absorption dans les pays en développement et trouve que l'effet bénéfique des IDE est très important dans les pays qui ont un niveau de capacité institutionnelle élevée et où la bureaucratie est efficiente. De même, De mello, (1999), Bende-Nabende et al. (2003) et Li et Liu (2005) expriment la capacité d'absorption par le gap technologique en plus du capital humain. Le revenu initial est important dans l'expression de la capacité d'absorption (Wu et Hsu, 2008) ainsi que la complémentarité entre le capital humain et le développement du secteur financier (Farkas, 2012), alors qu'Alfaro et al. (2003) mettent l'accent sur le développement financier comme indicateur de la capacité d'absorption dans les économies d'accueil des IDE. Néanmoins, il est prouvé sur le plan empirique que les effets avantageux des IDE ne sont pas nécessairement positivement liés à la capacité d'absorption. Bende-Nabende et al. (2003) trouvent que l'effet direct à long terme des IDE sur la production est significatif et positif pour des pays économiquement moins avancés tels que les Philippines et la Thaïlande mais négatif dans les pays économiquement plus avancés comme le Japon et Taiwan, alors que la capacité d'absorption serait moins importante aux Philippines et en Thaïlande qu'au Japon et à Taiwan.

Carkovic et Levine (2005) ne dégagent pas une influence significative des IDE sur la croissance économique. Cependant, ils estiment que les IDE exercent un effet favorable sur la croissance économique dans des conditions particulières du pays d'accueil telles que la disponibilité du capital humain, la stabilité macroéconomique, le bon fonctionnement des marchés et l'ouverture commerciale. Bende-Nabende et Ford (1998) montrent que les IDE ont un effet positif sur la croissance économique mais avec l'amélioration de l'infrastructure et la libéralisation économique à Taiwan.

Le non prise en compte des secteurs d'activités de l'économie pourrait entretenir l'ambigüité de la relation IDE - Croissance économique. En effet, il est observé que les secteurs de l'économie sont un élément important dans cette analyse. En se fondant sur des données multinationales pour la période 1981-1999, Alfaro (2003) établit que les IDE impactent la croissance économique de façon ambiguë. Ainsi, dans le secteur primaire, il tend à avoir un effet négatif sur la croissance, alors que le contraire se produit dans le secteur manufacturier. Nunnenkamp et Spatz (2003) montrent quant à eux que l'effet positif des IDE sur la croissance économique est garanti seulement quand on tient compte des données des pays d'accueil et des caractéristiques des industries avec leurs interactions. Pour ces auteurs, l'agrégation des données statistiques des IDE et la difficulté de distinction entre les différents types d'IDE, contribuent aux résultats ambigüs de l'effet des IDE sur la croissance économique. Par ailleurs, Ayanwale (2007) trouve que les IDE dans le secteur de la communication assurent un effet positif sur la croissance économique au Nigéria alors que les données agrégées des IDE indiquent une influence neutre sur la croissance économique entre 1970 et 2002.

L'impact indirect potentiel des IDE vient de la possibilité pour ceux-ci d'évincer l'investissement local ou au contraire de le stimuler. Les effets d'éviction ou d'entrainement ont leurs origines dans la rivalité ou la complémentarité des firmes étrangères et des firmes locales sur les marchés financiers, les marchés des facteurs et sur les marchés des produits.

Alaya et al. (2009) trouvent après estimations - respectivement par moindres carrés généralisés simples et moindres carrés généralisés avec interaction entre les IDE et d'autres variables sur la période 1975 – 2004 -, un effet direct et positif de l'IDE et un effet indirect de l'IDE sur la croissance économique des pays de la Méditerranée. Ils soutiennent que le deuxième résultat est plus concluant car les IDE exercent leurs effets à travers le capital humain dont son interaction avec l'IDE comme variable dans le modèle est de signe positif et statistiquement significatif.

Cependant, l'utilisation de différentes techniques d'estimation semble accroître l'ambigüité de l'effet des IDE sur la croissance chez Alaya et al. (2008, 2009). De même, Wu et Hsu (2008) estiment leur modèle par la technique des moindres carrés ordinaires puis avec la méthode des moments généralisés et établissent que les IDE n'accélèrent pas la croissance avec la première technique, tandis qu'il n'ont pas d'effet positif sur la croissance économique avec la deuxième technique. Cependant, Alaya et al. (2009), Wu et Hsu (2008) aboutissent à la même conclusion que l'effet des IDE sur la croissance économique dépend de la capacité d'absorption des pays d'accueil.

Aussi, il y a des faiblesses dans les techniques d'estimations utilisées car il se pose un problème d'endogénéité avec l'estimation de l'équation de la croissance sans utiliser la méthode des variables instrumentales, bien qu'il soit difficile d'obtenir des instruments idéaux (Ayanwale, 2007). L'estimation des modèles ne prend pas souvent en compte ni l'interaction entre les variables, ni les effets feedback entre l'IDE et la croissance (Li et Liu, 2005). Olakounlé (2004) et Li et Liu (2005) vont successivement utiliser une estimation du modèle de croissance endogène de Borensztein et al. (1998) après avoir montré l'existence de l'endogénéité entre les IDE et la croissance économique. La littérature propose différentes approches de résolutions de l'étude IDE-croissance économique (Li et Liu, 2005). Une première approche est le test bilatéral de causalité. L'utilisation de ce test – de Granger-- dans les travaux a donné des

résultats contrastés. Le lien entre les IDE et la croissance économique varie en fonction du temps et des pays. De plus, ce test a quelques inconvénients. Il peut présenter des résultats fallacieux lorsqu'il y a omission d'autres variables importantes (Granger, 1969 ; Sims, 1972). Une autre approche dans l'analyse du lien entre les IDE et la croissance économique est l'utilisation des techniques d'estimation par « variables instrumentales » (Bende-Nabende et Ford, 1998 ; Olakounlé, 2004, Li et Liu, 2005 ; Alaya et al., 2009).

3. Quelques faits stylisés sur les flux d'IDE sectoriels et la croissance économique dans les pays d'Afrique de l'Ouest

Les faits stylisés sont axés sur les IDE sectoriels et la croissance économique. Les statistiques font défaut quant à l'enregistrement des IDE par secteur d'activité. Les informations sont donc issues d'études ou de travaux sur la question.

3.1 Orientation des Investissements Directs Etrangers par secteur d'activité

Les flux d'IDE dans les pays de l'Afrique de l'Ouest, surtout ceux de l'Union Economique et Monétaire Ouest Africaine sont orientés dans les secteurs des mines, de la télécommunication et des banques (BCEAO, 2013). En effet, la découverte du pétrole et de l'uranium au Niger et au Mali, accompagnée de la hausse en bourse des prix des matières premières a attiré comme par le passé les flux d'IDE dans le secteur des mines. Ces nouveaux gisements découverts viennent s'ajouter aux anciens présents en Côte d'Ivoire, au Nigéria, au Ghana, au Sénégal, en Guinée. Le Nigeria a reçu en 2001 en moyenne 30,7 % des flux d'IDE dans les mines et l'industrie extractive, 32 % dans les manufactures, 25,8 % dans le commerce et les services, 0,6 %, 0,4 %, 2,0 % respectivement dans l'agriculture, les transports et communications, la construction (Ayanwale, 2007). Pour ce qui concerne les pays de l'Union Economique et Monétaire Ouest Africaine, la répartition par branches d'activité montre que sur la période 2007-2011, les flux d'investissements directs étrangers reçus ont été principalement orientés vers les secteurs minier et pétrolier, avec 49,9 % du total, suivis dans l'ordre par les transports et télécommunications (14,8 %), les industries manufacturières (11,9 %), les sociétés d'intermédiation financière (9,4 %) et le commerce de gros et de détail (7,1 %) (BCEAO, 2013).

Le secteur de la télécommunication est actuellement très dynamique dans la mobilisation des IDE. L'installation de grandes firmes transnationales dans les pays de l'Afrique de l'Ouest le montre. D'ailleurs si les IDE ont un effet positif sur la croissance économique au Nigeria, c'est bien par le biais de ce secteur. Les entreprises privées domestiques –bien qu'ayant une faible efficacité- et les entreprises privées étrangères rivalisent en termes de concurrence pour la satisfaction des clients afin d'obtenir le plus grand marché possible. Le secteur des banques enregistre de plus en plus de nouveaux établissements de nationalité étrangère[3]. A cela s'ajoute l'expansion des banques commerciales privées déjà installées. Les IDE dans ces différents secteurs prennent la forme de prise de participation dans le capital et de dettes intra-groupes dans les pays de l'UEMOA (BCEAO, 2013).

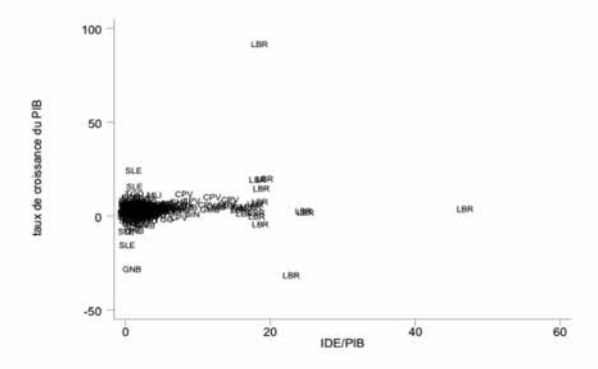
3 - C'est le cas de la marocaine ATTIJARIWAFA BANK et de la libyenne BSIC.

3.2 Evolutions comparées des taux de croissance du produit intérieur brut et de l'investissement direct étranger

De l'analyse des graphiques (cf. annexe 1) relatifs aux évolutions des produits intérieurs bruts et des investissements directs étrangers dans les pays de la CEDEAO, trois faits se dégagent : une probable contribution positive des IDE au PIB ; aucune contribution des IDE au PIB et une contribution défavorable des IDE au PIB.

Les investissements dans les services et le secteur du Bâtiment–Travaux Publics (BTP) à partir de 2007 expliquent l'augmentation du taux de croissance du produit intérieur brut du Bénin en 2008 et 2009. La courbe de la part des IDE dans le PIB semble aller dans le même sens que celle du taux de croissance du PIB. Les IDE paraissent n'avoir aucun lien avec la croissance économique au Burkina Faso, au Libéria et en Guinée- Bissau car les deux courbes suivent des évolutions différentes. Tel n'est pas le cas au Cap Vert, au Ghana, en Guinée, et au Mali où on peut présumer une forte corrélation positive entre les IDE et le taux de croissance du PIB. C'est entre 2006 et 2010 que les IDE paraissent influencer le taux de croissance du PIB du Niger, du Nigeria et de la Sierra Leone. Le recoupement entre les courbes est observé au niveau du Sénégal où par moments les IDE semblent contribuer à la croissance économique.

Graphique 1 : Ajustement de l'investissement direct étranger et du taux de croissance du PIB



Source : nos calculs à partir des données de WDI (2013)

4. Approche Méthodologique

L'approche méthodologique retenue s'inspire de celle d'Olakounlé (2004), Alaya et al. (2009). Olakounlé (2004) dans son approche constitue des sous échantillons pour distinguer les pays à forte croissance soutenue à long terme des autres pays. Une même manière de tenir compte des performances économiques des pays dans l'étude de la relation entre IDE et croissance économique est de distinguer les pays en développement de pays moins avancés. Cette approche est adoptée dans le présent travail. Olakounlé(2004) et Alaya et al (2009) utilisent le modèle de croissance augmenté, qui montre une amélioration de la croissance par

le biais de la technologie, de l'efficience et, la productivité des facteurs (Lim, 2001). Ces effets d'entrainement peuvent être fournis par les IDE. Alaya et al. (2009)) vont donc utiliser une approche introduisant les interactions entre les variables afin d'analyser la capacité absorptive des pays méditerranéens. Cette approche permet de dégager les facteurs catalyseurs d'un effet favorable des IDE sur la croissance économique. Pour notre part, nous introduisons dans le modèle la spécificité des pays par rapport au volume d'IDE mobilisés en pourcentage du volume total d'IDE mobilisés dans la région, d'où une démarcation par rapport aux modèles de Olakounlé (2004) et, Alaya et al. (2009). En outre, nous testons l'endogénéité entre les variable IDE et croissance économique, afin d'éviter des régressions fallacieuses.

4.1 Spécifications du modèle

Partant des contributions de Romer (1990), des nouveaux développements de la théorie de la croissance endogène incluant l'IDE (Boreinsztein et al., 1998) et des résultats de travaux empiriques mettant en relief la significativité des variables de la croissance économique, la relation entre IDE et croissance économique peut être spécifiée de la manière suivante :

$$g = f(gdp(initial), sch, \inf r, \inf lad, poliest, trade, ide, X)$$,

avec : g = le produit intérieur brut par tête pris sous la forme logarithme ; $gdp(initial)$ = le produit intérieur brut par tête de 1986 pris sous la forme logarithme ; le PIB de la période initiale (1986) introduit dans le modèle représente une constante propre à chaque pays et groupe de pays et doit permettre de calculer le taux de convergence conditionnelle relatif à chaque pays (Olakounlé, 2004) ; sch = le niveau du capital humain (taux d'inscription au niveau secondaire dans la population) ; $\inf r$ = les infrastructures de développement (le nombre d'abonnés aux réseaux téléphoniques par 1000 habitants) ; $\inf lad$ = le taux d'inflation mesurant l'instabilité macroéconomique ; $poliest$ = le niveau de la situation politique dans les pays (une estimation de la Banque Mondiale) ; $trade$ = l'ouverture commerciale ; ide = les investissements directs étrangers définis en pourcentage du produit intérieur brut ; et X = l'ensemble des variables d'interaction entre IDE et capital humain, IDE et exportation et variables indicatrices. En effet, des variables indicatrices sont retenues pour capter l'effet de mobiliser fortement, moins faiblement et faiblement les investissements directs étrangers. Trois variables indicatrices sont introduites « gaide », « maide », « paide », respectivement les pays qui attirent plus d'IDE dans la CEDEAO, les pays qui attirent moins d'IDE dans la CEDEAO, les pays qui attirent faiblement des IDE dans la CEDEAO (Cf. annexe 4). Cette équation de la croissance augmentée permet d'analyser l'effet direct des IDE sur la croissance économique. Le modèle à de fins d'estimation s'écrit :

$$\lg dp_{it} = \beta_1 \lg dp_{i,t86} + \beta_2 sch_{i,t} + \beta_3 \inf r_{i,t} + \beta_4 \inf lad_{i,t} + \beta_5 poliest_{i,t} + \beta_6 trade_{i,t} + \beta_7 ide_{i,t} + \varphi X_{i,t} + u_{it}$$

avec $u_{i,t} = \alpha_i + \varepsilon_{i,t}$ pour la prise en compte des effets spécifiques aux pays (qui peuvent être fixes ou aléatoires) et le bruit blanc $\varepsilon_{i,t}$.

4.2 Données et méthode d'estimation du modèle

Les données recueillies sur les différentes variables des modèles sont issues de la base de données de la Banque Mondiale (Word Development Indicators, 2013). Elles s'étendent sur la période 1995 – 2010. L'échantillon est composé des quinze pays de la Communauté Economique des Etats d'Afrique de l'Ouest. Cependant deux sous-échantillons sont constitués pour tenir compte de certaines spécificités : un sous-échantillon composé des pays de l'Union Economique et Monétaire Ouest Africaine pour prendre en compte l'effet d'appartenance à une même zone monétaire, un autre constitué des Pays Moins Avancés (pour tenir compte de l'effet du niveau de développement sur le bénéfice que peut procurer les IDE sur la croissance économique).

Les méthodes d'estimation sont fonction du modèle et des tests statistiques effectués. Ainsi, une estimation par la Méthode des Moindres Carrés Ordinaires (MCO) ou celle des Moindres Carrés Généralisés (MCG) est faite sur la base du test d'analyse de présence des effets individuels (fixes ou aléatoires) ou temporels (test de Breusch – Pagan, 1979). L'estimateur MCG est utilisé lorsque la présence de corrélations intra individuelles des résidus c'est-à-dire la présence d'effets aléatoires à travers la structure du résidu dans un modèle de panel est révélée (Baltagi, 2005, 2011). L'estimateur des MCG est en théorie, obtenu en deux étapes : la première étape consiste à appliquer l'estimateur « Within » pour obtenir une première estimation sans biais et convergente des paramètres du modèle et de l'erreur. A partir de ces estimations, on construit les séries de résidus individuels, un estimateur de la matrice variance covariance. La seconde étape consiste à appliquer l'estimateur des MCG en utilisant l'estimateur de la matrice variance covariance. Toutefois, la structure du résidu pourrait indiquer une corrélation avec une variable explicative omise (Baltagi, 2005). Les estimations sont faites sur les différents sous-échantillons également afin de mettre en évidence la robustesse du modèle et la prise en compte de la spécificité des différences catégoriques entre pays (Diaw et Guidime, 2012 ; Blomström et al., 1994). Le test de Chow réalisé pour tester la constance des paramètres dans le processus générateur du panel est fait pour justifier l'utilisation des sous échantillons. Des estimations du modèle avec l'introduction de variables d'interactions sont introduites pour observer des effets indirects des IDE (Alaya et al., 2009). Avant de procéder à l'estimation des différentes équations sur données de panel, des tests de racine unitaire sont effectués pour déterminer si les variables sont stationnaires pour éviter les régressions fallacieuses.

5. Analyse des résultats

5.1 Résultats

Les résultats sur la stationnarité des variables montrent que le logarithme du produit intérieur brut, le taux de scolarisation au secondaire, l'estimation de l'instabilité politique, ne sont stationnaires qu'en différence première tandis que les autres variables telles que l'investissement direct étranger rapporté au produit intérieur brut, l'infrastructure, le degré d'ouverture, le taux d'inflation, et l'exportation rapportée au produit intérieur brut sont stationnaires en niveau (cf. annexe 2). Les variables stationnaires en niveau sont directement introduites dans le modèle pour estimations alors que les autres sont différenciées une fois avant d'être introduites. Pour ce qui concerne la spécification du panel, le test de Fisher présente le résultat suivant : le Test de

F que tous les u_i=0 : F(14, 199) = 4174.92 Prob > F = 0.000 la probabilité de la statistique de ce test étant 0,000 (cf. annexe 5), ce qui est inférieur au seuil de significativité. L'hypothèse d'absence d'effets individuels est donc rejetée, ce qui signifie qu'on pourrait être en présence d'effets individuels fixes qui conduiraient à considérer l'homogénéité du processus générateur des données. Quant au test de Breush et Pagan (1979), le résultat est le suivant : Test : Var(u) = 0 chibar2(01) = 1064.88 Prob > chibar2 = 0.000. La probabilité de la statistique du test montre que les effets aléatoires sont globalement significatifs à un seuil de 1 %. L'estimateur des MCG est préféré à celui des MCO. Le résultat du test d'endogénéité (Nakamura et Nakamura, 1981) montre que les résidus de l'équation de la première étape sont significativement corrélés à la croissance économique, ce qui tend à soutenir l'hypothèse d'endogénéité de la variable IDE ; l'estimateur des doubles moindres carrés de Baltagi (EC2SLS de Baltagi) est donc aussi utilisé. Enfin les résultats du test de Chow indiquent une probabilité de 0,9, ce qui permet de ne pas rejeter l'hypothèse Ho de constance des coefficients des sous échantillons utilisés (Nigeria, Ghana, Côte d'Ivoire ; contre les autres pays de la CEDEAO). Cependant, le test de Chow dans un nombre important de travaux rejette toujours l'hypothèse Ho (Baltagi, 2005) d'où l'intérêt pour nous de faire des estimations tant sur des sous échantillon que sur l'échantillon total.

Les résultats des estimations figurent dans le tableau 1. Le deuxième, quatrième et cinquième sous colonnes présentent les estimations du modèle sans les variables d'interaction. Ce sont le troisième, cinquième et sixième sous colonnes qui donnent les estimations avec les variables d'interaction. Le deuxième, troisième et quatrième sous colonnes principales montrent les estimations en tenant compte respectivement de l'ensemble des pays de la CEDEAO, des pays de l'UEMOA et des Pays Moins Avancés de la CEDEAO sur la période de recherche. La variable, « IDE », a été instrumentée par l'IDE retardé d'une période et le retard d'une période de la croissance du PIB. Les deuxième, quatrième et sixième sous colonnes présentent les estimateurs de moindres carrés généralisés avec chacune la prise en compte ou non des variables d'interactions. La méthode des Moindres Carrés Généralisés (MCG) et celle de EC2SLS de Baltagi[4] donnent quasiment les mêmes résultats.

