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FORECASTING CURRENCY IN CIRCULATION IN NIGERIA

By Milton Iyoha and Patricia Adamu*

Abstract

The main objective of this paper is to determine the most effective method of forecasting currency in circulation (CIC) in Nigeria. It is generally believed that good forecasts of currency in circulation would contribute to improved liquidity management by the Central Bank of Nigeria and promote the attainment of the macroeconomic goal of price stability. Two alternative forecasting techniques are utilized, namely, the univariate statistical Box-Jenkins ARIMA methodology and the structural econometric modeling of demand for currency using co-integration and error correction (ECM) methodology. Monthly time-series data are utilized for the 1995-2013 period. The study uses the two techniques to generate 12-month ahead forecasts of CIC and then utilizes some standard forecast performance criteria to evaluate the best performing forecasting technique. The study employs several performance criteria including the root mean square error and finds that the best performing forecasting methodology is the seasonally adjusted autoregressive integrated moving average model, ARIMA (0,1,1).

Key words: Forecasting, Currency in Circulation, ARIMA, ECM, Nigeria

JEL: E44, G12, G15

I. Introduction

The principal objective of the Central Bank of Nigeria (CBN) is the attainment of price stability. In order to achieve this purpose, the CBN targets monetary aggregates, in particular, broad money (M_2) as intermediate target and monetary base as the operating target. The narrow money supply (M_1) consists of currency outside bank (COB) and private sector demand deposits of money banks. Among the components of the reserve money, the COB is the largest (accounting for about 70% of the total), the most liquid and the most difficult to control, but it is a very important element in macroeconomic management. The amount of COB is mainly a function of economic activities; however other factors affect the pattern and quantity of currency demand in the economy. Some of these factors are: monetization of foreign exchange for distribution to the various tiers of government, political events, religious festivities, availability of alternative payment instruments, and inflation.

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The views expressed in the paper are those of the authors and do not represent those of the University of Benin and WAIFEM.

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The main purpose of this paper is to forecast the CIC in Nigeria to enable the CBN strategize on how to control future liquidity in the system in order to guarantee price stability. Following current usage, we may define the term "currency in circulation" may be defined to include paper bills and subsidiary coins issued by central banks and held either by the public or in bank vaults, but excluding currency held by central banks themselves. As in most other developing countries of sub-Saharan Africa, currency (consisting of notes and coins) is a predominant component of money in the Nigerian economy. Thus, it may be assumed that the demand for currency is driven basically by the same factors as demand for money. While it is important to investigate the determinants of the demand for currency in Nigeria, the objective and focus of this study is more limited, namely, forecasting the amount of currency in circulation. The need to obtain good forecasts of the demand for currency is important not only for deposit money banks but also for the Central Bank of Nigeria (CBN) whose function it is to issue currency in circulation. Currency, which is the major component of money in the Nigerian economy, is the grease that keeps the economy functioning. Any serious shortage of currency in circulation would have a deleterious effect on the growth of the economy and the welfare of its citizens. Since it costs money to print currency, which is often done overseas, it would be economically unwise to have a surplus.

In Nigeria, currency is printed in foreign countries for technological and security reasons. The overseas company in charge of printing the notes needs to be given advance notice of the quantity of currency needed. The Central Bank itself needs to determine how much currency is needed. Thus, there is need to forecast demand for currency many months ahead. Past experience suggests the need to obtain forecasts at least 6 months ahead and preferably 12 months ahead. The need to forecast the amount of needed currency many months ahead is as desirable for developing countries as it is for advanced industrialized countries. For example, the Reserve Bank of New Zealand has found it useful to obtain 12 month-ahead forecasts of the demand for currency, Cassino, Misich and Barry (1997).

There is indeed a consensus that it is desirable for central banks to obtain accurate forecasts of currency in circulation. However, most central banks have found it difficult to achieve this important objective for a host of reasons, including the technical challenge of predicting in an uncertain environment. Indeed, some years ago, the Reserve Bank of New Zealand actually set up a task force of academic and central bank experts to solve this problem for it. See Cassino, Misich and Barry (1997). Also, there are indications that the Central Bank of Nigeria is currently experiencing capacity gaps in addressing the

problem of achieving optimal forecasts of its currency in circulation. This study is aimed at contributing efforts in that direction.

Following this introductory section is section II which discusses some stylized facts regarding the determinants of currency in circulation in Nigeria. Section III presents a concise literature review. Next is section IV which contains material on data and methodology. Section V presents the econometric results on forecasting CIC in Nigeria using two alternative methodologies, viz., (i) forecasting from an estimated currency demand function, using the method of co-integration and error-correction modeling and (ii) forecasting currency in circulation using the Box-Jenkins univariate statistical technique, the autoregressive integrated moving average (ARIMA) methodology. The last section contains the summary and recommendations.

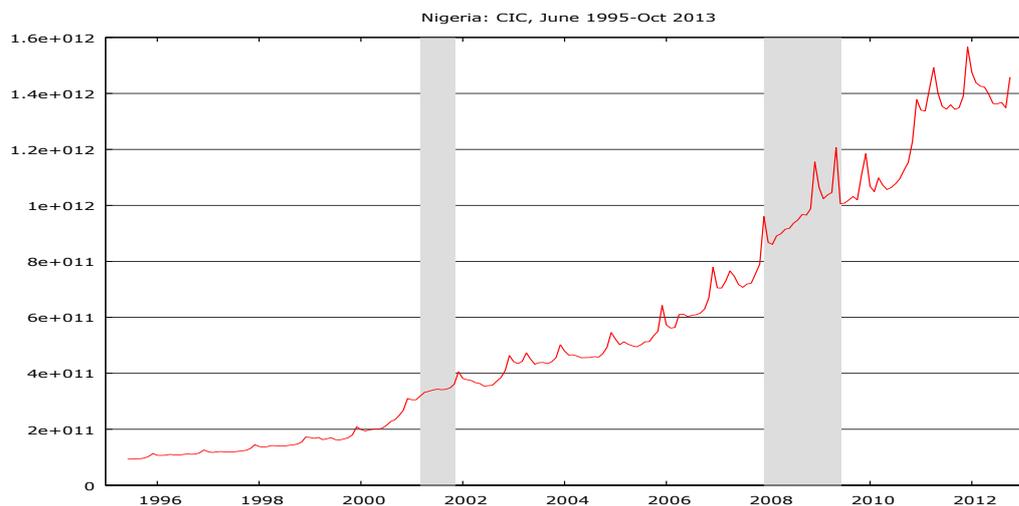


Fig. 1: Nigeria – Currency in circulation, 1995-2013

II. Stylized facts regarding CIC in Nigeria

As in other countries (both developed and developing) of the world, CIC in Nigeria has been rising over time. See Fig. 1. Most of the long-term increase in currency holdings is accounted for by growth in population, growth in real per capita income and in the naira volume of economic transactions. Other determinants include individuals' preferences for holding currency versus bank deposits, the cost of holding currency, changes in the distribution of income, increase in urbanization, the magnitude of black market activities, the size of the informal sector and the underground economy, and the tempo of financial innovations such as e-banking and the use of automated teller machines (ATMs). (Cagan (1958)

At first glance, the rising trend in CIC seems rather surprising, since there have been significant developments in the application of electronic technology in the retail payments area over the last few decades. These developments include strong growth in the use of ATMs (Automatic Teller Machines) and EFTPOS (Electronic Funds Transfer at Point Of Sale). However, on further reflection, the rising trend in cash holding is easily explained since the use of ATMs actually necessitates even greater use of cash. Also, with greater access to payment cards such as credit cards and debit cards comes easier access to cash through the use of ATMs.