4 - Des estimations en EC2SLS de Baltagi (Cf. annexe 6) sont faites sur le modèle qui révèle la présence d'effets aléatoires. Les résultats sont pratiquement les mêmes que ceux obtenus avec les estimateurs des MCG.

Tableau 1 : Estimations des effets de l'IDE sur la croissance économique de 1995 à 2010

	Ensemble des Pays de la CEDEAO		Ensemble des Pays de l'UEMOA		Ensemble des Pays Moins Avancés	
	Estimateurs MCG					
Regresseurs	M(1)	M(2)	M(3)	M(4)	M(5)	M(6)
Constante	10,41 (0,00)***	10,53 (0,00)***	12,56 (0,00)***	12,06 (0,00)***	10,81 (0,00)***	11,83 (0,00)***
igdp (initial 1986)	-0,36 (0,014)**	-0,00007 (0,99)	-1,59 (0,283)	-0,35 (0,759)	-0,057 (0,769)	1,68 (0,134)
Capital humain	0,0035 (0,498)	0,0062 (0,072)*	-0,008 (0,786)	-0,02 (0,369)	0,011 (0,122)	-0,03 (0,419)
Infrastructures	0,00007 (0,566)	0,0002 (0,001)***	0,002 (0,00)***	0,001 (0,001)***	0,0006 (0,002)***	0,002 (0,00)***
Inflation	0,00003 (0,616)	-0,00009 (0,020)**	0,005 (0,477)	0,009 (0,133)	-0,00002 (0,676)	-0,0002 (0,522)
Stabilité politique	0,004 (0,923)	-0,004 (0,884)	-0,17 (0,458)	-0,12 (0,507)	-0,015 (0,790)	-0,21 (0,517)
Ouverture commerciale	0,001 (0,20)	0,0001 (0,878)	0,02 (0,147	0,005 (0,624)	-0,002 (0,302)	-0,01 (0,157)
IDE/PIB	0,05 (0,001)***	0,05 (0,00)***	-0,49 (0,00)***	-0,36 (0,001)***	-0,04 (0,106)	-0,28 (0,00)***
IDE*Capital humain	-	-0,00004 (0,806)	-	-0,0005 (0,923)	-	0,002 (0,443)
IDE*EXP	-	-0,001 (0,00)***	-	0,006 (0,022)***	-	-0,001 (0,555)
gaide	-0,49 (0,645)	-	-	1,30 (0,00)***	-	-
maide	0,04 (0,967)	-	-	-0,013 (0,917)	-	-
paide	0,28 (0,758)	-	-	-0,33 (0,005)***	-	-
R-carré	0,57	0,39	0,43	0,67	0,7	0,77
Test de Wald	37,08	102,73	21,18	25,44	15,11	318,8
P-value	0	0	0,0035	0,0079	0,0347	0
Nbre d'Obs	225	225	120	120	180	180

NB: ***, ** et * correspondent respectivement à la significativité statistique de 1%, 5% et 10% avec le T-student entre parenthèse ( )

Source: Calcul des auteurs

5.2 Discussions et Implications de politiques économiques

Le résultat essentiel est que la variable IDE est statistiquement significative quel que soit l'estimateur et ce dans la CEDEAO, l'UEMOA et les Pays Moins Avancés. Cependant, l'impact des IDE sur la croissance économique est positif pour l'échantillon CEDEAO, alors qu'il est négatif dans les sous-échantillons UEMOA et Pays Moins Avancés. L'infrastructure a un effet positif et statistiquement significatif sur la croissance économique de tous les pays de l'Afrique de l'Ouest. Les efforts d'investissements dans les infrastructures dans ces pays sont donc à encourager au regard de leur effet très bénéfique pour l'activité économique. Si l'IDE a un signe négatif pour l'UEMOA, il faut remarquer que cela n'est pas vérifié pour la Côte d'Ivoire où le signe est positif, car la Côte d'Ivoire est le pays qui reçoit le plus d'IDE dans l'UEMOA (gaide = 1,30***), alors que dans les pays qui attirent très faiblement l'IDE ce dernier a un effet négatif sur la croissance économique (paide = − 1,06***). L'effet négatif de l'IDE sur la croissance économique de ces pays s'explique par leur faible capacité d'absorption d'innovation et, l'insuffisance de dynamisme économique (pré-condition avant d'observer un effet positif des IDE sur la croissance économique). En outre, la qualité des IDE présents dans ces pays importe également. Le stock de capital humain est statistiquement significatif et impacte positivement la croissance économique dans la CEDEAO. Cependant, tel n'est pas le cas pour les pays de Pays Moins Avancés. Intuitivement les Pays Moins Avancés n'auraient pas encore atteint le niveau adéquat du stock de capital humain pouvant avoir une influence positive sur la croissance économique. Aussi, la présence des firmes étrangères dans certains pays pourrait s'avérer défavorable au développement du tissu économique local. En effet, l'entrée des firmes multinationales pourrait évincer du marché les entreprises locales qui ne sont pas en mesure de les concurrencer. Cet impact négatif des IDE sur les entreprises du pays d'accueil a déjà été mis en évidence par Aitken et Harrisson (1999) pour le Venezuela. Ainsi, de nos résultats il ressort que les économies d'accueil des IDE qui ont une dynamique interne (importance du taux de croissance) remplissent la pré-condition à un effet positif des IDE sur la productivité globale. Les Pays Moins Avancés, de par leur niveau de PIB ne connaissent pas encore ce dynamisme économique –pré condition- pour observer un effet positif des IDE sur la croissance économique. A cela s'ajoutent les « bons IDE », lesquels ne sont pas les IDE orientés dans l'exploitation minière. La variable croisée IDE*EXP montre l'interaction positive entre les IDE et les exportations dans la CEDEAO. Ici, les filiales des multinationales sont intégrées dans des réseaux internationaux contrairement aux entreprises locales.

Par ailleurs, dans l'échantillon total, c'est-à-dire l'ensemble des pays de la CEDEAO, les variables statistiquement significatives lorsqu'on n'intègre pas les variables interactives sont le PIB initial et l'IDE qui ont un signe positif. Cependant, lorsque sont intégrées les variables interactives, les variables statistiquement significatives sont le capital humain, les infrastructures et l'IDE qui affectent de façon positive la croissance économique alors que l'inflation et la variable interactive IDE*EXP bien que statistiquement significative ont un effet négatif sur la croissance économique. Ce résultat renvoie à l'effet indirect des IDE sur la croissance économique. Ainsi, le résultat lié au canal du capital humain s'analyse comme suit : selon Borensztein et al. (1998) à partir du seuil de 0,52 année d'études secondaires les IDE commencent à entraîner des gains de croissance économique dans le pays hôte. En revanche, d'après les calculs de Xu, le seuil s'élève à 1,9 année d'études secondaires pour que le pays d'accueil bénéficie des gains de productivité via les IDE. Au regard de ces résultats, le constat

suivant peut être établi : la plupart des pays de la CEDEAO ont déjà atteint le seuil de développement fixé par Borensztein et al. (1998) (le stock de capital humain en moyenne est 0,81 année d'étude, Cf. annexe 3), mais pas celui fixé par Xu (2000). Les études menées par Xu (2000) et Borensztein et al. (1998) permettent de mettre en évidence l'importance de l'effet de seuil dans le processus de diffusion technologique. Ces auteurs postulent que les IDE exercent un effet bénéfique sur les économies d'accueil à condition qu'elles aient déjà atteint un certain seuil de développement du capital humain. L'investissement dans la formation du capital humain en Afrique de l'Ouest s'avère donc fondamental. Les IDE jouent un rôle positif dans les exportations des pays de l'UEMOA. Les IDE disposent de la potentialité d'améliorer la productivité des entreprises domestiques à travers leur impact sur la concurrence. L'effet d'entrainement dû à la concurrence se traduit de la façon suivante : la présence des multinationales exerce une pression concurrentielle sur les entreprises domestiques. Cette pression oblige les firmes locales à devenir efficaces et plus compétitives en rationalisant leur processus de production et en modernisant leurs technologies (Sjoholmn , 1999). Ainsi, pour les pays attirant très peu d'IDE, ces derniers ont un effet négatif sur la croissance économique car il y a très peu d'entreprises domestiques sur le marché pouvant profiter de l'effet contagion de la technologie des firmes étrangères. Par contre, pour les pays attirant plus d'IDE dans la sous région, ces derniers ont un effet positif sur la croissance économique. Or, il faudrait remarquer que la performance économique explique aussi l'importance des afflux d'IDE (Diaw et Guidime, 2012) ; les IDE ont donc un effet direct positif sur la croissance économique des pays certes, attirant plus d'IDE dans la sous région, mais qui ont atteint un seuil de développement (taille, capital humain) favorable à cet effet. Il y a un effet direct négatif des IDE sur la croissance économique des pays, attirant très peu d'IDE, mais qui ne connaissent pas encore une dynamique économique. Cependant, la contribution des IDE à la croissance économique des pays n'est pas systématique.

Les recommandations de politiques économiques qui découlent de l'étude sont les suivantes :

- améliorer davantage le stock de capital humain, catalyseur du dynamisme économique : en plus des efforts que font les Etats dans l'éducation de base, il convient d'investir davantage dans les formations techniques et supérieures. La complexité des technologies contenues dans certains investissements étrangers se résout plus aisément avec un niveau d'éducation plus élevé que celle de base. De plus, la disponibilité de main d'œuvre qualifiée attire les IDE orientés dans les secteurs productifs contrairement aux IDE qui s'orientent dans l'exploitation des ressources naturelles.
- soutenir le secteur privé domestique à travers une mise à disposition de services financiers de qualité pour encourager l'investissement domestique : le tissu économique local est davantage animé par des investisseurs domestiques. Cependant, ces investisseurs disposent généralement des entreprises de petites tailles et, exercent dans l'informel. L'entreprise de réformes pour la formalisation et l'encadrement serait pertinente. En revanche, les IDE améliorent les capacités et, l'efficacité des firmes locales lorsque ces dernières bénéficient aussi de financement local. Le développement de banques dédiées au financement de l'investissement privé est opportun dans les pays de l'Afrique de l'Ouest.
- assurer la stabilité politique, condition nécessaire à l'exploitation des capacités absorptives des pays de la CEDEAO.

6. Conclusion

L'analyse des effets des IDE sur la croissance économique dans les pays de l'Afrique de l'Ouest permet de dégager des effets directs et des effets indirects. Dans le premier cas l'IDE s'est avéré endogène et son effet est positif pour les pays de la CEDEAO, mais négatif pour les pays n'ayant pas respecté la pré-condition (dynamique économique), c'est-à-dire les Pays Moins Avancés. De plus, les pays ayant une capacité d'absorption via l'investissement domestique, le développement financier, bénéficient d'un effet favorable des IDE sur la croissance économique.

Aussi, le niveau de qualification de la main d'œuvre dans les pays de la CEDEAO n'est pas suffisant pour absorber et assimiler la technologie transférée par les multinationales. La disponibilité d'un stock de capital humain dans le pays hôte détermine à la fois la quantité et la qualité des flux d'IDE entrants. A priori, les pays relativement bien dotés en capital humain ont plus de potentialités à attirer les flux d'IDE intensifs en technologie.

En définitive, bien que l'effet des IDE sur la croissance économique soit différencié dans les pays de la CEDEAO, il est apparu que les pays ayant une pré-condition (niveau de développement par le dynamisme économique) où des capacités d'absorption internes (investissement domestique, développement financier) existent bénéficient d'un effet favorable de l'IDE sur la croissance économique.

Les pays de la CEDEAO sont dans un processus d'intégration économique et monétaire. Dans ce contexte, le rôle que pourrait jouer l'intégration régionale dans la nature et l'importance des IDE mobilisés est une question d'un intérêt majeur.

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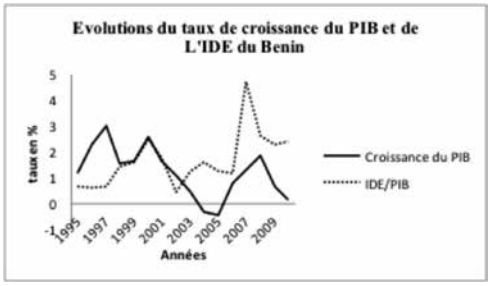
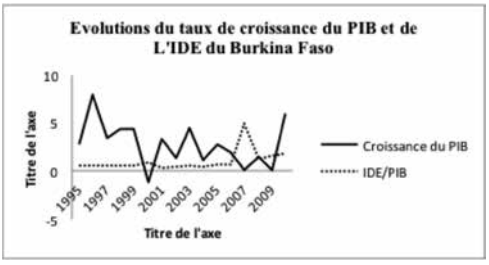
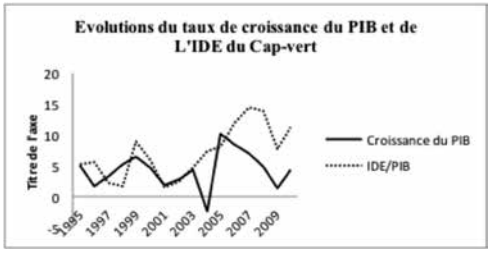
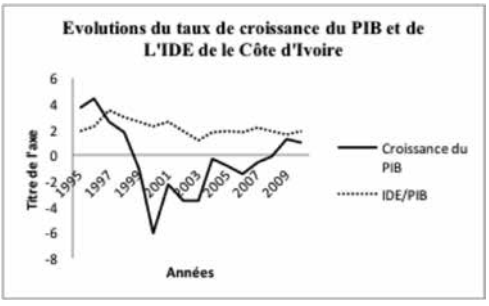
Annexe

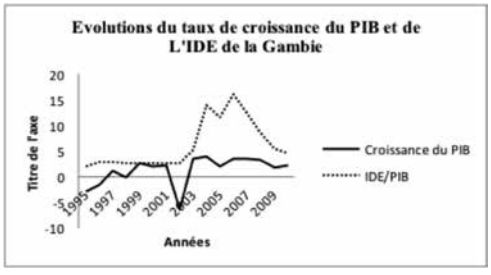
Annexe 1: Evolutions simultanées des courbes de produit intérieur brut et investissements directs étrangers.

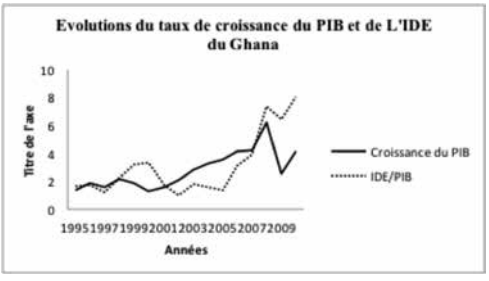


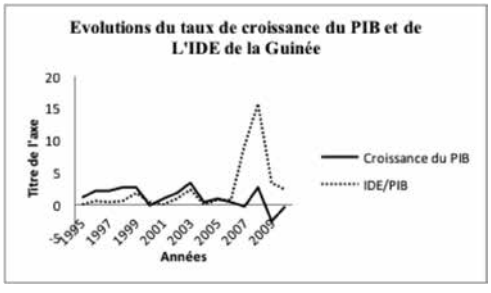


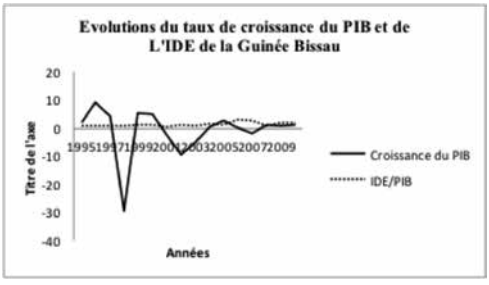


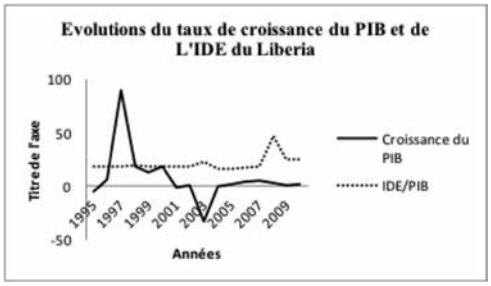








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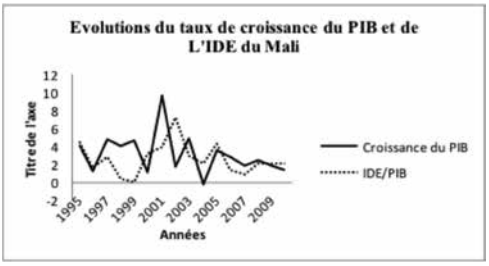
Titre de l'axe
Années
Croissance du PIB
IDE/PIB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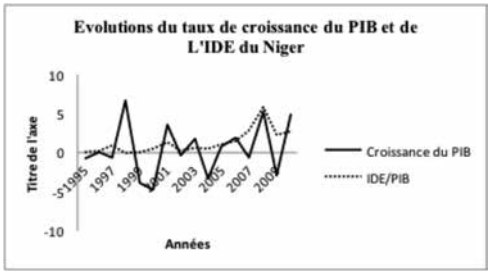
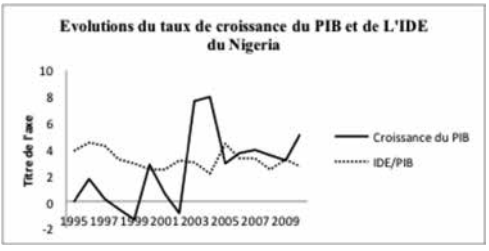
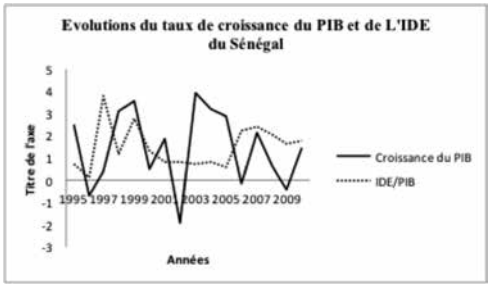
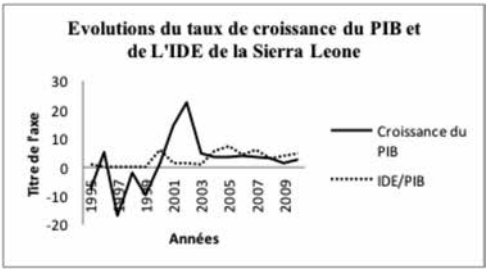
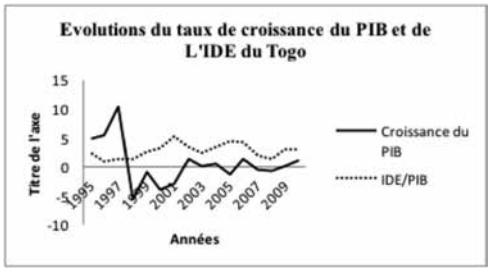
Titre de l'axe
Années
Croissance du PIB
IDE/PIB


Evolutions du taux de croissance du PIB et de L'IDE du Niger
Titre de l'axe
Années
Croissance du PIB
IDE/PIB


Evolutions du taux de croissance du PIB et de L'IDE du Nigeria
Titre de l'axe
Croissance du PIB
IDE/PIB


Evolutions du taux de croissance du PIB et de L'IDE du Sénégal
Titre de l'axe
Années
Croissance du PIB
IDE/PIB


Evolutions du taux de croissance du PIB et de L'IDE de la Sierra Leone
Titre de l'axe
Années
Croissance du PIB
IDE/PIB


Evolutions du taux de croissance du PIB et de L'IDE du Togo
Titre de l'axe
Années
Croissance du PIB
IDE/PIB

Annexe 2 : Résultats des Tests de racine unitaire sur données de panel

Test de racine unitaire sur les variables en niveau				
Variables	LLC_adj t*	IPS_Wtbar	CIPS_Ztbar	Décision de stationnarité
ide	-3.4963 (0.0002)***	-1.852 (0.087)*	-1.742 (0.511)	S
sch	0.7104 (0.7613)	-1.319 (0.788)	-2.046 (0.130)	NS
lgdp	1.2327 (0.8912)	-1.604 (0.361)	-1.264 (0.968)	NS
infr	-13.6110 (0.0000)***	-1.954 (0.038)**	-1.506 (0.823)	S
tchr	-3.1129 (0.0009)***	-1.296 (0.813)	-2.457 (0.004)***	S
trade	-3.5714 (0.000)***	-1.758 (0.164)	-2.528 (0.002)***	S
inflad	-6.4615 (0.000)***	-2.674 (0.000)***	-2.795 (0.000)***	S
mgdp	-2.7907 (0.0026)***	-2.131 (0.006)***	-2.461 (0.003)***	S
urbpop	-6.7872 (0.0000)***	-2.429 (0.000)***	-1.065 (0.995)	S
poliest	-0.9969 (0.1594)	-1.233 (0.874)	-1.099 (0.993)	NS
tinv	-2.1875 (0.0144)*	-1.739 (0.183)	-1.710 (0.561)	NS
tid	-4.9631 (0.000)***	-3.251 (0.000)***	-2.296 (0.019)**	S
tint	-0.3946 (0.3466)	-2.084 (0.011)**	-0.296 (1.000)	NS
exp	-3.6496 (0.0001)***	-2.226 (0.002)***	-2.396 (0.007)***	S
Test de racine unitaire sur les variables en première différence				
IDE	-9.7632 (0.0000)***	-3.824 (0.000)***	-2.662 (0.000)***	S
g	-9.9986 (0.0000)***	-4.906 (0.000)***	-3.069 (0.000)***	S
cre	-8.0224 (0.000)***	-3.020 (0.000)***	-3.202 (0.000)***	S
sch	-3.1052 (0.0010)***	-2.256 (0.002)***	-2.124 (0.081)**	S
rinv	-8.3948 (0.0000)***	-4.195 (0.000)***	-2.811 (0.000)***	S

lgdp	-1.6376 (0.0508)*	-2.810 (0.000)***	-1.991 (0.177)	S
infr	-5.5229 (0.0000)***	-3.380 (0.000)***	-1.835 (0.354)	S
tchr	-7.2108 (0.0000)***	-4.521 (0.000)***	-2.608 (0.001)***	S
trade	-9.4317 (0.0000)***	-3.605 (0.000)***	-3.194 (0.000)***	S
inflad	-11.7313 (0.000)***	-3.886 (0.000)***	-3.247 (0.000)***	S
mgdp	-0.3151 (0.3764)	-2.411 (0.000)***	-1.953 (0.214)	NS
urbpop	-4.7703 (0.000)***	-2.283 (0.001)***	-1.499 (0.794)	S
polisd	-9.0163 (0.0000)***	-3.051 (0.000)***	-2.456 (0.005)***	S
poliest	-7.7977 (0.000)***	-3.188 (0.000)***	-2.484 (0.004)***	S
tinv	-7.6086 (0.000)***	-3.374 (0.000)***	-2.905 (0.000)***	S
tid	-9.4066 (0.000)***	-4.070 (0.000)***	-3.051 (0.000)***	S
exp	-11.3885 (0.000)***	-3.772 (0.000)***	-3.401 (0.000)***	S

Source : nos calculs sur STATA 11.0

Annexe 3: Résumé statistique de l'estimation de l'échantillon

Variables	Moyenne	Ecart-type	Minimum	Maximum
In(gdp)	10,6238	5,702457	5,057135	46,8288
ide/pib	4,070856	5,5,702457	-0,057135	46,8285
D(igdp initial)	-0,0006065	0,0943196	-0,697875	0,65062
D(capital humain)	0,819903	2,493476	-18,0091	13,968
infrastructure	129,9256	176,8621	1,59564	918,106
inflation	24,6146	252,3707	-10,0088	3789,21
D(stabilité politique)	-0,0023591	0,3285087	-1,52125	1,24965
D(ouverture commerciale)	0,5487859	12,20453	-61,1115	107,316
D(ide*capital humain)	8,204372	130,1972	-785,585	1033,84
D'ide*investissement domestique)	4,186889	56,94233	-261,557	365,192
D(ide*M2/PIB)	5,699643	105,5617	-537,467	889,735
Nbre d'observations	225	225	225	225

Source : nos calculs sur STATA 11.0

Annexe 4 : Les différents échantillons

Echantillon et sous-échantillons	
CEDEAO	Bénin, Burkina Faso, Cap Vert, Côte d'Ivoire, Gambie, Ghana, Guinée, Guinée Bissau, Liberia, Mali, Niger, Nigéria, Sénégal, Sierra Léone, Togo.
UEMOA	Bénin, Burkina Faso, Côte d'Ivoire, Guinée Bissau, Mali, Niger, Sénégal, Togo.
Pays Moins Avancés (2010)	Bénin, Burkina Faso, Gambie, Guinée, Guinée Bissau, Libéria, Mali, Niger, Sénégal, Sierra Léone, Togo.
Pays attirant plus d'IDE	Côte d'Ivoire, Ghana, Nigéria.
Pays attirant moins faiblement d'IDE	Guinée, Libéria, Mali, Niger, Sénégal.
Pays attirant faiblement d'IDE	Bénin, Burkina Faso, Cap Vert, Gambie, Guinée Bissau, Sierra Leone, Togo.

Source : Réalisés par les auteurs.

Annexe 5 : Tests de spécification du panel

F test that all u_i=0: F(14, 199) = 4174.92 Prob > F = 0.0000

. * la probabilité de test de fisher donne 0,000. on rejette donc l'absence d'effets.

. * nous faisons donc le test de breuch pagan

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

lgdp[pays,t] = Xb + u[pays] + e[pays,t]

Estimated results:

| Var sd = sqrt(Var)

---------+-----------------------------

lgdp | 5.520308 2.349534

e | .0112405 .106021

u | 1.210542 1.100247

Test: Var(u) = 0

chibar2(01) = 1064.88

Prob > chibar2 = 0.0000

. * le test révèle la présence d'effets aléatoires et rejette l'estimateur mco dans sa totalité. L'estimateur mcg est ici préféré ; d'où le choix du modèle à effet aléatoire.

****test de Chow****

. ***regression sur tout l'échantillon***

. reg lgdp lgdp86 sch infr inflad trade poliest, robust

Linear regression

Number of obs = 210
F(6, 203) = 33.68
Prob > F = 0.0000
R-squared = 0.2101
Root MSE = 1.4e+05

lgdp |	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdp86 |	-.2074054	.824767	-0.25	0.802	-1.833614	1.418803
sch |	-4117.243	795.1782	-5.18	0.000	-5685.111	-2549.375
infr |	225.1685	68.8634	3.27	0.001	89.38925	360.9478
inflad |	-39.2479	8.749432	-4.49	0.000	-56.49932	-21.99648
trade|	-275.758	394.0459	-0.70	0.485	-1052.706	501.1898
poliest |	-37403.95	14258.59	-2.62	0.009	-65517.89	-9290.01
_cons |	241648.5	25396.71	9.51	0.000	191573.4	291723.7

. ** récupération de la somme des carrés des résidus***
. scalar scr = e(rss)

. **récuperaton du nombre d'observations
. scalar n = e(N)

. ** régression sur l'échantillon des pays en développement**
. reg lgdp lgdp86 sch infr inflad trade poliest if ped==1, robust

Linear regression

Number of obs = 42
F(6, 35) = 22.57
Prob > F = 0.0000
R-squared = 0.6896
Root MSE = 99985

lgdp |	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdp86 |	-1.411952	2.115657	-0.67	0.509	-5.706963	2.88306
sch |	-17087.89	2138.571	-7.99	0.000	-21429.42	-12746.36
infr |	388.6158	99.53964	3.90	0.000	186.5395	590.692
inflad |	-1268.895	1446.122	-0.88	0.386	-4204.679	1666.89
trade |	1118.388	1103.36	1.01	0.318	-1121.552	3358.327
poliest |	68267.86	23574.37	2.90	0.006	20409.34	116126.4
_cons |	641234.6	137562.1	4.66	0.000	361968.7	920500.5

. **recuperation de la somme des carrés des résidus**
. scalar scr1 = e(rss)

. ** régression sur l'échantillon des pays moins avancés**
. reg lgdp lgdp86 sch infr inflad trade poliest if ped==0, robust

Linear regression

Number of obs = 168
F(6, 161) = 20.76
Prob > F = 0.0000
R-squared = 0.1997
Root MSE = 1.5e+05

lgdp |	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lgdp86 |	-.0180894	.7840866	-0.02	0.982	-1.56651	1.530331
sch |	-3227.955	847.3065	-3.81	0.000	-4901.222	-1554.687
infr |	258.3097	92.91479	2.78	0.006	74.82084	441.7986
inflad |	-44.39191	11.22026	-3.96	0.000	-66.54977	-22.23406
trade |	-583.6295	382.9466	-1.52	0.129	-1339.876	172.6166
poliest |	-51109.52	19561.9	-2.61	0.010	-89740.52	-12478.51
_cons |	229974.8	24334.66	9.45	0.000	181918.5	278031.1

. **recuperation de la somme des carrés des résidus**
. scalar scr2 = e(rss)

. **calcul de la statistique du test***
. scalar stat = ((scr - (scr1+scr2)) / (scr1+scr2))*((n-2*8)/8)

. **calcul de la probabilité du test**
. display F(8, n-2*8, stat)
.99801789

. **si la probabilité du test est supérieure à 5%, on ne peut pas rejeter l'hypothèse Ho de stabilité des coefficients entre les deux sous échantillons.***

Annexe 6: Sortie de résultats d'estimations en Moindres Carrés Généraliséz et EC2SLSde Balgati

Variables	Ensemble des pays de la CEDEAO				Ensemble des pays de l'UEMOA				Ensemble des Pays Moins Avancés			
	Estimateurs MCG		Estimateurs EC2SLS de Baltagi		Estimateurs MCG		Estimateurs EC2SLS de Baltagi		Estimateurs MCG		Estimateurs EC2SLS de Baltagi	
	Effets sans variables interactives	Effets avec variables interactives	Effets sans variables interactives	Effets avec variables interactives	Effets sans variables interactives	Effets avec variables interactives	Effets sans variables interactives	Effets avec variables interactives	Effets sans variables interactives	Effets avec variables interactives	Effets sans variables interactives	Effets avec variables interactives
Constante	10,41 (0,00)***	10,53 (0,00)***	10,30 (0,00)***	10,53 0,00)***	12,56 (0,00)***	12,06 (0,00)***	12,40 (0,00)***	12,04 (0,00)***	10,81 (0,00)***	11,83 (0,00)***	10,83 (0,00)***	11,82 (0,00)***
Igdp(Initial 1986	-0,366 (0,014)**	-,00007 (0,99)	-,34 (0,012)***	-,002 (0,980)	-1,59 (0,283)	-,35 (0,759)	-1,29 (0,331)	-,36 (0,758)	-,057 (0,769)	1,68 (0,134)	-,04 (0,833)	1,73 (0,120)
Capital humain	0,035 (0,498)	,0062 (0,072)	,004 (0,415)	,006 (0,072))*	-,008 (0,786)	-,02 (0,369)	-,015 (0,588)	-,02 (0349)	,011 (0,122)	-,03 (0,419)	0,12 (0,115)	-,03 (0,426)
Infrastructure	0,00007 (0,566)	,002 (0,001)***	,001 (0,314)	,0002 (0,001)***	,002 (0,00)**	,001 (0,001)***	,0018 (0,00)***	,001 (0,001)***	,0006 (0,002)***	,002 (0,00)***	,0007 (0,00)***	,002 (0,00)***
Inflation	0,00003 (0,616)	-,00009 (0,020)**	,00002 (0,630)	-,00009 (0,022)**	,005 (0,477)	,009 (,133)	,006 (0,387)	,008 (0,133)	-,00002 (0,676)	-,0002 (0,522)	-,00003 (0,655)	-,003 (0,475)
Stabilité politique	0,004 (0,923)	-,004 (0,884)	,001 (0,972)	-,004 (0,877)	-,17 (0,458)	-,12 (0,507)	-,15 (0,457)	-,11 (0,510)	-,510 (0,790)	-,21 (0,517)	-,02 (0,783	-,21 (0,519)
Ouverture commerciale	0,001 (0,20)	,0001 (0,878)	,001 (0,231)	,0001 (0,891)	,02 (0,147)	,005 (0,624)	,017 (0,165)	,007 (0,605)	-,002 (0,302)	-,01 (0,157)	-,002 (0,247)	-,01 (0,151)
IDE/PIB	0,05 (0,001)***	,05 (0,00)***	,04 (0,002)***	,05 (0,00)***	-,49 (0,00)***	-,36 (0,001)***	-,39 (0,00)***	-,34 (0,001)***	-,04 (0,106)	-,28 (0,00)***	-,05 (0,042)**	-,27 (0,00)***
IDE*Capital humain		-,00004 (0,806)		-0,00004 (0,826)		-,0005 (0,923)		-,0005 (0,925)		,002 (0,443)		,007 (0,454)
IDE*EXP		-,001 (0,00)***		-,001 (0,00)***		,006 (0,022)**		,006 (0,030)***		-,001 (0,555)		-,001 (0,446)
gaide	-0,49 (0,645)		-,50 (0,599)			1,30 (0,00)***		1,30 (0,00)				
maide	0,04 (0,967)		,06 (0,943)			-,013 (0,917)		-,017 (0,889)			10,6 (0,00)**	1,06 (0,00)***
R-carré	0,57	0,39	0,44	0,39	0,43	0,67	0,48	0,68	0,7	0,77	0,71	0,77
Test de Wald	37,08	102,73	41,2	101,93	21,18	25,44	22,57	24,83	15,11	318,8	15,83	319,12
P-value	0	0	0	0	0,0035	0,0079	0,002	0,0096	0, 347	0	0,026	0
Nbre d'Obs	225	225	225	225	120	120	120	120	180	180	180	180

Relevance of the Credit Channel in the Monetay Policy Transmission Mechanism in Nigeria

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Abstract

This study employs a structural vector autoregressive (SVAR) model to investigate the relevance of the credit channel of monetary policy transmission mechanism in Nigeria. Though, the results establish a long run relationship, their impulse response functions indicate very limited transmission impact among one another. The results fail to provide any robust evidence that credit channel significantly matters in monetary policy transmission mechanism in Nigeria. This may be accounted for by the reluctance of banks to adequately finance the real sector of the Nigerian economy. Banks, more often, provide short term credits with greater concentration in commerce to finance imports than in real sector production. The inadequacy of credit supply to the real sector has the potential of negatively impacting on the growth of the real sector output in the economy. The study recommends that the CBN should increase its intervention funds to the real sector for long term on-lending at lower rate by the deposit money banks (DMBs) and to further strengthen its supervisory capacity to ensure the funds are appropriately utilized. It also points out the need for the government to increase its efforts in addressing the infrastructural gap and other structural bottlenecks in Nigeria in order to reduce the cost of doing business and the risk of lending to the real sector.

Key words: Transmission Mechanism, Credit, Monetary Policy

JEL Classification: E51, E52

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1. Introduction

Monetary policy transmission mechanism denotes the route through which monetary impulses pass to affect or influence macroeconomic indicators such as inflation, output and employment. To influence these indicators in a desired direction and, thus, achieve the objectives of monetary policy, it is imperative for policy makers to understand the workings of the various routes of the transmission mechanism and their efficacies in any given economy. These routes in economic literature are referred to as the channels of monetary policy transmission mechanism. These include interest rate, credit, exchange rate, asset price and expectation channels of monetary policy.

The way in which changes in monetary policy are transmitted into the real economy has, however, always been a topic of interest to economists and monetary authorities (See Ivanov and Cavrak [2004 & 2005], Bernanke and Gertler [1989], and Angelopoulou and Gibson [2007]). Theory suggests that central bank's policy changes affect the amount of credit banks grant to firms and consumers for purchases which in turn affect aggregate demand and the real output. In this context, the credit channel does not relate to banks' credit alone, but also to credit extended by other financial intermediaries to businesses (firms), households and individuals. Some studies have likened credit demand or expenditure to reflect movement in the overall banking system or economic wide liquidity (Ivanov and Cavrak, 2004, 2005) as variation in liquidity position affects credit availability. Therefore, any monetary policy action that impacts on the liquid reserves of banks will inevitably affect the capacity of banks to extend or otherwise reduce credit facilities. It is in this context that a change in policy interest rate or cash reserve ratio has profound ramifications through the credit channel. Economic agents, either as consumers or investors, react to interest rate changes to increase (reduce) consumption or investment proposals through credit facilities. The credit channel is therefore regarded as an indirect amplification or a derivative of interest rate and other policy variables (Ivanov and Cavrak, 2004,2005).

Conventionally, the credit channel is literally construed as bank lending channel, the supply of banks' loans for investment or consumption. However, another variant of the credit channel, which is known as the balance sheet channel, was further propagated in a seminal work by Bernanke and Gertler (1989) (see Angelopoulou and Gibson, 2007). The balance sheet channel emphasizes the reaction of individuals, households and firms to credit facilities in accordance to the net worth of their respective balance sheets following a policy stimulus. Those with positive net worth could increase credit facilities, while those with negative net worth will naturally refrain from obtaining further credit facilities for consumption or investment activities owing to a policy action. In effect, while the bank lending channel relates to the balance sheets of deposit money banks (DMBs) and their capacity to supply loans (credits) to customers, the balance sheet channel, on the other hand, relates to customers' capacity to demand for credit. These two variants of supply and demand constitute the credit channel of monetary policy transmission mechanism (see Angelopoulou and Gibson, 2007).

Specifically, the focus of this paper is to examine the relevance of credit channel of monetary policy transmission mechanism in Nigeria. The paper is organized in six sections. Section 2 presents the literature review; Section 3 discusses some stylized facts on the credit channel of monetary policy transmission in Nigeria; Section 4 examines the methodology and data, while

Section 5 analyzes the results and their policy implications. Finally, Section 6 summarizes and concludes the paper.

2. Literature Review

2.1 Theoretical Literature

Monetary policy transmission mechanism refers to a process through which monetary policy decisions affect real sector output, inflation and equities. The traditional interest rate and exchange rate mechanisms have become a subject of criticisms on the ground that it is difficult to determine the magnitude, timing and composition of the economy's response to monetary policy shocks solely in terms of conventional interest rate only. However, many recent publications have promoted credit markets as a key component in the transmission of monetary policy to the real economy (credit channel mechanism).

Bayoumi and Melander (2008) model provides a theoretical approach in tracing the impact of credit supply on aggregate spending. The first link is from the capital-to-asset ratio to bank lending standards. Capital requirements on banks are imposed by regulators and/or market discipline, so a negative shock on capital-to-asset ratio constrains the capacity for lending. Thus, banks are induced to tighten their lending standards in order to reduce the quantity of credit and restore the capital to asset ratio. A tightening of lending standards causes a decrease in the quantity of credit. When credit availability declines, there is a direct effect on spending due to credit constraints, notably through consumption and investment. On the income side, as spending and income fall, loan losses gradually increase and the capital-to-asset ratio deteriorates further. The second feedback channel is due to deterioration of incomes and balance sheets of households and firms, which has a further adverse financial-accelerator effect on credit availability. Taking these feedback mechanisms into account, the final effect of a capital-to-asset ratio shock on aggregate economic activity is larger than the direct effect. Eventually, as bank credit declines while the capital-to-asset ratio starts to improve, bank deleveraging causes a decrease in the denominator of the capital to asset ratio, which increases the overall ratio.

2.2 Empirical literature

Much of the initial empirical literature on the effects of credit aimed at distinguishing between different channels of monetary policy transmission mechanism, such as the balance sheet channel, the bank lending channel and the bank capital channel[5]. However, efforts to analyze the interaction between credit and monetary policy include studies by Bernanke et al. (1999), Carlstrom and Fuerst (2001), Van den Heuvel (2002), Iacoviello (2005), Agha et al (2005), Kishan and Opiela (2000).