However, as in other countries of the world, the ratio of currency to income or GDP, commonly called the "currency ratio", has been steadily declining in Nigeria. From Fig. 2, it can be ascertained that while the currency ratio was 50 percent in 2000, it had declined to 20 percent by 2013. In his seminal study on the determinants of the currency ratio in the USA, Cagan (1958) establishes that the main determinants of the currency ratio are: (i) the pervasiveness of banking habit; (ii) the costs of holding currency or the return on deposits; (iii) preferences of citizens or consumers; and (iv) the level of real per capita income.

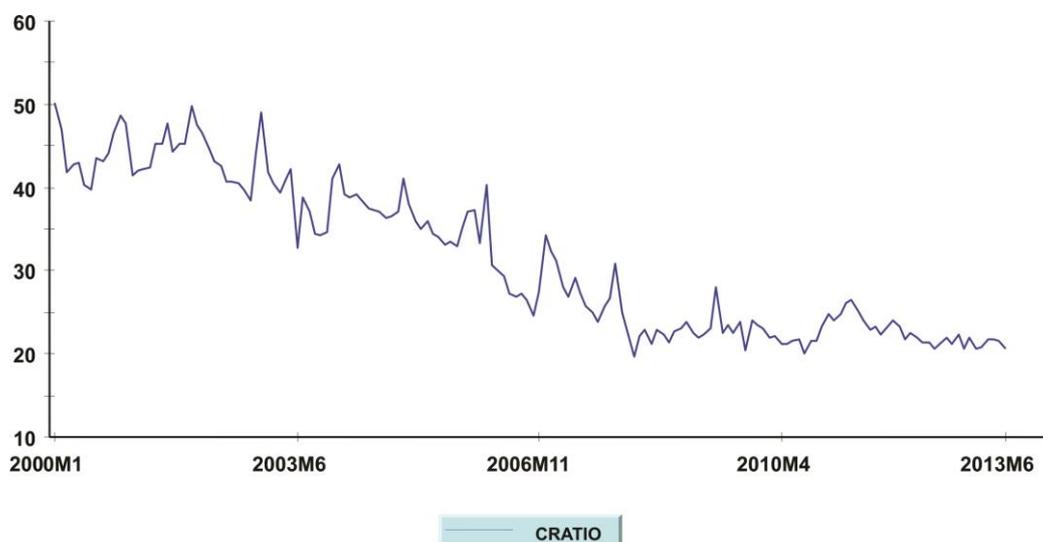


Fig. 2: Nigeria – Currency Ratio, 2000-2013

An influential study by Vito Tanzi (1982) hypothesizes that the ratio of cash to broad money supply depends on the personal income tax ratio, the ratio of cash wages to national income, interest rates, and real income per capita. Accordingly, he estimates the following logarithmic regression equation:

$$\ln\text{CMR} = \beta_0 + \beta_1\ln T + \beta_2\ln\text{WYR} + \beta_3\ln R + \beta_4\ln\text{PCY} + \mu \dots\dots\dots(1.1)$$

Where: CMR = Cash to broad money supply ratio, T = Personal income tax ratio, WYR = Ratio of cash wages to national income, R = Annual interest rates, PCY = Income per, capita, ln = Natural logarithm, and μ is a stochastic error term. Note that the ratio of currency to broad money stock, often referred to as the “liquidity ratio” has been falling. See Fig 3.

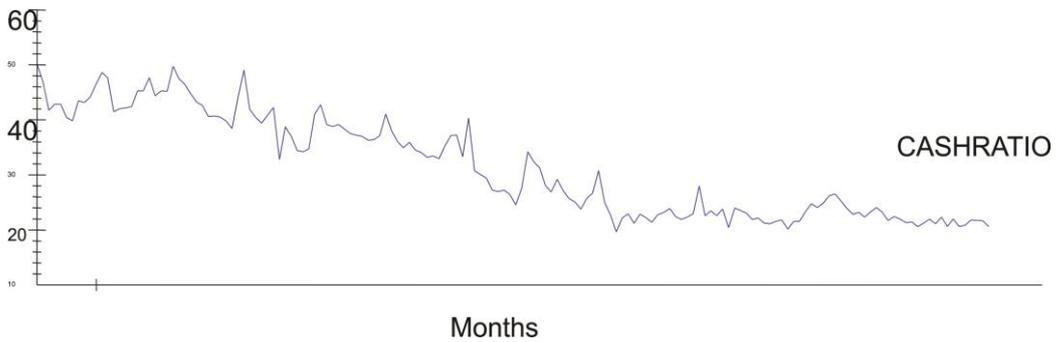


Fig 3: Nigeria - Cash ratio, 2000-2013

III. Literature Review

3.1 Demand for Currency

With the increase in economic activities over the years, the demand for currency has progressively expanded. Too often, the increases were not anticipated by the monetary authorities which under-estimated the demand for money. Consequently, the actual currency expenses incurred by the central banks usually exceed the budgeted estimates. (Cassino and Misich, 1997; Auerbach, 1964). With the recent development of electronic technology such as the automated teller machines (ATMs) and electronic funds transfer at point of sales (EFTPOS), economic agents have been able to access cash and make retail payments more easily. This innovation is supposed to shrink the demand for currency, but due to the ease with which individuals are able to access funds, there has been an upsurge in the amount of currency demanded. Similarly, the introduction of the use of pre-paid cards like internet data bundle cards, credit cards, for example, is expected to reduce the demand for currency (Ledingham, 1994, Bowsher, 1980), but may not do so.

In sum, the growth in the use of this electronic technology has snowballed into higher demands for currency (Fischer, Köhler and Seitz; 2004; Attanasio, Guiso and Jappelli, 2002; Rinaldi, 2001; Goodhart and Krueger, 2001; Snellman, Vesala,

and Humphrey, 2000; Boeschoten, 1998; Schneider, 1990; Virén, 1989, 1992, 1994). The demand for currency, regardless of where it originates or from whom it is exercised, generates a demand for base money. Thus, changes in the demand for money also affect the reserve positions of banks. The higher the demand for currency, the lower will be the reserves of the banks.

There is a large volume of literature on the determinants of the demand for currency. A number of factors have been identified which affect the aggregate demand for currency, and these include: the per capita income levels of people; prices of goods and services or inflation; opportunity cost of holding cash *vis-à-vis* other forms of money; financial innovations leading up to alternative non-cash means of payment (e.g. smart cards, debit cards, credit cards, ATMs); degree of monetization; extent of financial inclusion and the size of the underground economy. These variables affect the demand for currency through the transaction, precautionary and speculative motives for holding money. Cagan (1958) also finds that in addition to the cost of holding currency and expected real income per capita, which are negatively related to the currency ratio, other variables such as the volume of retail trade, the volume of travel per capita, the degree of urbanization and the rate of tax on transactions, have a positive relationship with the variations in the currency ratio. However, by its very nature, the size of the shadow or underground economy is difficult to estimate and good proxies are hard to come by. Some authors have attempted to include various proxies for the shadow economy such as the tax-GDP ratio (Dotsey, 1988) or "bad behaviour" variables (Drehmann and Goodhart, 2000).

Banks have introduced a lot of charges for transaction services. In order to avoid or minimize the payment of these charges, customers have devised means of reducing the quantum of cash withdrawals or payments. This tends to increase the demand for currency (Cassino et al, 1997).

Currency demand depends on country specific circumstances, such as economic, technological, cultural and sociological factors which differ across countries and influence currency demand. The cross-country variations in growth, inflation and interest rates, the rate of direct and indirect taxes, the share of informal and underground economy in the overall economic activity and the organization of economic activity (*viz.*, dominance of retail *vis-à-vis* large-scale business), regulation of various modes of payment, proportion of migrant workers, the nature of currency ('soft' or 'hard'), etc. are among the important explanatory economic factors that influence the demand for currency (Humphrey, Pulley and Vesala, 1996). Attanasio et al., (2002) model

both the access to interest bearing assets and the choice of an ATM card together with the demand for currency for Italian households. They find substantial economies of scale in cash holdings over time and significant differences in cash holdings between ATM cardholders and non-ATM cardholders. Dutta and Weale (2001) show theoretically how changes in the transaction technology affect the choice of cash versus other methods of payment for consumption. An implementation of their model, using UK data results in a steady improvement of transaction technology from the 1970s until the end of the 1990s and a high value for the substitution elasticity. Similarly, De Grauwe, Buyst and Rinaldi (2000) compare the costs of cash and cards of the payment system participants in Belgium and Iceland. Their investigation unambiguously yields the result that the cost efficiency of the cash payment system is low compared to a payment system based on cards.

The endogeneity of the evolution of different payment methods in a cross-country study is analyzed by Humphrey, Kim and Vale (2001) who find that payment users are quite sensitive to relative prices that reflect relative user costs. Also, Markose and Loke, (2003) investigate the interdependencies between payments media use, network effects and interest rates. This question has to do with the precise amounts of currency needed for transactions and other purposes and the frictions involved with only concentrating on a single motive for holding currency. Mathä (2001) illustrates with the help of a survey that the euro cash change-over could have more than temporary real economic effects, as it may take several years before people truly and fully accept the new currency and the new denomination of prices.

It is often argued that advances in payments technology have resulted in a substitution of noncash payments for cash (Snellman et al., 2000). The extent and type of financial innovations also affect currency demand. The growing acceptance of cash substitutes and electronic modes of payment and use of credit or debit cards, particularly in the developed countries has not, however, necessarily resulted in an offsetting reduction in the total stock of currency outstanding (Fischer, Köhler and Seitz, 2004). The influence of this financial-innovation-effect may be captured by including a linear time trend (time) in the regressions. Some authors use more direct measures of financial innovation such as the number of ATM.s, bankcards or EFTPOS terminals (Rinaldi, 2001; Drehmann and Goodhart, 2000).

Use of cash for the underground economy is also a well known phenomenon and, as such, the size and share of black economy also impact currency demand, especially of higher denominations. On grounds of efficiency, high

denomination banknotes are most likely to be used for hoarding. Currency tends to be used for hoarding in the official economy when the income on alternative assets, costs of currency storage in a locker and the risk of loss (via theft, spoilage and most importantly inflation) is smaller than the transactions costs associated with portfolio transformation (Fischer, Köhler and Seitz; 2004). Also, the advantage of using currency as an instrument for store of value (hoarding) is its liquidity and anonymity, the latter factor being particularly important in the case of the black economy. Ercolani, (2000) analyses theoretically and empirically a situation in which agents in the hidden economy are able to avoid direct and indirect taxes but unable to avoid the inflation tax because they require cash to carry out transactions. Cash transactions permit anonymity and hence constitute a preferred medium of transactions in the shadow economy – either for transactions of contraband products or to evade taxes, e.g., in the housing sector.

Therefore, the taxation of labour and capital income as well as fiscal controls of tax payments should be decisive factors in this respect; hence, the share of taxes in GDP is also a latent determinant of currency demand (Boeschoten, 1992). Cagan (1958) finds that high tax rates will cause economic agents to evade taxes through shadow economy. Rogoff (1998) argues that if large denomination euro notes are used in huge amounts in illegal activities the revenue losses of direct and indirect taxes might outweigh possible seigniorage benefits.

An efficient system for management of currency needs to be based on a *prior* knowledge of not only the future demand for the total value of currency but also for the demand for various denominations of banknotes and coins. In an ideal scenario, given the size and distribution of cash transactions in an economy within a specified time frame, the total value of currency and its denominational composition should match the currency needs to carry out those transactions without significant mismatches at the denomination level. Further, the gradual shift in the denominational composition over time needs to be captured so as to optimize the total volume of currency required to meet the demand in terms of value (Nachane, Chakraborty, Mitra, and Bordolai, 2013). With continuous changes in macroeconomic parameters, not only does the demand for the aggregate value of currency undergo changes, its composition also shifts towards higher denominations. Estimation of the evolving demand for currency in the economy and understanding its relationship with various macroeconomic parameters is an essential element in the planning of the issue and distribution of currency.

A review of cross-country studies on determinants of currency demand indicates that differences in economic activity levels, opportunity costs of holding currency (as reflected in interest rate and inflation differentials) and financial innovations in carrying out transactions affect currency demand. Also, differences in national taxation systems, the informal economy as well as heterogeneous payment habits, which are likely to be related to the different structure of banknote denominations and cashless payment instruments, influence the demand for currency (Roseman 2010; Fischer, *et al*, 2004; Doyle, 2000; Nenovsky and Hristov, 2000).

Roseman (2010), posits that the domestic demand for currency in the US is largely based on the use of currency for transactions and is influenced primarily by income levels, prices of goods and services, the availability of alternative payment methods, and the opportunity cost of holding currency in lieu of an interest-bearing asset. Doyle (2000) adopts a dynamic OLS method to estimate the overseas demand for US dollars based on data for 1960-1996, using a cointegrating framework between real currency balance, interest rates and retail sales. The exercise was carried out for the US and several other countries, which were likely to hold US dollar cash balances. The estimation results indicate that in case of most countries, for aggregate currency demand, coefficients are positive for retail sales and negative for interest rates and both are significant. When currency data are split into large and small denominations, the signs flip for small denominations. The study also finds evidence that the equations were stable for the period 1960-1996.

Nenovsky and Hristov (2000) model transactions demand for currency in nominal terms and added inflation rate to the set of explanatory variables in order to estimate the influence of price level on demand for currency. This is because household money expenses - rather than money income - is more closely connected with demand for currency in circulation (Boeschoten, W., 1992). Attanasio *et al* (2002) estimate the demand for money in Italy between 1989 and 1995 using a dataset of detailed information about households and firms. The study finds that demand for money by households is significant with respect to elasticity of consumption and interest rate.

3.2 Forecasting Currency in Circulation

It should be apparent that forecasting currency, while a highly technical problem, cannot be considered in isolation from the more general monetary, economic, and institutional factors that affect buying and spending habits. For this reason and because of the inherent variability of the data, the accuracy of the forecasts cannot be expected to be perfectly precise. Therefore, we may

expect forecasts to be subject to constant refinements and continuous improvements.