Bernanke and Blinder (1988) established that lending channel is effective when firms are not perfectly indifferent between borrowing money from banks and raising bonds by borrowing from the general public. If they are indifferent, then any decrease in loans supply will not affect

5 - See Oliner and Rudebusch (1996) (balance sheet channel vs bank lending channel), and van den Heuvel (2002; 2007) (bank capital channel vs bank lending channel) and Bernanke & Blinder (1988) etc.

them and this is more reinforced if the central bank is able to influence the supply of loan through the use of monetary instruments. He suggested that the effectiveness of monetary policy could be easily determined by the prevailing market conditions on the demand and supply of bank loans in an economy where bank loans are truly sensitive to short term money market rates.

Also, Blinder (1992) applied VAR analysis to U.S. data to examine the impulse response functions of bank loans, securities and deposits to a positive innovation in the federal funds rate. While the result showed an immediate decline in the volume of securities and deposits, it showed a delayed decline in the volume of bank loans following a monetary tightening. Secondly, over a longer time span, there is a rebuilding of bank securities holdings and a further decline in loans basically matching the decline in deposits. Though, the results were found to be consistent with the credit channel, it failed to show whether the change in bank loans following a monetary tightening is as a result of supply of loans or demand for it.

Agha et al (2005) stressed that bank lending play a prominent role in monetary policy transmission mechanism in Pakistan primarily due to the dominance of the banking sector. The banks' role was further strengthened by financial reforms, credit allocation based on markets and a decline in fiscal dominance which crowded-in the private sector.

Kishan and Opiela (2000) argued that the asset size and capital of a bank can affect loan growth. A reduction in the bank's capital increases the cost of funds which is passed on to borrowers, thereby ultimately affecting lending. They found that loans of smaller banks with lower capital leverage ratio were more responsive to monetary policy tightening compared to banks with higher ratios.

Dabla Norris and Floerkemeir (2006) examined monetary policy transmission mechanism in Armenia. Using VAR analysis the study found that monetary policy tightening by reducing reserves limit the ability of banks to supply loans. They maintained that if the banks have excess reserves and have the ability of substituting bank reserves with other alternative sources of investment funds, they become less responsive to contractionary policy measures.

Agung (2000) examined the role of cash flow and leverage in firm investment to test directly the existence of the balance sheet channel in Indonesia. The result confirmed that the channel existed but did not reveal whether balance sheet of firms is affected significantly by a monetary contraction. Agung, et al. (2001) further investigated the presence of the balance sheet channel in Indonesia by extending the data employed by Agung (2000) to include the crisis period. The result suggested that small firms are more sensitive to their balance sheet changes than large firms. It also showed that firms' balance sheet variables are very important determinants of the firms' investments.

Ziaei (2012) evaluated different channels of the monetary policy transmission mechanism in Saudi Arabia over the last 15 years with a baseline of structural vector autoregressive (SVAR) model. Contemporaneous coefficient in the structural model indicated that while Saudi Arabia pegged its currency to US dollar, monetary policy instrument reacted positively to unexpected changes in the monetary aggregate. Moreover, variance decomposition results showed that past shocks of credit, nominal effective exchange rate (NEER), federal funds rate (FFR) and treasury bill (TB) were important for credit growth in shorter and longer horizon.

Ogun and Akinlo (2010), using Structural Vector Autoregressive (SVAR) technique, tested the effectiveness of bank credit channel of monetary policy transmission mechanism during the adoption of deregulatory measures in Nigeria. The study found that bank deposits, securities holdings and total loans and advances responded slowly to monetary policy shock during the simulation period. Monetary policy shock also contributed very little to the forecast errors of these bank balance sheet variables. The paper concluded that the bank credit channel was ineffective in Nigeria.

Ndekwu (2013) carried out an empirical analysis which sought to explain the monetary policy transmission mechanism to the real economy in Nigeria. Employing vector auto-regression (VAR) with dynamic logarithmic form and the ordinary least squares (OLS) methods, he found that, of all the channels, the credit channel in the financial market for credit supply and accessibility to the private sector provide the effect of a linchpin in the process by which monetary policy transmits to the real economy.

Ogbonna and Uma (2014) examined the monetary policy transmission mechanism in Nigeria focusing on empirical studies and happenings in the country that retarded the efficiency of the Central Bank of Nigeria over the years in the pursuant of effective transmission mechanism. The empirical studies showed that interest rate, credit channel and exchange rate channels were among the relevant channels of monetary policy transmission in the economy. They however concluded that credit and interest rate must be manipulated from time to time to accelerate aggregate economic activity since they are known to play important role in the monetary policy transmission mechanism in Nigeria.

Employing a VAR model, Ishioro (2013) examined the channels of monetary policy transmission mechanism in Nigeria with the aim of identifying and validating the existence of the channels. The results of the study showed that interest rate and the exchange rate channels were the most functionally important channels of monetary policy transmission in Nigeria as they were linked unidirectional to other channels.

Nwosa and Saibu (2012) investigated the transmission channels of monetary policy impulses on sectoral output growth in Nigeria for the period 1986 to 2009 using secondary quarterly data and utilizing granger causality and Vector Auto-regressive method of analysis. The results showed that interest rate channel was most effective in transmitting monetary policy to Agriculture and Manufacturing sectors while exchange rate channel was most effective for transmitting monetary policy to Building/Construction, Mining, Service and Wholesale/ Retail sectors. The study therefore concluded that interest rate and exchange rate policies were the most effective monetary policy measures in stimulating sectoral output growth in Nigeria.

Bature (2014) examined the degree or the strength of the effects of the various channels of monetary policy transmission mechanism in Nigeria. The analysis showed that interest rate channel was the dominant channel with the highest speed of transmission. The study found the exchange rate channel to be weak compared to the credit channel.

3. Credit Channel of Monetary Policy Transmission: Some Stylized Facts.

3.1 Monetary Policy Regime in Nigeria

The Central Bank of Nigeria, since inception in 1959, has implemented two main regimes of monetary policy, namely, the direct and indirect (or market driven) monetary control regimes. The direct control lasted between 1959 and 1990, while the indirect control started in 1991 and has subsisted till date. While the direct control regime featured the use of direct monetary policy instruments such as administered interest rates, pegged or managed exchange rates and direct allocation of credit to preferred sectors of the economy, the indirect regime liberalized monetary policy management and allowed competition and market forces to determine suitable instruments for monetary policy.

Essentially, three main reasons accounted for the adoption of the direct control regime in monetary policy management; first, the financial system was still evolving and not strong enough to withstand market dynamics; second, the government needed appropriate policy measures to generate cheap credit given the fall in revenues as a result of the prosecution of the Nigerian civil war, and the dwindling international commodity export prices; and lastly, the need to jump start growth and address the challenge of income distribution and unemployment (CBN,2009).

The indirect or market driven monetary policy regime was introduced because of the failure of the direct regime to address some of the challenges of monetary policy during its implementation. For instance, as a result of the direct control of monetary policy, there was rapid expansion of government borrowing fuelled by cheap credit availability and monetization of oil revenue both of which burdened the inflation objectives of the Central Bank of Nigeria (CBN). Consequently, between 1980 and 1985, the CBN continued its expansionary monetary policy which resulted in huge deficits, financed through ways and means of the CBN. The impact of deficits was visible in the unfavorable balance of payments position and huge foreign debts, which combined to fuel inflation that continued until the introduction of the Structural Adjustment Programme (SAP) in 1986.

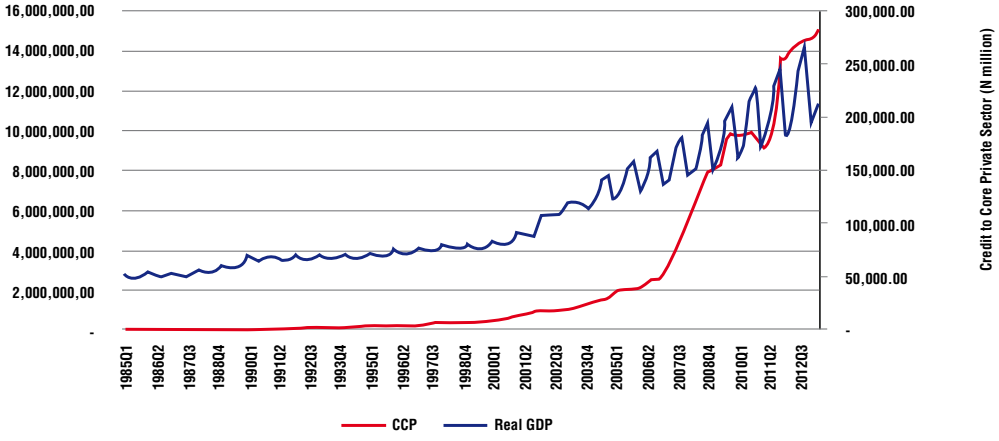
The introduction of indirect control of monetary policy was, therefore, heralded by the fundamental financial liberalization programmes that commenced in the 1986 soon after the introduction of the Structural Adjustment Programme. However the implementation of market driven monetary policy commenced in 1991 with the liberalization of interest rates and the introduction of OMO bills. This was quickly followed by the deregulation of exchange rates, and deepening of financial intermediation through government divestment in many of the banking institutions which was hitherto nationalized.

Performance of the economy during the indirect control of monetary policy was however mixed, especially from 1996 to 2006. While the average output growth target was about 4.1 percent, actual growth was 3.1 per cent; inflation rate averaged 14.4 percent against the target of 12.3 percent. Narrow money (M1) grew at 26. 4 percent as against the 10.4 percent target and the growth of broad money supply (M2) was 26.9 percent against 14.4 percent that was targeted. More importantly, credit expansion to the economy was targeted to grow at an average of 21.5 per cent annually, but actual performance was put at 17.7 percent. The expansion of credit to the private sector was at 29.0 percent, while credit to government which was targeted to grow at 9.3 per cent actually declined by 3 percent (CBN, 2009).

3.2: Credit and Growth Performance (1985-2013)

The primary objective of credit allocation to the preferred sectors of the Nigerian economy during the direct control era was essentially to leverage on the sectors of the economy with the highest credit-growth elasticity that had the potential to lead the rest of the economy on the trajectory of sustainable growth. However, the correlation between credit to core private sector and growth outcomes was tenuous until after the global financial crises of 2008 and the reform of the banking system in 2009 and beyond. The era of direct credit allocation did not show a remarkable uniform trend starting from the early 1980s to around 2008 when the global financial crises ensued. The improved impact of credit on the growth of the economy can be attributed to the sustained reforms of the banking sector and the effective management of monetary policy especially after the global financial crises and the reform of the banking system that followed (see Fig 1).

Fig 1: Credit and Growth Performance (1985 - 2012)



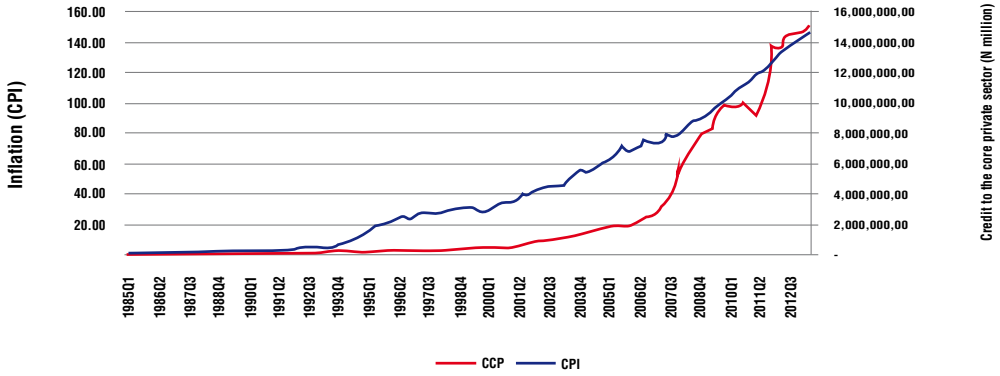
Source: CBN Annual Reports (various issues)

3.3 Credit and Inflation Performance (1985-2012)

Price stability and non-inflationary growth remains the primary objective of the CBN's monetary policy. The essence of monetary policy is to ensure that inflation is kept as low as possible so that investors can access credit at reasonable rates and grow real sector through increased investment. In Nigeria, the relationship between inflation and credit to the private sector is mixed. While during the period of direct monetary control, inflation played a little or no role in credit performance because credit was more or less administered, the experience during the era of indirect monetary policy regime showed some co-movements between the two. From 1985 to1991 when there was liberalization of interest rates, the relationship between credit and inflation seemed flat On the other hand, after the 1991, while inflation commenced an upward trend, credit remained flat until 2000 when both started trending upwards.

However, in 2008, while inflation was still on the upward trend, credit dropped drastically mainly because of the impact of the global financial meltdown. Credit growth picked up in 2011 as a result of the banking sector reforms and further liberalization of the financial system. However, in 2012, credit to the private sector seem to be slowing down perhaps owing to the slow impact of structural policies to address the problem of infrastructure, and probably due to increased government borrowing that seem to crowd out private sector credit.

Fig 2: Inflation and Credit Performance (1985 - 2012)



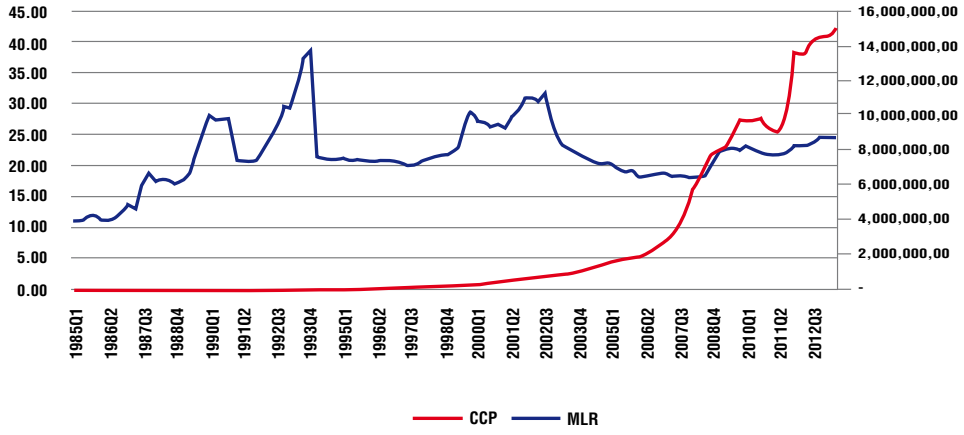
Source: CBN Annual Reports (various issues)

3.4 Interest Rates and Credit Performance (1985-2012)

The impact of interest rates on credit in Nigeria has been a subject of intense policy debate. The spread between the lending and deposit rates have remained very wide, thus generating tremendous concerns among policy makers and analysts. However, banks cite the cost of funds which is attached to sundry costs associated with the infrastructure deficit in the economy as the main reason. Efforts to address the widening gap through monetary policy have not been quite successful. The performance between credit and interest rates during the direct control regime and the indirect regime is also very stark.

During the direct control regime, the lending rate was clearly responding to policy changes which were not related to credit developments in the economy as interest rates were administratively fixed. This trend continued until 2006 when the CBN introduced the monetary policy rate (MPR) as the anchor rate for market rates in the economy. The maximum lending rate temporarily moderated till 2008 when it picked up perhaps due to the credit crunch associated with the global financial crises. In 2010, available data indicate that lending rates were on the downward trend but credit to the core private sector was on an upward trend. This situation can only be explained by the impact of prime lending rate in the economy. It does seem that prime lending rate decline much lower than the maximum lending rate in the Nigerian economy.

Fig 3: Maximum Lending Rate and Credit to theCore Private Sector (1985 - 2012)

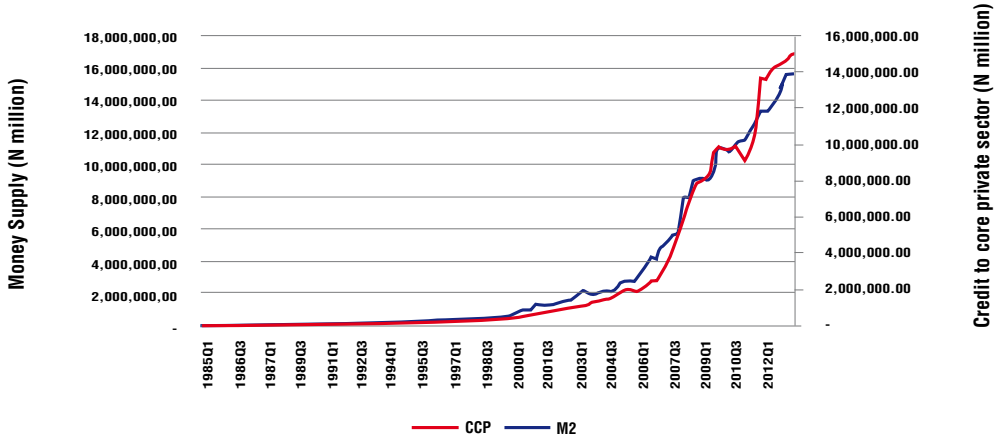


Source: CBN Annual Reports (various issues)

3.5 Money Supply and Credit Developments (1985-2013)

Theoretically, movements in money supply lead credit developments following the monetarist argument that money supply has direct impact on system liquidity which translates into loanable funds by the banks. In Fig 4 below, money supply trended with credit to the core private sector up until 2010 (Q3) when money supply was higher than the credit to the private sector. Perhaps the most reasonable explanation for this development was the after effects of the global financial crises which impacted on the ability of banks to extend loans because of the damage the crises caused on banks' balance sheets. Furthermore, in 2012(Q1), credits and monetary policy resumed co-movements which suggests that the relationship between money supply and credit in Nigeria has been sustained over time.

Fig 4: Money Supply and Credit Performance (1985 - 2012)



Source: CBN Annual Reports (various issues)

4. Methodology

4.1 Theoretical Framework and Model Specification

There is no consensus exists for an equilibrium model in studying the effects of monetary policy on the economy (see Ramey, 1993). Thus, we follow the framework advanced by Ramey (1993) in analyzing the credit view of monetary policy. Although the Ramey's (1993) model seems not holistic, it has much flavor of the extended IS-LM model by Bernanke and Blunder (1988) and also serves as a useful guide for empirical analysis on credit channel in the transmission of monetary policy.

Ordinarily, the credit channel is generally understood to be an amplifying mechanism of the balance sheet model (see Bernanke and Gertler, 1995), the framework popularised by Ramey (1993) essentially distinguished between the money and credit transmission mechanisms of monetary policy in a systematic procedure (see Ramey, 1993). Ramey (1993) argued that the bank loans have a separate and unique role different from being a substitute to open market bonds as in the case of the perfect capital market's view or that of the balancing identity in the balance sheet model.

To the credit view, banks have access to special monitoring and evaluation's technology that assures that funds are directed to the highest value issues. Thus, when a firm finances through bank loans, it avails itself of the credit services provided by banks. It is assumed that the firm rents its capital stock from customers. The current real profits for the representative firm are given by:

$$Ff_t = Y_t - (p_{mt} + i_t)\frac{Mf_t}{P_t} - (P_{1t} - i_t)\frac{L_t}{P_t} - w_t Nf_t - (i_t - \pi_t + \delta)K_t \qquad (1)$$

In this equation, is the fee for using bank transaction services, is the nominal interest rate on bonds, is the interest rate on bank loans, is the real wage rate, and is the rental price of capital, with as the inflation rate. The firm chooses input to maximize current period profit given technology and balance sheet identity. If the production function is concave, then, a supply function is well defined in the following form:

$$Y_t^s = y(P_{mt} + i_t, P_{it} - i_t, w_t, i_t - \pi_t + \delta, \lambda_t, \theta_t, \eta_t) \quad (2)$$

Where;

θ and η ωare idiosyncratic shocks to the production of money and bank loans; λ are technological shocks and other variables are as previously defined. The signs under the arguments indicate the signs of the derivative with respect to the arguments. Equation (2) is a useful equation for distinguishing the money and credit views. The credit view differs from the money view in that it argues that the elasticity of output with respect to $P_i - i$ is negative and economically significant. This condition is essentially the second necessary condition of credit view. The credit channel may be viewed as an amplifying mechanism of the balance sheet model (Bernanke and Gertler, 1995). Ramey (1993) popularized the essential distinguishing elements of the credit transmission channel.

The basic model in line with Ramey (1993), augmented with credit to the core private sector, is as follows:

$$rGDP_t = (CCPS_t, Z_t) \quad (3)$$

Transforming equation (3) and including both the consumer price index (CPI) and money supply as control variables, we obtain;

$$LrGDP = (LCPI_t, LM2_t, LCCPS_t) \quad (4)$$

where L denotes natural logarithm, rGDP is the real GDP to control for demand-side shocks in the economy that affect bank loans, *CCPS* is the credit to the private sector; M_2 is the broad money supply and *CPI* is the consumer price index; while Z_t is a vector of control variables. We find the use of credit to the private sector appropriate to capture total credit since the former is often considered a strong indicator for financial deepening for the whole economy (see CBN Statistical Bulletin, 2012).

The matrix form of the credit channel is represented as:

$$\begin{vmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{vmatrix} \begin{vmatrix} LrGDP \\ LCPI \\ LM2 \\ LCCP \end{vmatrix} = V(L) \begin{vmatrix} LrGDP \\ LCPI \\ LM2 \\ LCCP \end{vmatrix} + \begin{vmatrix} \varepsilon rLGDP \\ \varepsilon LCPI \\ \varepsilon LM_2 \\ \varepsilon LCCP \end{vmatrix} \quad (5)$$

Where; *JrGDP*, *JLCPI*, JM_2, and *JLCCP* are structural disturbances on the respective variables. The variables were ordered with the implicit assumptions that the speed with which they respond to shocks differ. Output was assumed to be the least responsive as shocks to the

policy variables have no contemporaneous impact on output and price due to the real sector's usual slow response to monetary and exchange rate changes.

This study employs a systematic approach to model estimations. We begin by tracing the credit channel of monetary policy transmission mechanism (MPTM) through its theoretical framework and later proceed to setting the modeling frameworks for MPTM. We use the Structural Vector Autoregression (SVAR) frameworks. This is because the SVAR methodology solves the problem of interpreting VAR by introducing restrictions sufficient to identify the underlying shocks. In other words, the SVAR method imposes additional theoretical restrictions upon the theoretical assumptions of VAR (see Cooley and Dwyer, 1998)[6].

Some preliminary tests are also conducted to evaluate the statistical properties of the variables included in the models. These include descriptive statistics, unit root tests and cointegration tests. More so, the fact that estimations on non-stationary data may lead to spurious regressions make these tests of unit-root essential for our analyses (see Green, 2009). In this regard, both the traditional and efficient unit-root tests are considered for robustness purpose. In addition, cointegration test is also performed in order to ascertain if equilibrium conditions exist among the variables of interest. The conventional cointegration test for multivariate frameworks such as the Johansen-Juselius (1990) test is employed.

Thereafter, post estimation analyses are carried out involving forecast variance decompositions and impulse response functions in order to evaluate the spill-over interactions among the shocks to the variables under consideration.

4.2 Structural VAR (SVAR) Framework

This study employs a systematic approach to model estimations. We begin by tracing the credit channel of monetary policy transmission mechanism (MPTM) through its theoretical framework and later proceed to setting the modeling frameworks for MPTM. We use the Structural Vector Autoregression (SVAR) frameworks. This is because the SVAR methodology solves the problem of interpreting VAR by introducing restrictions sufficient to identify the underlying shocks. In other words, the SVAR method imposes additional theoretical restrictions upon the theoretical assumptions of VAR (see Cooley and Dwyer, 1998)[7].

The basic framework of the SVAR for this study is as follows[8]:

6 - Although, a brief exposition of these framerworks is provided in this paper, a thorough theoretical clarification can be obtained from Banerjee, Dolado, Galbraith, and Hendry (1993), Hamilton (1994), Hendry (1995), Johansen (1995), and Lutkepohl (2006).

7 - Although, a brief exposition of these framerworks is provided in this paper, a thorough theoretical clarification can be obtained from Banerjee, Dolado, Galbraith, and Hendry (1993), Hamilton (1994), Hendry (1995), Johansen (1995), and Lutkepohl (2006).

8 See Nakahira (2009). A structural VAR analysis of monetary policy stance in Japan. The International Journal of Economic Policy Studies, 4, 78-103.

Let y_t be an n-dimensional time series (n≤ 1) vector of endogenous variables, $y_t = (y_{1t}, \ldots, y_{nt})$, and Yt be an (n≤ 1) vector of structural innovation with zero mean. The pth-order VAR model is described as:

$$Ay_t = A_1^* y_{t-1} + A_2^* y_{t-2} + \ldots + A_p^* y_{t-p} + B\xi_t \quad (6)$$

Compactly, equation (6) can be rewritten as:

$$Ay_t = \sum_{i=1}^{p} A_1^* y_{t-1} + B\xi_t \quad (7)$$

Matrix $A(n \times n)$ is invertible, and it summarizes the contemporaneous (instantaneous) relationship among the variables. The $A_i^{*}s (i = 1, \ldots, p)$ are $(n \times n)$ coefficient matrices. Structural shocks are properly identified from the error terms of the estimated reduced form with the appropriate identifying restrictions. Non-zero off diagonal elements of matrix B $(n \times n)$ allows some shocks to affect more than one endogenous variable in the system directly.

Where Y_t is a vector of structural disturbances postulated to follow a white-noise process. Their linear combinations are assumed to be white-noise processes with zero mean and constant variances, and are serially uncorrelated individually. The variance-covariance matrix of 's is usually restricted to be diagonal. The reduced form (corresponding to the structural form) is obtained by pre-multiplying with A^{21} provided that A is non-singular:

$$y_t = A_1 y_{t-1} + A_2 y_{t-2} + \ldots + A_p y_{t-p} + U_t \quad (8)$$

Where;

$A_j = A^{-1} A_j^* (j = 1, \ldots, p)$. $U_t = A^{-1} B\xi_t$ describes the relation between the reduced form disturbances ( ) and the underlying structural shocks ( ). Thus, we obtain:

$$E(U_t U_t^{'}) = A^{-1} B E(\xi_t \xi_t^{'}) B^{'} A^{-1} \quad (9)$$

Moreover, assuming that the variance of each disturbance is standardized, and substituting population moments with the sample moments, we have:

$\hat{\sum}_u$ contains $\frac{n(n+1)}{2}$ different element, so $\frac{n(n+1)}{2}$ is the maximum number of identifiable parameters in matrices A and B. Therefore, a necessary condition for identification is that the maximum number of parameters of A and B should be equal to $\frac{n(n+1)}{2}$. In other words, the number of equations should be equal to the number of unknowns in the equation (see equation 8). Here, the total number of elements of the structural form matrices and is . Thus;

$$2n^2 - \frac{n(n+1)}{2} = n^2 + \frac{n(n+1)}{2} \quad (10)$$

Restrictions should be imposed for identification. If one of the matrices A and B is an identity matrix, then, $\frac{n(n+1)}{2}$ restrictions are left to be imposed. Hence, identification necessitates the imposition of some identifying restrictions on the parameters of and , and we have three

cases: under-identification, just-identification and over-identification. The validity of an over-identified case is examined by the statistic distributed as X^2(chi-square) with a number of degrees of freedom equal to the number of over-identifying restrictions. In practice, the four most common patterns for identifying restrictions are: (a) $B = I_k$, (b) $A = I_k$, (c) $Au_t = B\xi_t$ (AB-model of Amisano and Giannini; 1997) and (d) the pattern with prior information on the long-run effects of some shocks, like that of Blanchard and Quah (1989).

Once the SVAR is estimated, a further analysis in terms of Variance Decomposition[9] and Impulse Response[10] was conducted. Intuitively, we also performed some tests of analyses such as the descriptive analyses in order to obtain some statistical properties of the variables included in our models and conduct the lag length test to establish the optimal lag length appropriate for estimations and analyses while the Granger causality test assists in confirming the direction of transmission between the variables.

Besides, some preliminary tests are also conducted to evaluate the statistical properties of the variables included in the models. These include descriptive statistics, unit root tests and cointegration tests. Moreover, the fact that estimation on non-stationary data may lead to spurious regressions make these tests of unit-root essential for our analyses (see Green, 2009). In this regard, both the traditional and efficient unit-root tests are considered for robustness purpose. In addition, cointegration test is also performed in order to ascertain if equilibrium conditions exist among the variables of interest. The conventional cointegration test for multivariate frameworks such as the Johansen-Juselius (1990) test is employed.

Thereafter, post estimation analyses are carried out involving forecast variance decompositions and impulse response functions in order to evaluate the spill-over interactions among the shocks to the variables under consideration.

4.3 Data and Sources

The data employed for this study are secondary data of the quarterly frequency. These data include the real growth rate of gross domestic product (real GDP growth rate), the broad money supply (M2), the credit to the private sector and the consumer price index. The data span the quarterly period 1980:01 - 2012:03 and are obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (various issues). The choice of period for this study is deliberate and intended to identify the role of credit in the monetary transmission mechanism beginning from the period of interest rate liberalisation in Nigeria as enshrined in the Structural Adjustment Programme of the 1980s and other subsequent reforms.

9 - The VAR's also described by forecast error variance decomposition (variance decomposition of forecast errors). Forecast error variance decompositions (FEVDs) measure the contribution of each type of shocks to the forecast error variance. FEVD tells us the proportion of a change in a variable that is due to its own shock and the proportion due to shocks to other variables. Usually, for the initial period, FEV is due to own shock. As the lagged variables' effect starts manifesting, however, the proportion of the effect of other shocks rises over time.

10 - Impulse response functions (IRFs) show the effects of shocks on the adjustment path of the variables in the VAR model. IRFs can also be graphically presented showing the effect of shocks on the current and future path of the variables under consideration. In essence, IRFs show how these variables react to different shocks in the model.

4.4. Stationarity Test

The stationarity[11] tests adopted for this study include Augmented Dickey Fuller (ADF), Phillip-Perron tests and modified Dickey-Fuller_GLS and Ng-Perron Unit Root tests and KPSS[12]. It is along this thread that we set forth the framework for unit-root and stationarity tests. These approaches are taken in turn in the following sub-sections.

The simplest and pioneer approach to test for a unit root which is referred to as Dickey-Fuller (DF) test begins with an AR(1) model:

$$\varphi_p(B)Y_t = \theta_0 + a_t \tag{11}$$

If serial correlation exists in the DF test equation (i.e., if the true model is not AR(1)), then the AR(p) is used to get rid of the serial correlation.

$$\{a_t\} \sim WN(0, \delta_a^2) \tag{12}$$

Where;

$E(a_t^4) < \infty$ with $\varphi_p(B) = 1 - \varphi_1(B) - \ldots - \varphi_p(B)$ and $\varphi_p(B) = (1-B)\varphi_{p-1}(B)$ may contain a unit root.

To test for unit root; we assume that: $\varphi_{p-1}(B) = 1 - \varphi B - \ldots - \varphi_{p-1}B^{p-1}$

Where;

$\varphi_{p-1}(B)(1-B)Y_t = \theta_0 + a_t$ has unit roots lying outside the unit circle.

$$\varphi_{p-1}(B)(1-B)Y_t = \theta_0 + a_t$$
$$\varphi_{p-1}(B)\Delta Y_t = \theta_0 + a_t \tag{13}$$
$$\Delta Y_t - \sum_{j=1}^{p-1} \varphi_j \Delta Y_{t-j} = \theta_0 + a_t$$

Hence, testing for a unit root is equivalent to testing in the following model;

$$Y_t = \varphi Y_{t-1} + \sum_{j=1}^{p-1} \varphi_j \Delta Y_{t-j} + \theta_0 + a_t \tag{14}$$

11 - Impulse response functions (IRFs) show the effects of shocks on the adjustment path of the variables in the VAR model. IRFs can also be graphically presented showing the effect of shocks on the current and future path of the variables under consideration. In essence, IRFs show how these variables react to different shocks in the model

12 - The sophisticated approach contains the DF-GLS test and the Ng and Perron (NP) test.

$$\text{Or; } \Delta Y_t = (\varphi - 1)Y_{t-1} + \sum_{j=1}^{p-1} \varphi_j \Delta Y_{t-j} + \theta_0 + a_t \ ; \ (\varphi - 1) = \delta \tag{15}$$

ADF test equation then becomes:

$$\Delta Y_t = \delta Y_{t-1} + \sum_{j=1}^{p-1} \varphi_j \Delta Y_{t-j} + \theta_0 + a_t \tag{16}$$

However, the Phillip Perron test follows a non-parametric approach which ignores any serial correlation in the test regression. The non-parametric approach corrects for any serial correlation in the errors of the test regression based on the Phillips (1987) Z test, which involves transforming the test statistic to eliminate any autocorrelation in the model. More so, Kwiatkowski et. al., (1992) posited that it would be useful to perform tests of the null hypothesis of stationarity as well as tests of the null hypothesis of a unit root in trying to decide by classical methods whether economic data is stationarity or integrated. The KPSS is the only popular used test in which the null of stationarity is tested against a non-stationary alternative. In particular, the KPSS test regression is given as:

$$y_t = \omega t + \lambda_t + \varepsilon_t \tag{17}$$

$$\lambda_t = \lambda_{t-1} + \mu_t \tag{18}$$

4.5. Framework for Cointegration Test

Cointegration test is to check the long run equilibrium condition among the variables included in a model. For a Vector Autoregression (VAR) model, we summarise the cointegration framework as enunciated by Johansen (1990) and Juselius (1990) and make it amenable to VAR framework as the case in this study.

Given a VAR (p) of $I(1)X's$ (ignoring constant and deterministic trends)

$$X_t = \phi_1 X_{t-1} + \ldots + \phi_p X_{t-p} + \varepsilon_t \tag{19}$$

There always exists an error correction representation of the term; where;

$$\Delta X_t = \Pi X_{t-1} + \sum_{i=1}^{p-1} \phi_1^* \Delta X_{t-1} + \varepsilon_t \tag{20}$$

Where;

Π and ϕ_1^* are functions of the

Specifically;

$$\phi_j^* = -\sum_{i=j+1}^{p-1} \phi_j, \quad j = 1, \ldots, p-1 \tag{21}$$

$$\Pi = -(I - \phi_1 - \ldots \phi_p) = -\phi(1) \tag{22}$$

The characteristics polynomial is $1 - \phi, z - \ldots - \Pi = \phi_p z_p = \Pi = \phi(z)$ (23)

If Π=0, then there is no cointegration. Non-stationarity of $I(1)$ type vanishes by taking differences. If Π has full rank, then, X's cannot be $I(1)$ but are stationary $(\Pi^{-1}\Delta X_t = X_{t-1} + \Pi^{-1}\varepsilon_t)$.

5. Empirical Results

5.1 Descriptive Statistics and Time Series Properties

Table 1 summarizes the basic statistical features of the data under consideration, including the mean, the minimum and maximum values, standard deviation, skewness, kurtosis and the Jarque-Bera test for the data. These descriptive statistics provide a historical background for the behavior of our data. For instance, there seems to be evidence of significant variations as shown by the huge difference between the minimum and maximum values for the variables under consideration.

The descriptive statistics in the table 1 shows that the variables are all positively skewed at a moderate level with values of 1.03 for consumer price index (CPI), 1.90 for broad money supply (M2) and 1.05 for the real GDP (RGDP). More so, both the money supply (M2) and the real gross domestic products (RGDP) have large dispersions away from the mean values. The kurtosis with 3.0 for CPI shows that consumer price index is normally distributed. Also, the RGDP distribution is normal while that of the broad money supply is leptokurtic in nature. These distribution patterns are supported by the Jarque-Bera statistics of 23.03, 105.3 and 24.31 for the CPI, M2 and RGDP, respectively (see table 1).

Table 1: Summary Statistics of Variables

Series	Mean	Max.	Min.	Std.Dev.	Skewness	Kurtosis	Jarque-Bera	Obsvtn.
CPI	32.65	132.6	0.355	36.85	1.0346	2.955	23.028 (0.00)	111
M2	2108372	13303495	11411.3	3586073	1.896	5.280	105.30 (0.00)	111
RGDP	91698.8	246281.4	7380.37	50880.07	1.0467	3.374	24.31 (0.00)	111
CCP	2230552	14336222	12987.8	3731244	1.856	5.23	86.66 (0.00)	111

The lag selection criteria conducted indicate that the optimum lag length is four (4). This is unanimously the lag length collectively taken by all the criteria. As such, this lag length will serve as the basis upon which we seek to perform other tests and essentially estimate the coefficients for analyses and interpretation in this study (see table 2).

Table 2: Lag Length Test Result

Lags	AIC	FPE	HQ_	SC
4	-11.18*	1.67e-10*	-10.483*	-9.466*
3	-10.35	3.78e-10	-9.819	-9.042
2	-9.79	6.58e-10	-9.425	-8.89
1	-9.08	1.34e-09	-8.872	-8.57
0	-9.01	1.44e-09	-8.966	-8.91

Note: AIC – Aikaike Information Criterion; FPE - ; HQ_– Hannan Quinn Criterion; SC – Schwarz Bayesian Criterion.

5.2 Unit Root and Cointegration Tests

The null hypothesis for ADF and PP suggest that an observable time series is not stationary (i.e. has unit root) while that of KPSS tests for the null hypothesis is that the series is stationary. Table 3 shows the unit root and stationarity test.

Table 3: Unit Root Test Results

Variable	Level			First Difference			I(d)
	ADF	PP	KPSS	ADF	PP	KPSS	
LRGDP	-1.408b	-5.183b*	0.261b	-3.982a*	-	0.049b*	I(0)
LM2	-2.369b	-2.679b	0.066b*	-11.052a*	-11.034a*	-	I(0)
LCPI	-2.447a	-1.791a	0.277b	-2.631a***	-7.434a**	0.085b*	I(1)
LCCP	-3.086b	-3.086b	0.071b*	-11.938a*	-11.905a*	-	I(0)

The critical values for the ADF tests are 3.675, 2.731 and 2.622 for 1%, 5% and 10% respectively. For PP test, critical values are 3.675, 2.731 and 2.622 for 1%, 5% and 10% respectively while for the KPSS test, critical values are 0.125, 0.231 and 0.453 for 1%, 5% and 10% respectively.

Sequel to these, those variables that were unit root or not stationary at levels were differenced at order of integration 1. The estimates obtained show that all the other variables became non-unit-root and stationary at order 1. Specifically, the ADF test which has all variables unit-root suggests all the variables would become non-unit-root at a constant without deterministic trends. All the variables got stationary at 1 percent level of significance except for the logged consumer price index (LCPI) which became stationary at 10 percent level. For the Phillip Perron (PP) test, all other three variables, except for the logged RGDP (LRGDP which got stationary at level, became stationary at the 1 percent level of significance except for the logged consumer price index (LCPI) which has stationarity at 5 percent level. Finally, the stationarity test of KPSS indicates that both the logged real GDP (LRGDP) and the logged consumer price index (LCPI) became stationary at order of integration 1 and at the 1 percent level of significance both with a constant and deterministic trend.

Table 4: Cointegration Test Result

S/N	Trace Test Statistic				Maximum Eigenvalue Test			
	Ho:r	Hi:r	Statistics	5% Level	Ho:r	Hi:r	Statistics	5% Level
1	r = 0	r = 1	72.77*	47.86	r = 0	r = 1	29.044*	27.584
2	r ≤ 1	r = 2	43.73*	29.80	r ≤ 1	r = 2	20.916	21.132
3	r ≤ 2	r = 3	22.81*	15.49	r ≤ 2	r = 3	14.141	14.265
4	r ≤ 3	r = 4	8.67*	3.84	r ≤ 3	r = 4	8.669*	3.841

Trace test indicates 4 Co-integration equation(s) at 5% significant level.
*signifies rejection of the hypothesis at the 5% significant level
**MacKinnon-Haug-Michelis (1999) p-values.

In table 4, the co-integration test result is based on the Johansen-Juselius (1990) framework. The estimate suggests that the variables included in the model are co-integrated and can be linked by a long-run economic relationship. The trace statistics show that four co-integrating equations exist at the 5 percent critical levels as the coefficients of 47.86, 29.8, 15.49 and 3.84 are less than the trace statistics coefficients of 72.77, 43.73, 22.81 and 8.67, respectively, for all the equations. Therefore, this model is fit for long-run analyses. Also, the maximum eigenvalue test indicates that there are equilibrium conditions that could keep the variables together into the long-run situations. Unlike the trace test statistic which chooses four (4) co-integrating equations, the maximum eigenvalue test indicates two (2) co-integrating equations in existence. These co-integrating equations exist where the null hypothesis of no co-integration are rejected at the 5 percent significant level. At this point, the maximum eigenvalue of 29.044 is greater than its 5% level of significance and that of 8.669 is greater than its critical value counterparts of 3.841. By implication, we can resolve this contradiction by choosing only two co-integrating equations existing.