In an influential paper many years ago, Cassino, Misich and Barry (1997) report the results of a commissioned study by the Reserve Bank of New Zealand dealing with econometric methods for forecasting currency in circulation in New Zealand. Two main methodologies are utilized, viz., (i) forecasting from an estimated currency demand function, using the method of co-integration and error-correction modeling and (ii) forecasting currency in circulation using the Box-Jenkins univariate statistical technique, the autoregressive integrated moving average (ARIMA) methodology. The seasonal moving average of order 1 is found to out-perform all the other methods for out-of-sample forecasts, Cassino, Misich and Barry (1997, pp 31-32). Both methodologies will also be utilized in this study. Ikoku (2014) has recently contributed to the literature by modeling and forecasting CIC for liquidity management in Nigeria. He finds that the most accurate forecasting models are mixed models with structural as well as ARIMA components, augmented by seasonal and dummy variables.

IV. Methodology and Data

4.1 Methodology and Econometric technique

Currency in circulation is typically estimated either by specifying a currency demand equation based on the theory of transaction and portfolio demand for money or estimating univariate time series models. Not surprisingly, in their study, Cassino, Misich and Barry (1997), make a case for utilizing both a structural econometric model (estimating a currency demand function by an error-correction model) and forecasting by a univariate time series technique such as ARIMA (autoregressive integrated moving average). They use quarterly time-series data. Although this study utilizes monthly data for currency in circulation, it was considered desirable to adopt the methodology by Cassino et al (1997), that is, both the structural econometric modeling and the univariate technique of ARIMA modeling. However, seasonal adjustment was allowed for.

Recall that Box and Jenkins (1970) present and use the ARIMA model as a versatile and flexible instrument for forecasting univariate economic time series data. ARIMA models are a-theoretical, being independent of any particular economic theory, and the forecasts from the models are based purely on the past behavior of the series of interest. Even so, the ARIMA technique uses the properties of a 'stationary' time series to forecast its future movement.

The concept of stationary time series arises from the existence of stationary stochastic processes, defined as one whose joint and conditional distributions are *invariant with respect to displacement in time*. From this definition, it is obvious that if the underlying stochastic process which generates a given time series is stationary (that is invariant over time), then one can model the process by means of an equation with fixed coefficients that can be estimated from past data. It should be noted that since the time series are stationary, the structural relationship described by the equation is also stationary, i.e., invariant with respect to time.

Basically, a stationary time series is mean reverting, that is, it is a time series that tends to return to its mean value after any external shock (involving an increase or decrease of its value). If the series is non-stationary, then it is first differenced to make it stationary, and an ARMA (auto-regressive moving average) model is fitted to the differenced series.

ARMA models are obtained as combinations of the autoregressive (AR) and moving average (MA) models. Consider a stochastic process $\{X_t\}$ specified as

$$X_t = \alpha_1 X_{t-1} + \dots + \alpha_p X_{t-p} + \varepsilon_t + \beta_1 \varepsilon_{t-1} + \dots + \beta_q \varepsilon_{t-q} \dots\dots\dots(4.1)$$

where $\{\varepsilon_t\}$ is a purely random process with mean equal to zero and variance equal to σ^2 . This stochastic process is called an ARMA (p, q) process or model. This class of models is of particular interest as the models result in a parsimonious representation of higher order AR(p) or MA(q) processes.

Using the lag operator, L this equation may be re-written as

$$\varphi(L)X_t = \theta(L)\varepsilon_t \dots\dots\dots(4.2)$$

Where: $\varphi(L)$ and $\theta(L)$ are polynomials of orders p and q, respectively, and are defined as

$$\varphi(L) = 1 - \alpha_1 L - \alpha_2 L^2 \dots - \alpha_p L^p \dots\dots\dots(4.3)$$

$$\theta(L) = 1 + \beta_1 L + \beta_2 L^2 + \dots + \beta_q L^q. \dots\dots\dots(4.4)$$

For stationarity, the roots of $\varphi(L) = 0$ must lie outside the unit circle and for invertibility of the MA component, the roots of $\theta(L)$ must again lie outside the

unit circle. Thus, we have a combination of the "stability" conditions of both the autoregressive and the moving average processes.

Note that if $\Delta^d X_t$ is a stationary series that is representable as an ARMA (p, q) process, then it follows that X_t is an ARIMA (p, d, q) model. The term "integrated" in the autoregressive integrated moving average process is used to denote the fact that it is "differenced" data that are fitted to the stationary ARMA model. Thus, while d is the order of integration of the time series data, p is the order of the autoregressive process while q is the order of the moving average process. An examination of the ARIMA (p, d, q) model shows that it is very general. It can be easily verified that a combination of a small p and q can generate a wide range of time series models, hence its versatility and popularity.

In particular, the purely random process, the moving average process and the autoregressive moving average process are all special cases of the ARIMA process. For example, if $p = d = q = 0$, the ARIMA model collapses to a purely random process or white noise. If $d = 0$, the ARIMA model collapses to an ARMA process. In order to improve forecast ability, seasonality is allowed for in the econometric estimations that follow.

4.2 Data

This study utilizes monthly data on currency in circulation obtained from the Central Bank of Nigeria. So far as we know, this is possibly the first time monthly data has been used for forecasting currency in circulation in Nigeria and even for other countries in Africa. The influential study by Cassino, Misich and Barry (1997) only utilizes quarterly time series data. The available data is for the period June 1995 through October 2013. Econometric estimation was carried out using the GRETLM Econometric Software and MICROFIT 5.0 software.

V. Econometric results

5.1 ARIMA Results

5.1.1 Descriptive Statistics and Unit Root tests

At this juncture, the time series characteristics of the data used in the study are examined. Monthly data for currency in circulation (CIC) is obtained for the period June 1995 through October 2013. (Tables).

Table 1: Summary Statistics

Summary Statistics, using the observations 1995:06 - 2013:10 for the variable CIC (221 valid observations)

Mean	Median	Minimum	Maximum
6.26383e+011	4.73176e+011	9.34186e+010	1.63172e+012
Std. Dev.	C.V.	Skewness	Ex. Kurtosis
4.60936e+011	0.735870	0.598737	-0.985987
5% Percent	95% Percent	IQ range	Missing obs.
1.08618e+011	1.45728e+012	8.25808e+011	0.000000

5.1.2 Results of Unit Root tests for LCIC

Using 3 standard unit root tests, namely, the Augmented Dickey Fuller test, the ADF-GLS test and the KPSS test, it is found that the logarithm of CIC is non-stationary at levels but stationary after first differencing. In other words, the logarithm of CIC is integrated of order one, that is, log CIC is an I(1) variable. See the test results in Table 2. The first difference which is stationary can then be fitted to an ARMA (auto-regressive moving average) model. The value of d in the ARIMA (p,d,q) is known to be 1. All that is left is to find the best fitting ARIMA by trying different values of p and q. Next, the best fitting ARIMA will be used to obtain a 12-month-ahead forecast of CIC.