5.3 Presentation of Results from SVAR Estimation

In obtaining the Structural VAR estimates, the method of scoring was employed in maximizing the log likelihood. In the optimization process, the maximum number of iterations of 500 was imposed. Before adding and eliminating unrestricted coefficients in the A matrix, the value of log likelihood and signs of impulse response functions against one standard deviation change in domestic credit to the private sector were observed.

Table 5: SVAR Estimates

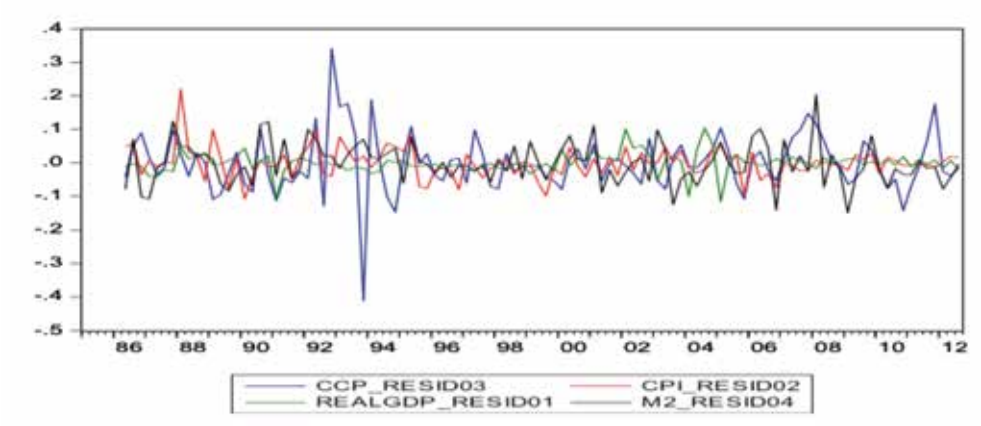
SVAR Variables	Coefficients	Z-statistics	Prob<Z
C(1)	-1.436	-14.785	0.000
C(2)	-0.331	-3.376	0.0007
C(3)	-0.344	-3.084	0.002
C(4)	0.128	1.317	0.188
C(5)	0.169	1.534	0.125
C(6)	0.538	5.538	0.000

Log Likelihood: -323.72; Chi-Square: 1893.88; Probability: 0.000. Note: The estimates in Table 5 follow the long-run response pattern of the restriction imposed theoretical framework for monetary policy transmission mechanism specified in equation (5).

The value of log likelihood (LR) of the derived structural VAR is 323.72, and its likelihood test statistics of Chi-Square with 7 degrees of freedom is 1839.88, which is equivalent to 0% probability (Prob.) to reject the null hypothesis of over-identification. The tabulated estimates above were obtained through the imposition of long-run restriction on the Structural Vector Autoregression (SVAR) since issues of monetary policy are faced with policy lags due to structural and institutional rigidities. The estimates indicate that the domestic credit is, though positively related to the growth process but insignificant at the 5 percent level of significance with 0.128 coefficients and 0.188 probability values.

From the estimated structural VAR, we further our analyses by generating the fundamental shocks of the series. The graph depicted below suggests that shock volatility of domestic credit to the private sector was higher between 1992 and 1993. During the 1992, this shock was positively volatile while in 1993, it was negatively volatile. The shock volatility in the latter period appears more intense than that of the former period (see Fundamental Shock Graph below).

Figure 5: Fundamental Shocks Graph



This lend credence to the findings that credit to the private sector comes with more detrimental effect than positive impacts on the growth process of the Nigerian economy. This translates to mean that the credit transmission of monetary policy could not impact significantly on the growth process of the Nigeria economy as depicted in the graph above. That aside, from 1992 and 1993; we could see that the behavior of domestic credit to the private sector remains moderately related.

5.4 Analysis of Variance Decomposition and Impulse Response Function

The post estimation tests comprise the variance decomposition analysis, impulse response function and a post estimation Granger causality test. A variance decomposition analysis is to compare the relative importance of each structural innovation of each series in the monetary transmission mechanism. On the other hand, the impulse response function summarizes the shock-response behavior of the variables included in the model. For the post estimation Granger causality test, we seek to perform the exogeneity test among the variables.

5.4.1 Variance Decomposition

The variance decomposition analysis is meant to compare the relative importance of each structural innovation of each series in the monetary transmission mechanism. As such, the estimates in Tables 6 - 9 show that the series only vary significantly to innovations in series. The structural shocks as depicted by the SVAR technique show about 50 percent variations in the other variables due to the innovation in a particular variable. The estimates for the variance decomposition show that after the fourth quarter, credit to the private sector accounts for less than 1.0 percent of the shocks in the aggregate output, while the money supply accounts for less than 5 percent of shock in aggregate output. The price level accounts for about 5.3 percent shock in the aggregate output in the 9th quarter. On the whole, these estimates show that the credit channel to monetary transmission mechanism is insignificant and less substantial in the Nigerian economy, going by the standard theoretical proposition, that a rise in money supply

increases the total supply of bank credit to the economy and, through the bank lending channel of credit transmission, will in turn raise aggregate demand and output.

Table 6: Variance Decomposition of RGDP due to an innovation in:

Period	M2,*	CCP,**	CPI,***	RGDP,****
1	2.92	0.08	0.01	96.99
4	3.23	0.13	0.08	96.56
7	1.62	0.09	0.06	98.26
10	1.12	0.08	0.06	98.74

Note: *Shock 1; **Shock 2; ***Shock 3 and ****Shock 4 for SVAR Estimates.

Table 7: Variance Decomposition of CPI due to an innovation in:

Period	M2,*	CCP,**	CPI,***	RGDP,****
1	17.813	33.004	1.053	48.134
4	43.319	22.725	1.815	32.141
7	45.694	23.941	2.188	28.178
10	46.033	24.182	2.211	27.574

Note:*Shock 1; **Shock 2; ***Shock 3 and ****Shock 4 for SVAR Estimates.

Table 8: Variance Decomposition of CCP due to an innovation in:

Period	M2,*	CCP,**	CPI,***	RGDP,****
1	0.046	0.001	50.926	49.027
4	6.448	0.082	45.112	48.357
7	7.952	2.652	43.059	6.336
10	8.345	2.774	42.751	46.130

Note:*Shock 1; **Shock 2; ***Shock 3 and ****Shock 4 for SVAR Estimates.

Table 9: Variance Decomposition of M2 due to an innovation in:

Period	M2,*	CCP,**	CPI,***	RGDP,****
1	40.646	9.066	7.293	42.996
4	40.318	9.331	7.621	42.730
7	39.418	9.332	7.505	43.744
10	39.880	9.243	7.456	43.421

Note:*Shock 1; **Shock 2; ***Shock 3 and ****Shock 4 for SVAR Estimates.

The impulse response functions show that negative shocks to the domestic credit decrease the aggregate output for the first to third quarters, while positive shocks in domestic credit positively increase the aggregate output in the fourth quarter but negatively in the quarters thereafter. This behavior in shock transmission interaction and response between the domestic credit to the private sector and the real GDP also reflects for the latter variable and the money supply in the economy. However, positive shocks in the money supply increase the domestic credit for the private sector from quarters 1 through 4 and a reverse shock transmission from domestic credit to the money supply, the same behavior results.

One-time shock of domestic credit to the private sectors and those of other variables such as the real GDP, money supply (M2) and the consumer price index (CPI), the graph shows that the real GDP in Nigeria rose immediately after an economic shock while the price level, domestic credit and money supply do not respond to economic shock. In effect, all the other variables such as the CPI, CCP and money supply respond to self-shock which seek to die out with time lag along the baseline; beginning from quarter 2 to quarter 10. Particularly, price level, domestic credit and money supply respond less to economic shock (see figure 3).

Figure 6: SVAR Impulse Response Graph

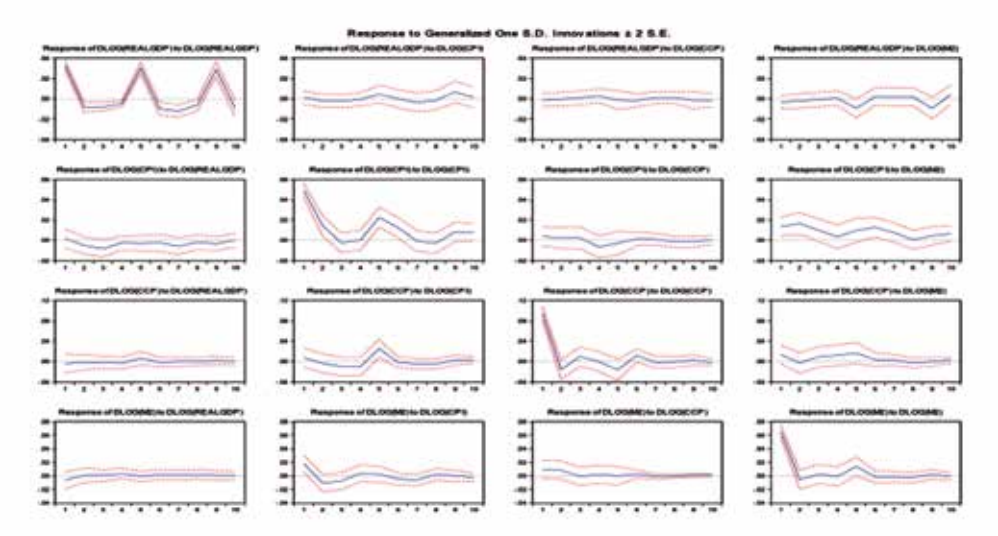
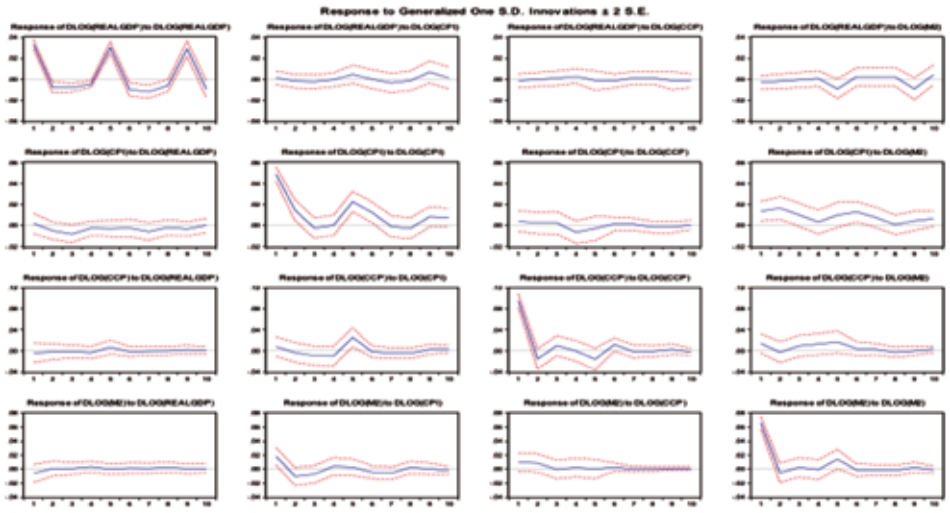


Figure 7: Generalised Impulse Response Graph for SVAR Estimates



6. Conclusion

The study investigates the monetary transmission mechanism in Nigeria through the credit channel for the periods 1980Q1 to 2012Q3. The findings of this study suggest that price level is the intervening variable as well as the factor between money supply and domestic credit in Nigeria. However, the empirical findings contradict the theoretical propositions on the final mechanism, as increasing domestic credit does not translate to increasing aggregate output in Nigeria. As such, we could conclude that the credit channel of monetary policy transmission in Nigeria is not strong. This may be attributed to Nigeria's dependency on foreign goods and services; much of the credits are used to finance imports rather than production of domestic output. In addition, banks, more often, provide short term credits with greater concentration in commerce. In light of the foregoing, there is need for the CBN to increase its intervention funds to the real sector for long term on-lending at lower rate by the deposit money banks (DMBs) and to further strengthen its supervisory capacity to ensure the funds are utilized for the purpose they are meant for. The government should also increase its efforts in addressing the infrastructural gap and other structural bottlenecks in Nigeria in order to reduce the cost of doing business and the risk of lending to the real sector.

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An Examination of the Relationship between Growth in Reserve Money and Inflation in Nigeria

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Abstract

The objective of this study is to empirically examine the nature of the relationship between reserve money and inflation in Nigeria, and the factors underlying the relationship. A Vector autoregressive specification was applied on quarterly data on reserve money (RM), broad money (M2), interbank exchange rate of the naira (EXR), Consumer price index (CPI), Monetary Policy Rate (MPR), Deposit rate (DR), and Treasury bills rate (TBR_91 day) spanning the period 2002Q1 to 2013Q4. The results showed that a shock to reserve money is propagated through the system by an increase in the TBR rate, a drop in money supply a depreciation of the interbank exchange rate, and gradual lowering of the inflation rate from quarters 2-5. This indicates that increasing reserve money growth beyond the target benchmarks has the effect of tightening liquidity and lowering inflation in Nigeria as shown by recent experiences of raising the CRR on public sector deposits.

Key Words: *Inflation, Monetary Base, Monetary Policy*

JEL Classification: *E31, E51,E52*

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1. Introduction

As a way of achieving their core mandate of ensuring price stability, it has become increasingly important for central banks to understand the driving forces behind the general price level for effective formulation of monetary policy. Central banks' understanding of the precise nature of relationship between reserve money and inflation is essential for monetary policy formulation. This is because for the purpose of monetary policy formulation and implementation, central banks use the quantity of bank reserves as the relevant metric for control.

In Nigeria the relationship between money and inflation has been the subject of several studies, analyses, and policy making over the years. Some researchers believe that the problem of inflation in Nigeria is largely structural, stemming from the weaknesses and deficiencies in the production and distribution system of the economy which have combined to exert cost pressures. Olorunfemi and Adeleke (2013) remarked that inflation in Nigeria is chiefly associated with the failure to address the structural challenges, especially the failure to diversify the economy and reduce dependence on oil exports. This line of thinking perhaps informed previous reform measures over the years starting from the structural adjustment Programme (SAP) in 1986, aimed at diversifying the production and consumption patterns of the economy to reduce dependence on imports.

The monetarists, however, still believe that inflation is driven by excess supply of money in the economy. It was in recognition of this that the Central Bank of Nigeria was established with the mandate to pursue monetary and price stability. The Bank had implemented several measures to control inflation and money supply, such as the direct credit control (between 1984 and 1999), and subsequently, indirect monetary policy using market based instruments including: the Monetary policy rate (MPR), Open Market Operations (OMO) for liquidity management, discount window operations, and the use of Liquidity ratio and cash reserve requirements. These measures were complemented by transactions in the foreign exchange market, to manage foreign currency liquidity. However, recent developments in which the Central Bank of Nigeria has been tightening monetary policy consistently, resulting in sluggish performance of monetary aggregates, and inflation outcomes in the high single digit and lower double digit rates raises the issue of re-examining the relationships between monetary aggregates and inflation. This development has led several authors to question whether money still matters in the inflation dynamics of the country. Mbutor (2014) analyzed how much inflation in Nigeria is the function of money and found a persistent positive relationship between inflation and money supply. Using data for the period 1970 to 2009, Adenuga et al (2012), concluded that inflation in Nigeria was not purely a monetary phenomenon as the coefficient of broad money supply growth in their estimated model was less that unity. They recommended that inflation control in Nigeria should not be left solely to the monetary authority. These studies have, however, concentrated on the relationship between broad money supply (M2), and inflation, without consideration of the role of reserve money. In particular the relationship between the growth in reserve money which is under the control of the central bank, and inflation, has not been explored. This has left central bankers with little information on how to manage reserve balances to control inflation. This gap in knowledge and policy constitutes the primary motivation for this study.

The objective of this study, therefore, is to empirically examine the nature of the relationship between reserve money and inflation in Nigeria. Understanding the nature of the relationship

between reserve money and inflation as well as the factors underlying the relationship will provide the Bank with veritable basis in choosing appropriate monetary policy instruments and setting targets.

2. Literature Review

The theoretical relationship between money supply and inflation has been examined by various studies. For instance, one of the earliest propositions by the monetarists is that persistent changes in price level (inflation) are associated with changes in money supply. This proposition is supported by Milton Friedman, who came up with the statement that "inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output". This Friedman's maxim brings about the informal definition of inflation as "too much money chasing a few goods". This statement supports the argument that growth in money supply is related to inflation. Several Economists have reaffirmed the close relationship between changes in the nominal quantity of money and inflation. However, the issue that remains in contention is whether a recent substantial growth in money supply will always result in increase in inflation.

The quantity theory of money (QTM) posits that there is a direct relationship between the quantity of money in an economy and the level of prices of goods and services. According to the QTM, if the amount of money in an economy doubles, price levels also double, causing inflation. In the long-run the relationship between money growth and inflation depends on the demand and supply of money. Central banks influence the level of money supply by their monetary policy actions such as open market operations, altering reserve requirements, or changing policy rates. Demand for money by the public is also important in determining the relationship between money growth and inflation. In what follows we pay attention to empirical issues in the literature.

Gary and Wallace (2005) found that there is a strong positive correlation between post 1960 money growth and inflation in the United States for broad money. However, there are some Economists that have expressed the view that it takes a generation to establish the apparent relationship between money growth and inflation which makes central bankers to put little weight on recent money growth. Towing this line of thought are Dwyer and Hafer (1988) who found that growth rate in money supply and inflation are closely related for over a period as short as five years. Lucas (1995) expressed this view of long-term relationship between money and prices in his Nobel Prize lecture.

Meltzer (1998) observed that most economists and central banks do not use growth in money supply to forecast inflation. This is because although in the long-run there is strong correlation between money growth and inflation, this relationship disappears in the short-run.

Strano (2000) noted that in the long-run, the relationship between money supply and price was very strong and their correlation is almost one. Various authors including (Lucas 1995) and McCandless and Weber (1995) noted the long-term relationship between money and prices. However, for the short-term relationship, empirical evidence of relationship between money growth and inflation appears unclear and weak. Based on this, establishing a straight relationship between money growth and inflation in the short-term is difficult.

AfDB (2014) noted that monetary expansion was the major driver of inflation in Ethiopia and Uganda in the short run and it contributes significantly to inflation in Kenya and Tanzania. Kovanen (2011) examined the impact of money on inflation dynamics in Ghana. The study established that the impact of money in the determination of inflation in Ghana was weak. The findings of the study was similar to those of Nell (2003) and (Todani 2007) who conducted studies in South Africa showing that though the studies have established a structurally stable money demand function, it has not established that money is a reliable indicator for monetary policy. The implication is that for the Bank of Ghana money aggregates should be assigned significant weight in determining its monetary policy stance. Umeora (2010) found that money supply has a positive impact on inflation in Nigeria.

WAMA (2009) examined the impact of money supply growth on macroeconomic convergence in ECOWAS and found that growth in broad money supply had a high inflationary impact in Gambia and Guinea, and a moderate effect in Ghana, Benin, Guinea Bissau, Mali, Cape Verde and Liberia. In Burkina Faso, Cote d'Ivoire, Niger, Senegal, Togo, Nigeria and Sierra Leone money supply growth interacts with other exogenous factors resulting in the tendency of deflation.

Barnichon & Peiris (2007) examined the correlation between inflation, the output gap, and the real money gap to determine the sources of inflation in Sub-Saharan Africa (SSA). The major finding of the study indicated that both gaps contributed significantly to the evolution of inflation, though the money gap played a more significant role. This attests to the fact that targeting monetary aggregates in SSA can serve as an effective anchor for controlling inflation as is the case with a number of countries in the region.

Akinboade, Siebrits & Niedermeier (2004) investigated the determinants of inflation in South Africa during the period 1970 to 2000. Their findings indicate that in the short-run inflation reduces when the rand appreciates (i.e. nominal effective exchange of the rand increases). However, in the short and long run increases in the broad money stock contributes to higher inflation in South Africa.

Saville (2013) posits that by implication, boosting reserve money will not increase the money supply as there is an indirect link in that an increase in reserves held at the central bank could make banks lend more money. However, increasing reserve money according to him may not immediately increase money supply and lead to higher inflation in the future. This, he states, is why the difference between an increase in reserve money and an increase in the money supply is linked to why the pro-inflation policies of the Bank of Japan (BOJ) have not, over the past 20 years, led to price inflation. In Japan, quantitative easing (QE) does not directly expand the money supply; it only expands reserve money. The BOJ relies on commercial banks and other private financial institutions increasing their lending in order to transform a QE-related increase in the reserve money into a higher MS. As a consequence, the BOJ's QE is not necessarily inflationary. However, in the US, the Fed's QE is always inflationary as it increases the money supply leading to price increases, distortions in relative prices, and, eventually, a decline in the purchasing power of economic agents. Saville, concludes that reserve money is not necessarily a good indicator of the monetary inflation situation. The main focus of analysts should therefore be on the change in the money supply, not the change in the reserve money.

In order to evaluate the impact of reserve money on inflation in Nigeria it would be necessary to examine the transmission mechanism of monetary policy in the country. The known channels for transmission of monetary policy are the interest rate channel, the credit channel, exchange rate channel and the asset price channel.

Ndekwu (2013) explored the monetary policy linkage with output, financial markets, and the exchange rate. He found that the monetary policy was transmitted to the Nigerian economy through the financial markets. The key channels were the interest rate channel, the credit channel and the exchange rate channel. Out these channels, the credit channel was found to be the most effective.

Saibu and Nwosa (2012) found that the interest rate channel was the most effective in transmitting monetary policy to Agriculture and Manufacturing sectors while exchange rate channel was most effective for transmitting monetary policy to Building/Construction, Mining, Service and Wholesale/Retail sectors.

Kelikume (2014) assessed the interest rate channel of monetary transmission mechanism in Nigeria from 1996 to 2013, and found that interest rates were significant in influencing long run output. He found that a 10 per cent increase in interest rates reduced output by 0.8 per cent through its effect on investment and aggregate consumption. He also found an unstable long-run relationship between interest rate and output.

Kimura et al (2002) identified a monetary base transmission mechanism channel for Japan and found that expansion of the monetary base can have some expansionary effect on the economy, however, the quantitative magnitude of any such effect was found to be highly uncertain and very small.

In the literature various studies have been conducted to provide empirical clarifications on the nature of the relationship between money supply and inflation rates in Nigeria.

As early as 1972, a study was conducted to ascertain the impact of deficit financing on inflation and capital formation in Nigeria by relating domestic money supply to inflation in the Fishers equation framework Oyejide, (1972). The author observed some direct correlation between deficit financing and the general price level over the period 1957 to 1970, and suggested that less emphasis should be accorded deficit financing by the authorities to limit problem of price inflation.

Odusanya and Atanda (2010) used Nigerian data from 1970 to 2007 to analyze the dynamics and simultaneous inter-relationship among inflation and its determinants in the country. The variables included were inflation rate, growth rate of real output, money supply , real share of fiscal deficit, real share of Import, exchange rate and interest rate. The study used the Augmented Engle-Granger (AEG) cointegration test and the Error Correction Model (ECM) to examine the long-run and short-run mechanism of interaction between inflation and its determinants. The study found that the growth rate of GDP, growth rate of money supply, and real share of imports exerted positive influence on the inflation rate; while real share of fiscal deficit and exchange rate were negatively related to the inflation rate.

Adenuga et al (2012), studied whether inflation in Nigeria is purely a monetary phenomenon using annual data spanning the period 1970-2009, and the Ordinary least square (OLS)

estimation technique. Following a model adapted from the Fisher's quantity theory of money, the study indicated that inflation in Nigeria was not purely a monetary phenomenon as the estimated coefficient of 0.916 for broad money supply was less than unity. Accordingly, they recommended that the process of inflation management should not be left to the monetary authority alone.

Olanipekun and Akeju (2013) investigated the relationship between money supply, inflation and capital accumulation in Nigeria from 1970 and 2010 using the Johansen cointegration technique. The tests indicated a long run relationship among the variables employed. Estimates from the Error Correction Model showed that both narrow and broad money supply had positive relationship with capital accumulation in Nigeria, implying that government's efforts at controlling inflation should take account of the contribution of money growth to investment and capital accumulation.

Odiba et al (2013), studied money supply and inflation in Nigeria over the period 1986 – 2009, using the OLS regression technique and the GARCH model. The specified variables were inflation, broad money supply (M2), imports, budget deficit, aggregate demand, and population. The inclusion of imports was informed by the monopolistic practices of importers which increases the prices of goods and services. The results showed that money supply and aggregate demand positively and significantly influenced the rate of inflation in Nigeria.

In order to determine the extent of contribution of money supply to the dynamics of inflation in Nigeria, Mbutor (2014), applied the Vector Error Correction Model (VECM) to Nigerian data set spanning 1970 to 2012. Chow tests indicated several structural breaks in the inflation data, with the most visible coinciding with the transition to market-oriented the economy, characterized by high levels of inflation that peaked in 1995. The variables included in the model were gross domestic product (GDP), nominal exchange rate, the maximum lending rate as control variables, while inflation, proxied by the consumer price index (CPI) and broad money supply (M2) were the focus variables. The impulse response analysis detected a consistent positive association between inflation and money supply. The variance decomposition showed that GDP made the strongest contribution to inflationary developments in Nigeria, and money supply accounted for up to 34.5 per cent of aggregate price changes until the tenth period.

Mbutor (2014)'s work represents the growing paradigm shift among researchers studying monetary variables and Nigerian inflation, whereby the focus appears to be shifting to examining the transmission mechanism of monetary policy. In essence, with the growing size of the Nigerian economy, increasing size of the banking system, the deepening financial markets and instruments, research is shifting towards clarifying how monetary policy impulses are transmitted to inflation and output growth. Reserve or base money is one of those monetary variables in the channel of the monetary policy transmission to inflation in Nigeria. Others include interest rates, credit, and exchange rates.

Ozdemir and Turner (2004) investigated the demand for base money in turkey using the Cagan demand for money function:

The data used were average values for each quarter of the variables base money, consumer price index, the TL per US dollar exchange rate for the period 1886Q:1 – 2000Q:1. Base money was calculated as the sum of currency in circulation and banking sector deposits at the Turkish central bank.

The function was estimated as an error correction model including current inflation, inflation with 4 lags, and four lagged endogenous variables. The specification of the equilibrium relationship was problematic as they found real money balances to be integrated of order one while the inflation rate was integrated of order zero. This was due to structural breaks in the data following the Turkish currency crisis in 1994.This problem was resolved by introducing two dummy variables to take account of the structural breaks as the authors acknowledged that the money supply process of CBRT was significantly changed after the 1994 currency crisis. The researchers obtained a parsimonious specification with all included variables significant at the 5 per cent level, which was then reparameterised into error correction form. The final equations showed that the logarithm of real base money was significantly and negatively explained by the two dummy variables, the lagged value of the third difference of real base money, and positively explained by the lagged value of the first difference of inflation rate and its interaction term the log of real base money. This implies that base money demand responds to an auto regressive process and the lagged values of inflation rate. The inflation elasticity of demand for money was estimated at 2.76 for quarterly inflation, which indicated a seignorage maximizing quarterly rate of inflation of 36 per cent for turkey. Actual quarterly inflation rate for turkey during the study period was 13 percent. The parameter estimate did not have the expected signs when the TL per US dollar exchange rate was used as the opportunity cost variable.

The review of literature has demonstrated that several variables including money supply are related to inflation. The studies largely used annual data with narrow or broad money supply as the relevant monetary aggregates. There was little attempt at examining other money supply concepts. In particular, there was little effort in the literature to relate reserve or base money that is under the direct control of the central bank, to inflation. Indeed from a practical policy perspective it is necessary to unravel the relationship between reserve money growth and inflation rates in Nigeria in other to provide central bankers and policy makers a proper handle on the required policy direction and instrument. This paper bridges this gap.

3. Methodology

3.1 Theoretical Framework.

The theoretical framework for this study derives from the quantity theory of money as propounded by Fisher and adapted by Idris et al (2013) in their study of inflation in Nigeria. We, however, expanded the framework to incorporate the operation of the money multiplier process as elaborated by Lodha and Lodha (2013). In Nigeria, broad money supply represented by, M2, consists of currency outside banks and demand deposits in commercial banks, plus quasi money (QM) - mainly savings and time deposits. The quantity theory simply indicates that changes in the stock of money supply (M2) translate to proportionate change in the general price level or inflation (P):

$$M2.V = P.Y \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where: **M2**= money supply, **V**= velocity of money; **Y** = real output of goods and services; **P**= general price level.

The theory assumes that at full employment equilibrium, the levels of transactions or output and the velocity of circulation are constant. Thus, a change in money supply (ΔM2) translates to an equal and proportionate change in the general price level (ΔP):

$$\Delta M2\bar{V} = \Delta P\bar{Y} \quad \text{.....(2)}$$

But the supply of reserve or high-powered money (H), which is under the control of the central bank, impacts the aggregate money supply (M2) through the operation of the money multiplier (m), thus:

$$M2 = mH \quad \text{..... (3)}$$

The money multiplier represents the ratio of broad money supply to the base money, and indicates the amount of money that could be created by the banking system at a given level of central bank reserves. Given that:

$$M2 = C + D; \text{ and } H = C + R$$

Where:

C= Currency held by the non-bank public;

D= Deposits held in commercial banks;

R= Reserve deposits held in the central bank

$$m = \frac{M2}{H} = \frac{C + D}{C + R} \quad \text{.....(4)}$$

Dividing the numerator and denominator of the right hand side of equation (4) by D, yields:

$$m = \frac{M2}{H} = \frac{C/D + D/D}{C/D + R/D} \quad \text{.....(5)}$$

$$m = \frac{M2}{H} = \frac{c + 1}{c + r} \quad \text{.....(6)}$$

Where: **c**=*C/D*; **r**= *R/D*.

The cash ratio (c) is the ratio of currency in circulation to total deposits; and the reserve ratio (r) represents the ratio of bank reserves to total deposits. Lodha and Lodha (2013) stated that the money multiplier should not simply be seen as a statistic, but as the product of the interactions of banks, non-bank public, and decisions of monetary authorities. In particular, it reflects the portfolio decisions of the non-bank public on currency and time deposit holdings, the behavior of banks regarding the distribution of liquidity between excess reserves and earning assets, as well as the behavior of central banks while setting reserve requirements and other liquidity management measures. Thus, the money multiplier process is affected by several variables (c, r, x1, x2,...xn) in the monetary transmission channel, which in turn impact on the broad monetary aggregates (M2) and inflation (P) as follows:

$$P = f(M2, c, r, x1, x2,...xn, U) \quad \text{.....(7)}$$

Where: M2, c, r, x1, x2,...xn= variables in the transmission channel; U= the stochastic error term.

3.2 Data and Empirical Model

In the literature, the variables used in analysis of the transmission mechanism are usually the variables affected by the transmission channels. Based on the literature review, the variables included were: Reserve Money, Broad Money (M2), interbank exchange rate of the naira (EXR), Consumer price index (CPI), Monetary Policy Rate (MPR), Interbank Call rate, and Treasury bills rate (TBR_91 day). These were included because they had been encountered in studies of the monetary transmission mechanism in Nigeria (CBN, 2013). Moreover, the interest rate variables reflect the opportunity cost of holding money; the exchange rate captures the portfolio decisions of holding domestic versus foreign currency assets, while inflation reflects the ultimate goal of monetary policy. The monetary policy rate is the base rate of the Central Bank of Nigeria which is periodically adjusted by the Monetary Policy Committee to indicate the stance of monetary policy. The MPR drives other short term interest rates in the market. Quarterly seasonally unadjusted data series spanning the period 2002Q1 to 2013Q4 were collected and used for the study. Logarithmic transformations were applied to the non-rate variables to transform them into growth rates. The variables and their descriptions are indicated in table 1.

Table 1: Description of Model Variables

Variable	Description	Data type
EXR	Average interbank exchange rate of the naira (N/ US dollars);	quarterly
RM	Reserve Money (N Billions) at the end of the quarter;	quarterly
M2	Broad Money supply (N Billions), end quarter level	quarterly
CP1	Consumer Price index (2009=100);	quarterly
CR	Interbank Call rate (per cent);	quarterly
TBR	91-day Treasury bills rate (per cent);	quarterly
MPR	Monetary policy rate (per cent), during the quarter	quarterly

Unit root tests were applied to test for stationarity in the time series preparatory to formal regression estimations. Both the Augmented Dickey fuller (ADF) and the Phillips- Peron (PP) tests were applied to check for unit roots in the data. Following Gujarati (2003), the ADF unit root equation was:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta Yt - i + \varepsilon_i \quad \text{----------(8)}$$

Where: Y_t= the relevant time series; Δ = first difference operator; T = the linear time trend; ε_i = white noise error term

The null hypothesis for the existence of unit roots is Ho:δ=0 , against the alternative that Ho:δ<0 . Rejection of the null hypothesis means that the time series is stationary, while failure to reject leads to further differencing until stationarity was achieved. All the variables except one, failed unit root test at level.

The relationship between growth in reserve money and inflation was examined using the vector autoregressive (VAR) specification. The general specification of the VAR model is:

$$z_t = \sum_{i=1}^{k} A_i z_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

Where:

z_t = nx1 column vector of endogenous variables of the model (n endogenous variables).

A_i = nxn matrices of non-zero parameters to be estimated

ε_t = nx1 column vector of random disturbances (or innovations), assumed to be uncorrelated over time.

Thus, depending on the number of lags, the model is specified as:

$$z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \cdots + A_p Z_{t-p} + \varepsilon_t \quad \ldots\ldots\ldots (10).$$

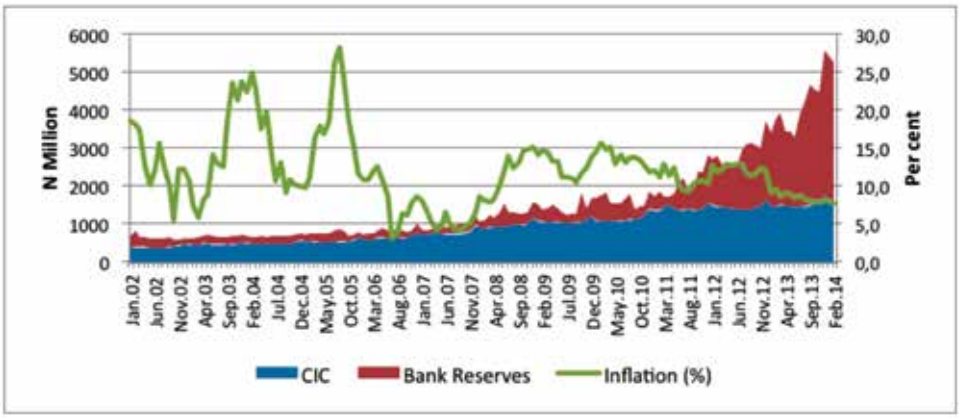
The basic VAR model was estimated with the following variables included: CPI, TBR, M2, and MPR. In order study the unique influence of reserve money and short-term interest rates, the alternative VAR models were estimated and analyzed relative to the basic VAR. The VAR analysis was employed because both the maximum eigenvalue and trace tests detected no evidence of co-integration among the variables in the model (see appendix table 1). The usual limitations in standard VARS as highlighted by Stock and Watson (2001) including missing nonlinearities, conditional heteroskedasticity, and drifts or breaks in parameters did not seriously affect the purpose of the analysis which was to trace links in the policy transmission channel from reserve money to inflation.

4. Results and Discussion

4.1 Stylised Facts on Reserve Money and Inflation in Nigeria

Reserve money is composed of currency in circulation and commercial bank reserves in the central bank. The central bank can use its policy instruments to determine the level of bank reserves, and control on the level of liquidity in the economy through open market operations. The quantum of reserve money in the economy impacts on the overall liquidity in the economy. As shown in Figure 1, reserve money was relatively stable from 2002 to November 2007. However, from 2008 reserve money started growing rapidly until February 2014. This growth was mainly driven by bank reserves as currency in circulation only increased slightly.

Figure 1: Trends in the Composition of Reserve Money and Inflation in Nigeria (2012-2014)



The increase in bank reserves was mainly due to the policy actions of the Central Bank of Nigeria with regard to Cash Reserve Ratio (CRR). The movements in the levels of bank reserves in 2008 could be attributed to the liquidity surfeit in the second quarter of the year and tight liquidity conditions occasioned by the impact of the global financial crisis on the domestic economy in the third and fourth quarters of the year. In the second quarter, when the system faced a liquidity surfeit, contractionary policy measures were implemented, such as the upward review of the Monetary Policy Rate (MPR) from 9.5 per cent in January to 10.0 and 10.25 per cent in April and June, respectively. The cash reserve ratio (CRR) was increased by 100 basis points, from 3.0 per cent to 4.0 per cent in June 2008. By September 2008, when liquidity tightness manifested and it became necessary to pre-empt the effects of the global liquidity and credit crunch on the domestic financial markets, the CBN relaxed its policy stance. The major monetary policy decisions taken to ensure money market liquidity were the reduction in the MPR by 50.0 basis points from 10.25 to 9.75 per cent; a reduction of CRR from 4.0 to 2.0 per cent; and a reduction of the liquidity ratio from 40.0 to 30.0 per cent. In 2009, the CBN continued its loose monetary policy stance in view of the liquidity challenges caused by the global financial crisis. Following the end of the global financial crisis, the CRR was increased from 4.0 per cent to 8.0 per cent in October 2011, from 8.0 to 12.0 per cent in July 2012; in July 2013 the CBN increased the CRR on public sector funds to 50 per cent and further to 75 per cent in January 2014. All these policy actions drove the increase in bank reserves over the period.

The Central Bank of Nigeria sets reserve money benchmarks at levels expected to provide the desired liquidity to achieve low inflation and provide conducive environment for macroeconomic stability, financial sector soundness and economic growth. A review of the reserve money targets against the actual reserve money performance revealed that from 2002 to the first quarter of 2011, the performance was mixed with the reserve money sometimes being above the target and at other times below the target. However, from the second quarter of 2011 till the fourth quarter of 2013 the reserve money was always above the targets.

In terms of inflation developments, during the before 2007 headline inflation rate rose from 12.2 per cent in 2002 to 23.8 per cent in 2003, peaking at 28.2 per cent in August 2005. Inflation during this period was thought to be the product of loose fiscal policy and a subdued monetary environment. During the period of the global financial crises, 2008 to 2011, characterized by quantitative easing by the central bank to stem liquidity shortage and restore credit flows to the economy, headline inflation edged up to 15.1 and 14.0 per cent in 2008 and 2009, and remained at the double digits until 2012. It was speculated in monetary circles that the inflation rate experienced during this period was perhaps traceable to the expansions in reserve money by the central bank. This study hopes to provide some clarifications on the relationships between reserve money growth and inflation in Nigeria during the study period.

4.2 Descriptive Statistics.

Table 1 shows the descriptive statistics of the variables. The rate variables had high standard deviations. The standard deviations of LRM, LEXR, LM2, TBR_91 and LCP1, were close to zero indicating that the distribution of the data series were close to their respective mean values. Apart from LM2, with a negative skewness coefficient, all the other series were positively skewed, or skewed to the right implying that the right tails of the distribution of the data were longer than the left tails. The kurtosis coefficients of TBR_91 and Call_Rate were slightly above the 3.0 for standard normal distributions, indicating that the peaks of these series were close to their means. The normality test based on the Jarque-Bera statistics indicated that all the series were not normally distributed.