Table 2: Results of Unit Root tests

Variable	ADF Test	ADF-GLS Test	KPSS Test	Conclusion	Remarks
dICIC	-10.4*	-12.26*	0.036*	ICIC is I(1)	Difference Stationary

Note: * indicates significance at the 5 percent level

5.1.3 Forecasting results obtained from ARIMA modeling

After an extensive search, the three best fitting ARIMA models for the entire period are found to be low frequency seasonally adjusted ARIMA models, viz., (i) an integrated auto-regressive moving average model of order (1,1,1), that is, ARIMA (1,1,1); (ii) an integrated auto-regressive model of order 1, that is, ARIMA (1,1,0); and (iii) an integrated moving average process of order 1, that is, ARIMA (0,1,1). Each of these three ARIMA models is then used to obtain a 12-month forecast of CIC. In order to be in a position to test for forecast accuracy, the models are re-estimated for the period from June 1995 to October 2012, which means omitting the last 12 observations. The equations are then used to forecast the CIC for the 12 months from November 2012 through October 2013. Actual

and forecast CIC are then analyzed to determine forecast accuracy -- utilizing 6 key statistics, namely, (i) the root mean square error; (ii) the mean per cent error; (iii) the mean absolute error; (iv) the mean squared error; (v) the mean error; and (vi) Theil's Inequality Coefficient. These three models perform extremely well in forecasting currency in circulation in Nigeria, with the integrated moving average model of order 1, that is, ARIMA (0,1,1) model winning the contest by a whisker. Co-incidentally, Cassino, Misich and Barry (1997) also find this to be the best performing forecasting model for New Zealand. See details of our results in Table 3 below:

Table 3: Forecast accuracy statistics

	ARIMA (0,1,1)	ARIMA (1,1,0)	ARIMA (1,1,1)
Mean Error	-0.030731	-0.030797	-0.030948
Mean Squared Error	0.0016651	0.0016681	0.0016767
Root Mean Sq. Error	0.040806	0.040842	0.040947
Mean Absolute Error	0.032917	0.032968	0.033092
Mean Percentage Error	-0.1097	-0.10994	-0.11048
Theil's U	0.65349	0.65456	0.65651

The plots of the forecasts for the three ARIMA models, viz., ARIMA (0,1,1), ARIMA (1,1,0), and ARIMA (1,1,1) are presented in Figs 4 – 6 below.

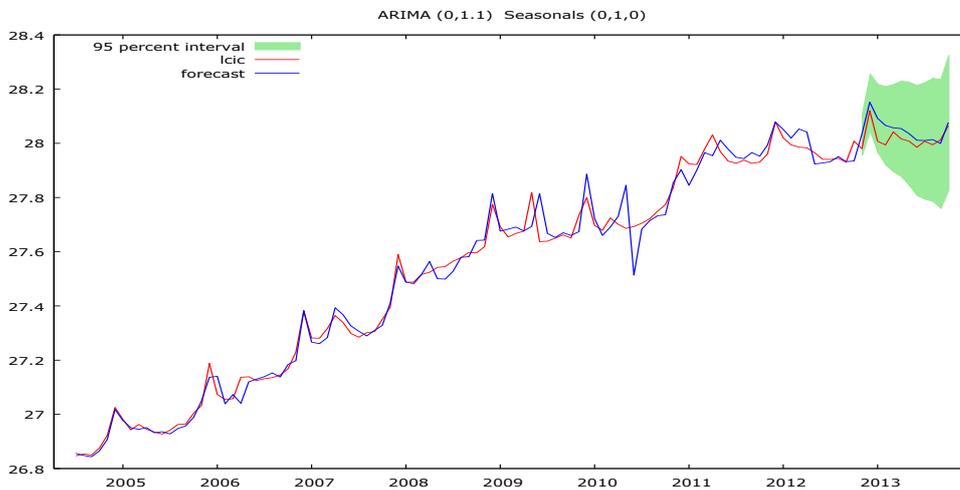


Fig 4: CIC forecast using ARIMA (0,1,1)

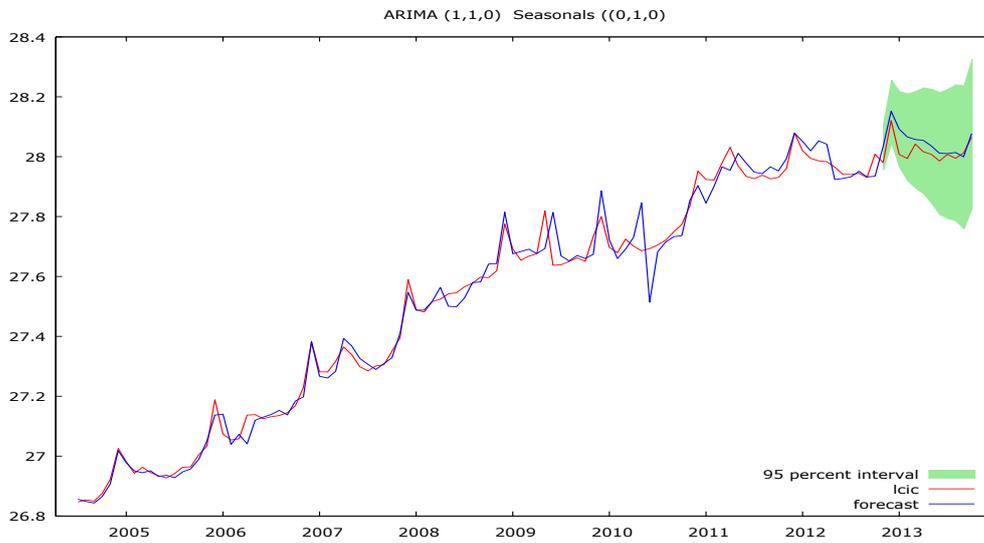


Fig 5: CIC forecast using ARIMA (1,1,0)

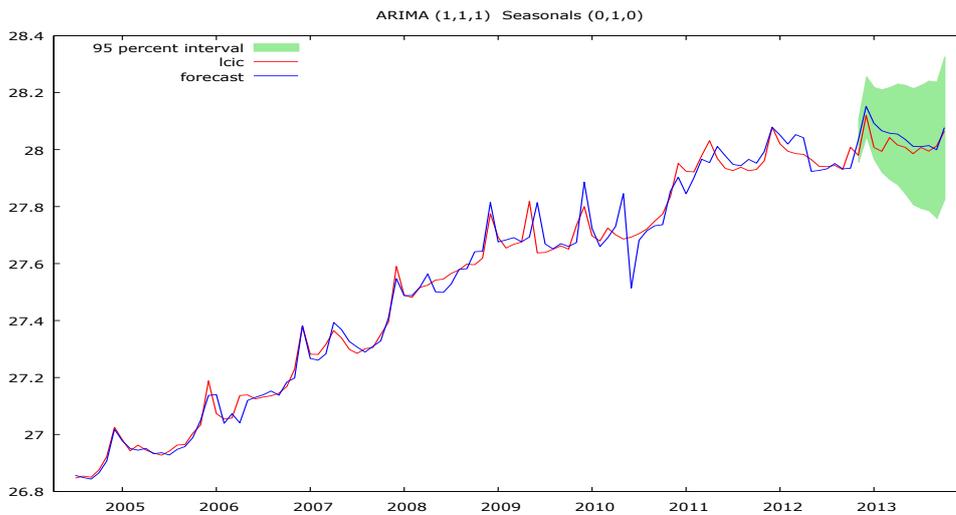


Fig 6: CIC forecast using ARIMA (1,1,1)

5.2 Econometric Results using an Error Correction Model

The second technique used in forecasting CIC involves estimating a structural demand function for currency and then obtaining forecasts from it. The framework used to forecast currency is to estimate a standard money demand function based on the transactions demand for money and portfolio demand for money and then use the best fitting equation to forecast currency in circulation. The demand equation can be expressed as:

$$CIC = f(NYPD, INFL, PINTR, EXRT) \dots\dots\dots (5.1)$$

Where: the amount of currency (CIC) demanded in period *t* depends on personal disposable income *NYPD*, the opportunity cost of holding cash (proxied by the prime interest rate *PINTR*), inflation rate *INFL* and the exchange rate *EXRT*, in view of the openness of the Nigerian economy . Assume this function has a log-linear form, then it can be written as:

$$LCIC = a_0 + a_1LNYPD + a_2LPINTR + a_3LINFL + a_4LEXRT + u_t \dots\dots\dots(5.2)$$

Where:

L stands for natural logarithm and *u_t* is a stochastic error term.