Table1: Descriptive Statistics of the Variables (log level)

	MPR	LRM	EXR	LM2	TBR_91	LCPI	CALL_ RATE
Mean	11.74479	14.02782	4.924531	15.53260	10.09458	4.417378	11.90958
Median	12.00000	13.99588	4.889334	15.73177	9.470000	4.376629	11.19000
Maximum	20.50000	15.53091	5.064302	16.56721	24.50000	5.025787	26.12000
Minimum	6.000000	13.29052	4.754452	14.16852	1.040000	3.730501	1.500000
Std. Dev.	3.724734	0.623184	0.101793	0.812801	4.887834	0.385154	5.602249
Skewness	0.316379	0.676101	0.050284	-0.257260	0.413537	-0.108635	0.668628
Kurtosis	2.659457	2.421248	1.586783	1.510107	3.285792	1.916885	3.456811
Jarque-Bera	1.032704	4.326803	4.014590	4.969023	1.531458	2.440686	3.993864
Probability	0.596693	0.114934	0.134352	0.083366	0.464995	0.295129	0.135751
Sum	563.7500	673.3354	236.3775	745.5647	484.5400	212.0342	571.6600
Sum Sq. Dev.	652.0612	18.25286	0.487009	31.05037	1122.873	6.972135	1475.104
Obs.	48	48	48	48	48	48	48

4.3 Unit Root Tests

The unit root tests included intercept and trend for tests at level for trended series, and only intercept for test at first differences. Since the data is quarterly, we included up to four lags to correct for auto correlation.

All the variables, except treasury bills rate (TBR) failed unit root tests at level indicating that there were non-stationary. However, the variables became stationary at first difference indicating that they were I(1) variables as shown by the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests in tables 4. The stationarity of the variables at I(1) indicates that they can only be used in the VAR analysis after differencing.

Table 4: Unit Root Test Statistics for the Variables

Variables	ADF Test statistics		Order
	Level	First Difference	
LEXR	-1.857656	-6.699121***	1
CPI	-1.245324	-7.830374***	1
LM2	-0.893935	-7.455829***	1
LRM	-2.460476	-7.276662***	1
LCPS	-1.221394	-4.115972**	1
TBR	-3.273013**		0
MPR	-2.521414	-5.490352***	1
LEXR	-1.417805	-6.777977***	1
CPI	-0.588821	-15.47523***	1
LM2	-0.722079	-7.503499***	1
LRM	-2.25224	-18.90501***	1
LCP	-1.044012	-4.115972**	1
TBR	-3.270463**		0
MPR	-2.453013	-5.545951***	1

Note: Values are t-statistics; *Significant at 10%; **Significant at 5%; ***Significant at 1%.

4.4 The VAR Results.

The result of the basic VAR model which included the variables CPI, TBR, EXR, M2, and MPR is shown in Appendix 1. The lag selection criteria using the likelihood ratio test indicated a lag length of 2. The stability of the VAR using the AR roots indicated that the VAR was stable as none of the inverse roots lie outside the unit circle (Fig. A1).

Analysis of the impulse response function showed that a one standard innovation to the MPR was propagated through the system. In the first quarter, the TBR did not respond due to persistent banking system liquidity surfeit which dampens the immediate transmission of monetary impulses. In the second and third quarter, the TBR increases by 0.5 per cent

and gradually declines thereafter. By the 4th and 5th quarters, the effect of the MPR on the TBR has died out (Figure. 4.1). Similarly, the innovation to the MPR was accompanied by a decrease in money supply by 0.02 per cent in quarters 2 to 3, but the effect died out after 7 quarters. Also, the innovation to MPR initially led to an appreciation of the exchange rate in the 1st and 2nd quarters, and subsequent depreciations which died out after 7 quarters. This pattern of response is consistent with expectations as tightening of policy through the MPR raises all interest rates including treasury bills rate, thereby making naira denominated assets more attractive. The relative attractiveness of naira denominated assets encourages portfolio shifts into the domestic currency as well as stimulates foreign capital inflows, resulting in the appreciation of the exchange rate.

The one standard deviation innovation to the MPR did not have any immediate effect on inflation in the first two quarters. However inflation declined by 0.02 per cent in the 3rd and 4th quarters, and the effect weakly died out, perhaps due to structural features of the economy and the transmission channel. This confirms the widely held belief that shocks to the policy rate do not have noticeable effects on inflation in the short-run.

Figure. 4.1 Impulse Response Analysis of the Basic VAR Model

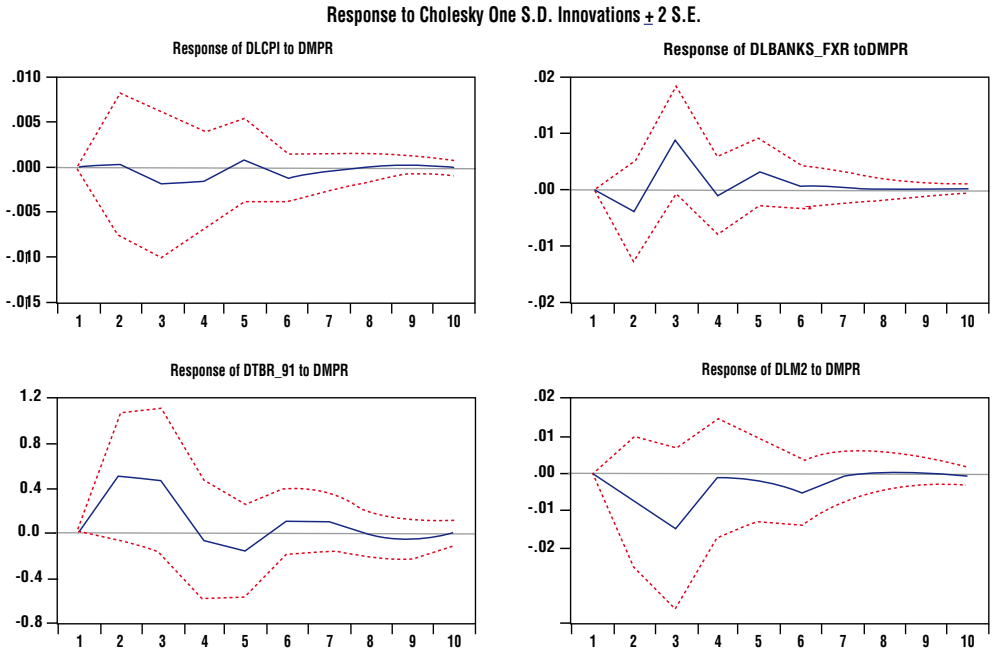
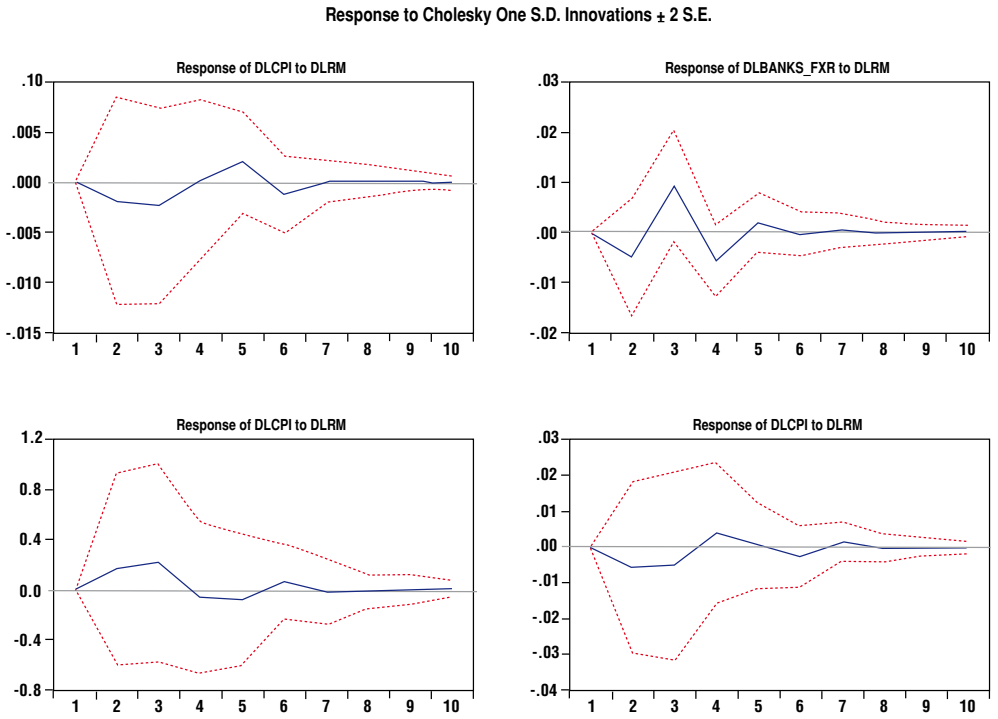


Figure 4.2 shows an extension of the basic model by including reserve money. An innovation to reserve money (DLRM) is propagated through the system in the following way. The treasury bills rate (TBR) does not respond to a one standard deviation innovation to reserve money in the first quarter due to lags in the transmission of monetary impulses perhaps occasioned by the persistent liquidity surfeit in the Nigerian banking system. In quarters 2 to 4, the treasury bills rate as expected increases by 0.3 per cent and declines thereafter. Similarly, a one standard

deviation innovation to reserve money leaves money supply unchanged in the first quarter due to lags in the transmission channel. In the 2nd to 3rd quarters, money supply declines by about 0.01 percent because increase in central bank reserves especially through the cash reserve requirement, constrains the ability of deposit money banks to create credit and expand money supply. Also, an innovation to reserve money elicits no response in quarter 1 but leads to depreciation of the interbank exchange rate in quarters 2 and an appreciation in quarter 3, with the effect dying out in the 6th quarter. This pattern of response was perhaps due to the volatile nature of the interbank exchange rate, and the speculative pressures following the tapering of United States quantitative easing as well as the reversal of capital flows to emerging markets. Also, a one standard deviation innovation to reserve money did not have any effect on the inflation rate in the first quarter. This is expected because of the lags in the transmission of the effect to interest rates and money supply. However, there was a gradual lowering of the inflation rate from quarters 2-5. These effects died out after 6- 8 quarters. This indicates that increasing reserve money growth beyond the benchmarks usually set by the central bank may have the effect of tightening liquidity and lowering inflation in Nigeria. This is consistent with recent monetary policy tightening measures through raising the CRR from 4.0 to 8.0 per cent (October, 2011), 8.0 to 12.0 per cent (July, 2012), and 12.0 to 50.0 per cent (of public sector deposits, July 2013), which had the effect of increasing reserve money levels, and lowering the rate of inflation from 12.0 per cent in December 2012 to 8.0 per cent in December 2013 and further to 7.8 per cent in April 2014.

Figure. 4.2 Impulse Response Analysis of Reserve money



5. Conclusion

The impulse response analysis of the Basic VAR showed that a one standard innovation to the monetary policy rate (MPR) was propagated through the system by an increase in the TBR rate, accompanied by a decrease in money supply and an initial appreciation of the exchange rate. This pattern of response is consistent with expectations as tightening of policy through the MPR raises all interest rates including treasury bills rate, thereby making naira denominated assets more attractive. The shock to MPR did not have any immediate effect on inflation, due perhaps to the structural features of the economy and the transmission channel. This confirms the widely held speculation that a shock to the policy rate does not have any noticeable effect on inflation in the short-run.

However, an extension of the basic model by including reserve money showed that an innovation to reserve money (DLRM) resulted in an increase in the treasury bills rate, a drop in money supply, a depreciation of the interbank exchange rate, and gradual lowering of the inflation rate after the second quarter. This indicates that increasing reserve money growth beyond the benchmarks usually specified by the central bank has the effect of tightening liquidity and lowering inflation in Nigeria as shown by recent experiences of raising the CRR on public sector deposits. The results reveal that reserve money growth and inflation rates are related through the transmission channel of monetary policy. In this regard, monitoring the growth of the reserve money is a useful tool for controlling inflation by the central bank in the short to medium term. Thus, central bank should constantly monitor reserve money developments in order to provide useful information to complement measures of controlling inflation in Nigeria.

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APPENDIX

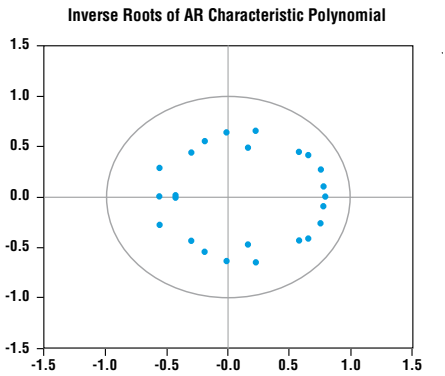
Lag Length Selection Criteria

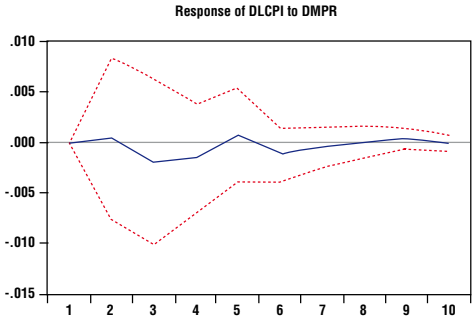
VAR Lag Order Selection Criteria
Endogenous variables: DLCPI DTBR_91 DLM2 DMPR
Exogenous variables: C
Date: 05/19/15 Time: 12:58
Sample: 2002Q1 2013Q4
Included observations: 43

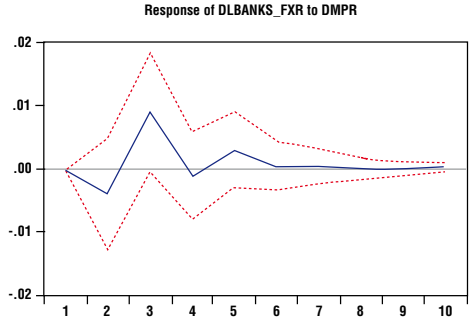
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-12.73749	NA	2.56e-05*	0.778488*	0.942320*	0.838904*
1	-2.327342	18.39932	3.33e-05	1.038481	1.857644	1.340563
2	18.57070	33.04807*	2.71e-05	0.810665	2.285158	1.354413
3	26.56375	11.15309	4.15e-05	1.183081	3.312905	1.968494
4	39.88700	16.11184	5.21e-05	1.307581	4.092735	2.334660

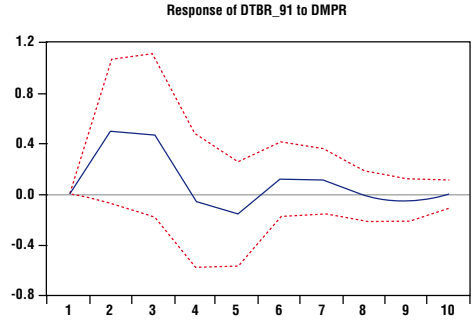
* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

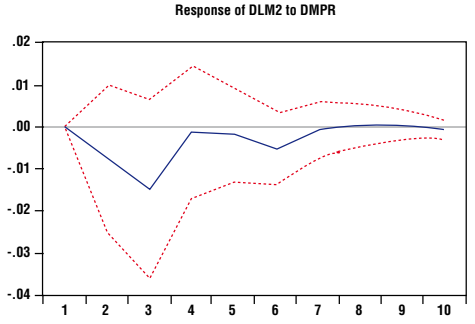
Figure A1: Stability of the Basic VAR




Response of DLCPI to DMPR
.010
.005
.000
-.005
-.010
-.015
1 2 3 4 5 6 7 8 9 10


Response of DLBANKS_FXR to DMPR
.02
.01
.00
-.01
-.02
1 2 3 4 5 6 7 8 9 10


Response of DTBR_91 to DMPR
1.2
0.8
0.4
0.0
-0.4
-0.8
1 2 3 4 5 6 7 8 9 10


Response of DLM2 to DMPR
.02
.01
.00
-.01
-.02
-.03
-.04
1 2 3 4 5 6 7 8 9 10

Appendix 1: Cointegration Test

Date: 05/13/15 Time: 18:12
Sample (adjusted): 2002Q4 2013Q4
Included observations: 45 after adjustments
Trend assumption: Linear deterministic trend
Series: LCPI LM2 TBR_91 MPR
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.286483	31.92376	47.85613	0.6164
At most 1	0.193354	16.73404	29.79707	0.6597
At most 2	0.097129	7.064896	15.49471	0.5701
At most 3	0.053346	2.466981	3.841466	0.1163

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.286483	15.18972	27.58434	0.7331
At most 1	0.193354	9.669143	21.13162	0.7751
At most 2	0.097129	4.597915	14.26460	0.7915
At most 3	0.053346	2.466981	3.841466	0.1163

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Basic VAR Model Results

Vector Autoregression Estimates
Date: 06/11/14 Time: 16:09
Sample (adjusted): 2002Q4 2013Q4
Included observations: 45 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	DLCPI	DLWDAS	DTBR_91	DLM2	DMPR
DLCPI(-1)	-0.162935	-0.011386	15.48007	-1.162890	-8.343662
	(0.17209)	(0.15695)	(11.7269)	(0.37943)	(6.11298)
	[-0.94680]	[-0.07254]	[1.32005]	[-3.06487]	[-1.36491]
DLCPI(-2)	-0.061434	0.351644	-31.04266	-0.082634	6.107210
	(0.18780)	(0.17128)	(12.7976)	(0.41407)	(6.67113)
	[-0.32712]	[2.05302]	[-2.42565]	[-0.19957]	[0.91547]
DLWDAS(-1)	0.044314	0.364648	-21.44438	-0.839558	-2.613257
	(0.16797)	(0.15319)	(11.4462)	(0.37034)	(5.96667)
	[0.26382]	[2.38030]	[-1.87349]	[-2.26696]	[-0.43798]
DLWDAS(-2)	0.171003	-0.050720	0.406155	0.028769	-11.04277
	(0.18491)	(0.16865)	(12.6008)	(0.40770)	(6.56850)
	[0.92477]	[-0.30075]	[0.03223]	[0.07056]	[-1.68117]
DTBR_91(-1)	0.002134	-0.001275	0.124205	0.001165	-0.050406
	(0.00218)	(0.00199)	(0.14886)	(0.00482)	(0.07760)
	[0.97706]	[-0.64003]	[0.83439]	[0.24197]	[-0.64960]
DTBR_91(-2)	0.002416	0.002246	-0.530960	0.005020	0.116552
	(0.00202)	(0.00184)	(0.13767)	(0.00445)	(0.07176)
	[1.19570]	[1.21923]	[-3.85680]	[1.12696]	[1.62411]
DLM2(-1)	0.112191	0.050130	-12.61903	-0.149560	-1.608222
	(0.07299)	(0.06657)	(4.97374)	(0.16093)	(2.59270)
	[1.53711]	[0.75307]	[-2.53713]	[-0.92937]	[-0.62029]
DLM2(-2)	0.109201	-0.015276	-3.549281	0.158957	-2.446205
	(0.06948)	(0.06337)	(4.73477)	(0.15319)	(2.46813)
	[1.57165]	[-0.24106]	[-0.74962]	[1.03762]	[-0.99112]
DMPR(-1)	0.000954	-0.001946	0.582755	-0.006307	0.160486
	(0.00431)	(0.00393)	(0.29370)	(0.00950)	(0.15310)
	[0.22132]	[-0.49503]	[1.98421]	[-0.66370]	[1.04826]
DMPR(-2)	-0.002983	0.006151	0.205068	-0.017396	0.018390
	(0.00440)	(0.00401)	(0.29978)	(0.00970)	(0.15627)
	[-0.67816]	[1.53300]	[0.68407]	[-1.79348]	[0.11768]
C	0.021419	-0.006982	1.289295	0.086175	0.272574
	(0.01080)	(0.00985)	(0.73603)	(0.02381)	(0.38368)
	[1.98301]	[-0.70878]	[1.75169]	[3.61863]	[0.71043]

R-squared	0.210144	0.303491	0.468979	0.412914	0.286157
Adj. R-squared	-0.022166	0.098636	0.312796	0.240241	0.076203
Sum sq. resids	0.029099	0.024204	135.1238	0.141455	36.71732
S.E. equation	0.029255	0.026681	1.993547	0.064501	1.039193
F-statistic	0.904584	1.481490	3.002760	2.391311	1.362950
Log likelihood	101.3815	105.5253	-88.59163	65.80260	-59.27542
Akaike AIC	-4.016954	-4.201125	4.426295	-2.435671	3.123352
Schwarz SC	-3.575325	-3.759497	4.867923	-1.994043	3.564981
Mean dependent	0.027285	0.004925	-0.122667	0.050629	-0.144444
S.D. dependent	0.028936	0.028103	2.404826	0.074000	1.081204
Determinant resid covariance (dof adj.)		7.13E-09			
Determinant resid covariance		1.76E-09			
Log likelihood		134.3363			
Akaike information criterion		-3.526059			
Schwarz criterion		-1.317916			

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