All the variables are tested for the presence of unit roots, using the Augmented Dickey Fuller (ADF) test, and are I(1), that is, they are first difference stationary. See Table 4 below.

Table 4: Results of Unit Root tests of all variables

<u>Variable</u>	<u>ADF test statistic</u>	<u>95% critical value</u>	<u>Remark</u>
DLCIC	-10.9	-3.4	I(1)
DLNYPD	-7.9	-3.4	I(1)
DLINFL	-7.2	-3.4	I(1)
DLEXRT	-5.8	- 3.4	I(1)
DLPINTR	-5.6	-3.4	I(1)

Next, the variables are tested for co-integration, using the two-step Engel Granger test. The variables are found to be co-integrated since the residual from the OLS regression of LCIC on LNYPD, LPINTR, LINFL, and LEXRT is stationary. See Table 5.

Table 5: Result of Unit Root test of residuals

<u>Variable</u>	<u>ADF statistic</u>	<u>95% critical value</u>	<u>Remark</u>
Residual	-11.1	-4.5	
Stationary			

Invoking the Granger Representation theorem, an error correction model was thereafter specified and estimated. See the Appendix for the results. The associated autoregressive distributed lag (ARDL) model was then used to generate a 12 month forecast of currency in circulation. The results of the forecasts and the associated summary statistics are reported in Table 6. Fig 7 provides a plot of actual and forecasted currency in circulation.

Table 6: Forecast Results using a Demand for Currency equation

Observation	Actual	Prediction	Error
2012M7	14.1230	14.1496	-.026599
2012M8	14.1303	14.1715	-.041224
2012M9	14.1156	14.1891	-.073491
2012M10	14.1939	14.2065	-.012584
2012M11	14.1662	14.2249	-.058771
2012M12	14.3041	14.2427	.061419
2013M1	14.1939	14.2559	-.061963
2013M2	14.1802	14.2695	-.089309
2013M3	14.2276	14.2824	-.054775
2013M4	14.2008	14.2970	-.096253
2013M5	14.1939	14.3137	-.11975
2013M6	14.1732	14.3327	-.15947

Summary Statistics for Residuals and Forecast Errors

	Estimation Period 2000M3 to 2012M6	Forecast Period 2012M7 to 2013M6
Mean	-.6090E-9	-.061064
Mean Absolute	.034595	.071301
Mean Sum Squares	.0023500	.0065871
Root Mean Sum Squares	.048477	.081161

Dynamic forecasts for the level of LCIC - 12 month forecast

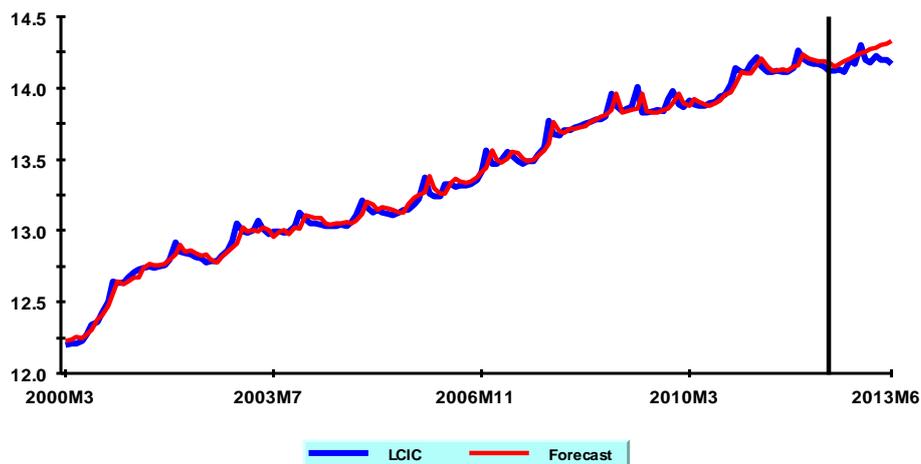


Fig 7: Nigeria - 12 month forecast of Currency in circulation

5.3 Comparison of Forecast Performance of the ARIMA Model and the Structural Demand for Currency Model

Results of forecasts obtained using the two techniques - ARIMA and structural demand for currency models - will now be compared. The usual procedure is to compare key summary statistics of the different forecasts. The root mean squared error is perhaps the most important of the criteria normally used to evaluate forecasts from alternative models. The other principal criteria are the mean error, the mean absolute error and the mean squared error. These criteria are used because they give a good and reliable measure of how much the predicted series varies (deviates) from the original series. These criteria and performances are shown for the different models in Table 7.

Table 7: Comparison of Forecast Performance

<u>Criterion</u>	ARIMA (0,1,1)	ARIMA (1,1,0)	ARIMA (1,1,1)	ECM, Demand for currency
Mean error	-0.03073	-0.03079	-0.03095	-0.6106
Mean absolute error	0.03292	0.03297	0.03331	0.0713
Mean squared error	0.001665	0.0016668	0.001671	0.006587
Root mean sq error	0.65349	0.65456	0.6565	0.8116

An examination of the contents of Table 7 shows clearly that the ARIMA forecasts dominate the structural demand for currency forecast. The result corroborates the findings of Cassino et al (1997) for New Zealand where the ARIMA model produced better forecasts than the demand for currency model. Overall, the best performing model for forecasting currency in circulation in Nigeria is the ARIMA (0,1,1) model, that is, the integrated moving average model of order 1.

VI. Summary and Recommendations

This paper, has sought to determine a good model for forecasting currency in circulation in Nigeria. It has relied on monthly data (obtained from the Central Bank of Nigeria) covering the period from June 1995 through October 2013. Forecasts for currency in circulation are obtained 12 months ahead using both the Box-Jenkins inspired technique of auto-regressive integrated moving average modeling and a structural econometric model of demand for currency. The best 12-month forecast for CIC is found to be the one obtained using an integrated moving average model of order one. It may be concluded therefore that, for the time being, the most suitable model for forecasting one year currency requirements for the Nigerian economy is the moving average equation of order 1. This technique is therefore recommended for adoption and use by the Central Bank of Nigeria. Even so, this finding is tentative considering

the limitations of data used, including unaccounted for possible parameter shift in data spanning 1995 through 2013, and limitations of forecasting techniques used. However, these limitations are not such as to nullify the judgment reached as to the suitability of the moving average model of order one, given the robustness of the goodness of fit statistics.

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APPENDIX

Autoregressive Distributed Lag Estimates

ARDL(2,0,2,0,2) selected based on R-BAR Squared Criterion

Dependent variable is LCIC

160 observations used for estimation from 2000M3 to 2013M6

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
LCIC(-1)	.74035	.080478	9.1994[.000]
LCIC(-2)	.16218	.081763	1.9835[.049]
LNPYD	-.012801	.019825	-.64567[.519]
LINFL	-.32344	.26569	-1.2173[.225]
LINFL(-1)	-.19187	.38586	-.49726[.620]
LINFL(-2)	.65413	.26054	2.5107[.013]
LPINTR	-.018272	.060811	-.30047[.764]
LEXRT	.34894	.28674	1.2169[.226]
LEXRT(-1)	-.78827	.45857	-1.7190[.088]
LEXRT(-2)	.34753	.28244	1.2304[.220]
INPT	1.3689	.41906	3.2667[.001]

R-Squared	.99236;	R-Bar-Squared	.99185
S.E. of Regression	.050731;	F-Stat. F(10,149)	1935.7[.000]
Mean of Dependent Variable	13.4200;	S.D. of Dependent Variable	.56189
Residual Sum of Squares	.38347;	Equation Log-likelihood	255.6632
Akaike Info. Criterion	244.6632;	Schwarz Bayesian Criterion	227.7497
DW-statistic	2.0978		

Error Correction Representation for the Selected ARDL Model

ARDL(2,0,2,0,2) selected based on R-BAR Squared Criterion

Dependent variable is dLCIC

160 observations used for estimation from 2000M3 to 2013M6

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
dLCIC1	-.16218	.081763	-1.9835[.049]
dLNPYD	-.012801	.019825	-.64567[.519]
dLINFL	-.32344	.26569	-1.2173[.225]
dLINFL1	-.65413	.26054	-2.5107[.013]
dLPINTR	-.018272	.060811	-.30047[.764]
dLEXRT	.34894	.28674	1.2169[.226]
dLEXRT1	-.34753	.28244	-1.2304[.220]
ecm(-1)	-.097474	.042576	-2.2894[.023]

R-Squared .16300; R-Bar-Squared .10683
 S.E. of Regression .050731; F-Stat. F(8,151) 3.6271[.001]
 Mean of Dependent Variable .012485; S.D. of Dependent Variable .053679
 Residual Sum of Squares .38347; Equation Log-likelihood 255.6632
 Akaike Info. Criterion 244.6632; Schwarz Bayesian Criterion 227.7497
 DW-statistic 2.0978

BUDGET DEFICIT AND TRADE BALANCE IN SUB-SAHARAN AFRICA

By Adegoke IbrahimADELEKE and Eme A. DADA*

Abstract

In spite of natural resource endowment and recent growth performance, many countries in sub Saharan Africa still face substantial internal and external constraints. The internal constraint can be adequately captured by the fiscal balance, while the external constraint, by the trade balance. Historical data have shown that both variables have been trending together in the deficit region. This presupposes the presence of the "twin deficits" in sub Saharan Africa. This study attempts to provide an empirical relationship between the budget balance and trade balance in sub Saharan Africa using data from 1970 to 2012. In achieving its goal, the study adopted the Keynesian twin deficits as a theoretical framework. According to the theory, an increase in the budget deficit will lead to deterioration on the trade balance. Based on this framework; the relationship was estimated using a panel regression analysis. Relying on the Hausman Test, the fixed effect estimation is preferred over the random effect estimation. The fixed effect result shows a positive relationship which confirms the presence of the twin deficits in sub Saharan Africa. The Granger Causality test performed shows a unidirectional causality running from the trade balance to the fiscal balance with no feedback from fiscal balance to trade balance. This implies that developments in the external sector are reflected on the internal balance in sub Saharan Africa. The study recommends that policy-makers in sub Saharan Africa, in an attempt to improve the fiscal balance, must focus on improving the trade balance by diversifying the export base and improving the competitiveness of the regions exports.

JEL Classification: F4 and H6**Keywords:** Budget Deficits, Trade Balance, Panel Regression, Sub Saharan Africa**1.0. Introduction**

In spite of recent impressive growth performance and potentials for further growth, many countries in Sub Saharan Africa (SSA) still face challenges; among which are maintaining favourable internal and external balances. Going by historical data, the fiscal and trade balances as percentages of GDP had generally been in the negative in SSA as a whole (-2.53 and -7.19 on average respectively), suggesting that there might be a link between both variables. In fact, the correlation coefficient between both variables is about 13% in SSA using, data from 1970-2012.

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The simultaneous occurrence of these events (fiscal and trade deficits) gave rise to a controversy on the causal link between the budget deficit and the trade deficit or the "twin deficits" hypothesis that neither theoretical nor empirical analysis had been able to resolve (Nickel and Vansteenkiste, 2008). In short, the controversy has reflected two main opposite views. One is based on the traditional Keynesian view that budget deficit has an important effect on the economy (Salvatore, 2006). The other is based on the Ricardian view that budget deficit has no effect at all on economic variables (Enders and Lee 1990).

Proper understanding of the relationship between the internal and external balance in SSA is required for two main reasons. First, the external balance is an indicator of the state of an economy; to the extent that if foreign investors perceive a country's current account as unsustainable, they are unlikely to hold the country's assets (Edward, 2002). Second, current account deficits lead to the accumulation of foreign debts, which has to be repaid at some point in the future (Osakwe and Verick, 2009). This imposes a substantial burden on the future generation. Therefore, a study that re-examines the interrelationship between budget deficit and trade deficit in SSA will not only adequately explain the perceived financial constraint facing the region, but also provides a better understanding of the nature of current account deficit in SSA and possible measures to reverse it.

Despite the obvious importance of understanding the interrelationship between the fiscal balance and trade balance in SSA, the literature presents inconclusive arguments on the subject. The conflicting evidence provided in the literature on the empirical relationship between the budget deficit and trade balance calls for further enquiry. It should be noted that previous studies on the relationship between budget balance and trade balance in SSA had been country-specific (e.g. Egwaikhide (1997) on Nigeria and Korsu (2007) on Sierra Leone). Given the fact that most countries in SSA are now engaging in various forms of economic cooperation and integration and sometimes agree on a common exchange rate, (e.g. the West African Monetary Zone, Southern African Development Community, etc), a study that analyses the impact of the fiscal balance on the trade balance in SSA as a whole is required.

Against this background, it is pertinent to establish a statistical relationship between the budget balance and trade balance in SSA countries given the fact that both variables tend to move together based on historical data. Also, as reversed causality is possible, it is also important to test for the direction of causality, given the nature of countries in SSA where most of the source of

financing government expenditure is through exporting of primary commodities and trade in general. Then, the possibility of trade deficit driving budget deficit cannot be ruled out. Accordingly, the following research questions are evident: Does fiscal balance have an impact on trade balance in SSA? What is the nature of the relationship between fiscal balance and trade balance in SSA? Is it fiscal balance that Granger causes trade balance or vice versa? These, among other research questions are the major thrusts of this paper.

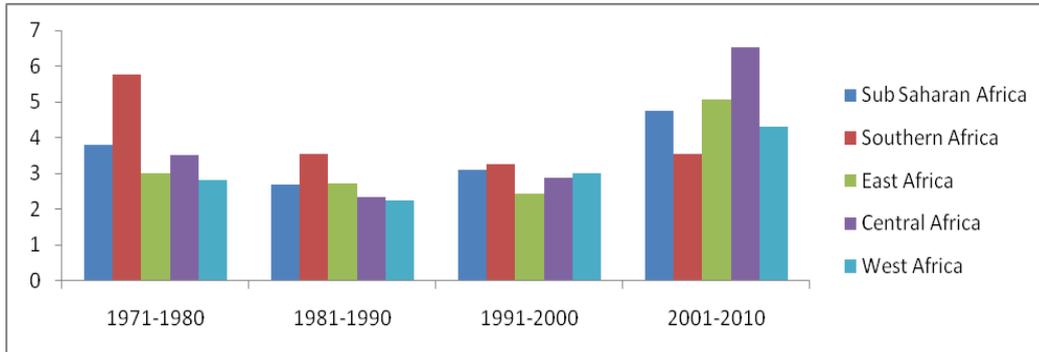
In that regard, the broad objective of this study is to determine the interrelationship between fiscal balance and trade balance in SSA. Specifically, the study is concerned with determining the direction of causality between budget deficit and trade balance in SSA. It takes into account the structural differences of the various countries and their similarities in terms of dependence on export of primary products as major sources of foreign exchange earnings. These issues are examined over the period 1970 to 2012.

To achieve the objectives, the rest of the paper is presented in five sections. The second section discusses background issues, including the dynamics of the current account and budget deficits, as well as trend analysis of selected macroeconomic variables. Section 3 reviews theoretical, methodological and empirical literature that pertains to the subject. The fourth section presents the theoretical framework and methodology. Section 5 presents the empirical results and discussions. Finally, Section 6 provides a conclusion of the study and policy recommendation.

2.0. Stylized Facts on Fiscal and Trade Balance in SSA

Proper understanding and assessment of recent developments in the internal and external balance of SSA requires recognition of the economic performance of the region from 1970 to 2010. An observation of the GDP is important because it helps in explaining the relationship between the budget deficit and the trade balance¹. Going by historical data, SSA has recorded consistent positive GDP growth as shown in Figure 1 below:

¹ This relationship is explained by the Absorption Approach to the Balance of Payments

Fig. 1: Trend in GDP Growth in SSA and Across Regions from 1970-2010

Source: UNCTADstat Online database

From the figure above, there is evidence that SSA as a whole recorded consistent growth in GDP, except for the period 1981-1990 when GDP growth declined by 2.9% across the region. This decline is consistent with several macroeconomic shocks that the region experienced within this period. In the early eighties there was massive outflow of foreign capital, especially in the southern part of the region. This period also marked the introduction of the World Bank/IMF Structural Adjustment Programme in many countries in the region (Nigeria, Botswana, Namibia, etc). The worst hit region, as a result of all these shocks was Southern Africa (for a list of countries that make up each of these blocks, see Appendix 1) with a decline of 3.8% in GDP growth.

In the period that followed (1991-2000), SSA as a whole recorded GDP growth of 1.6%. The growth was made possible by positive conditions in the Western and Central Africa sub regions, where the GDP growth rate was 3.5% and 2.3% respectively. It should be noted that the main driver of growth was increases in value of natural resource exports. However, the Southern and Eastern parts recorded decline in GDP growth of -0.8% and -1.0%, respectively. The negative performance of Southern Africa can be explained by observing that the region was still recovering from the massive withdrawal of foreign capital in the previous period. Also, the negative growth in the East reflected the increase in commodity prices in the world market. Given the vulnerable nature of countries in the eastern sub region, developments in the international arena are easily transmitted to their economies (African Economic Outlook, 2008).

Despite developments in the international community (the 9/11 attack on the U.S, the Asian financial crises, the subprime financial crisis, etc), SSA still managed to post a positive growth rate of 5.3% in the following period (2001-2010). Again, the growth drivers remained Western and Central Africa. The

phenomenal growth performance recorded within this period, irrespective of the financial turmoil that rocked the world in the second half of last decade confirms that SSA, excluding South Africa, is not well integrated financially with the rest of the world.

Current account deficits have been a constant feature of many SSA countries as indicated in Table 1. From the table, the average current account balance had mostly remained negative for a large number of these countries for the period 1970-2012. The overall average, as a percentage of GDP, was -7.19% for SSA as a whole.

Table 1: Averages of Current Account Components as Percentages of GDP in Sub-Saharan Africa from 1970-2012

	Current Account (% of GDP)	Trade Balance (% of GDP)	Trade in Services (% of GDP)	Net Income (% of GDP)	Net Transfer (% of GDP)
Sub Saharan Africa	-7.19	-7.35	-0.44	-1.14	4.00
Countries					
Angola	-0.76	22.04	-10.72	-6.58	0.58
Benin	-6.48	-14.30	-1.71	-0.53	2.89
Botswana	3.01	1.56	92.12	-4.02	0.48
Burkina Faso	-4.80	-13.00	-2.14	-0.17	4.64
Burundi	-5.94	-8.87	-4.77	-0.83	4.91
Cameroon	-3.44	-0.64	-2.73	-2.62	0.43
Cape Verde	-8.04	-46.70	4.08	-1.14	19.33
Central African Republic	-4.22	-1.01	-2.58	-0.38	2.73
Chad	-1.98	-6.00	-1.72	-0.09	2.14
Comoros	-7.53	-15.30	-0.22	0.00	0.32
Congo, Rep.	-10.66	21.46	-13.16	-9.39	0.09
Cote d'Ivoire	-4.87	8.88	-5.61	-4.41	-2.27
Equatorial Guinea	-31.09	15.93	-0.54	-0.14	0.24
Eritrea	-1.53	-24.53	1.29	0.05	16.85
Ethiopia	-2.86	-9.76	-0.55	-0.22	7.16
Gabon	3.56	25.48	-6.04	-4.56	-0.99
Gambia, The	-4.03	-19.33	1.43	-1.79	6.66
Ghana	-4.43	-5.04	-1.52	-0.87	4.81

Guinea	-6.31	0.72	-5.69	-2.83	2.18
Guinea-Bissau	-20.91	-8.18	-1.87	-1.71	1.34
Kenya	-5.80	-9.32	2.82	-1.24	4.75
Lesotho	-2.84	-96.23	-2.40	32.00	24.09
Liberia	-15.67	19.22	-13.27	-6.39	13.86
Madagascar	-6.66	-5.76	-2.71	-1.99	2.21
Malawi	-10.91	-9.24	-4.80	-2.29	3.03
Mali	-8.65	-10.95	-5.67	-1.79	4.28
Mauritania	-11.75	0.33	-4.95	-2.04	3.97
Mauritius	-3.60	-11.99	3.52	-0.11	1.51
Mozambique	-14.18	-14.22	-2.89	-3.81	6.64
Namibia	3.82	-4.25	-0.99	0.02	4.83
Niger	-7.64	-6.16	-4.48	-0.75	2.26
Nigeria	3.68	10.52	-3.53	-3.27	2.97
Rwanda	-3.21	-9.91	-4.89	-0.56	9.51
Sao Tome and Principe	-40.55	-0.79	-3.43	-0.57	1.99
Senegal	-7.45	-12.68	-0.96	-1.53	3.81
Seychelles	-10.89	-36.56	11.15	-2.28	1.32
Sierra Leone	-7.70	-7.56	-1.58	-1.42	2.54
Somalia	-15.97	-16.02	---	---	---
South Africa	-1.25	1.80	-0.42	-1.69	-0.30
Sudan	-4.24	-5.65	-1.78	-1.76	1.30
Swaziland	-3.13	-8.13	-3.84	1.99	4.70
Tanzania	-8.85	-10.66	-0.44	-0.94	3.52
Togo	-7.59	-13.63	-3.35	-1.39	-4.21
Uganda	-3.92	-7.33	-3.35	-1.22	6.07
Zambia	-9.92	6.01	-3.20	-4.60	0.33
Zimbabwe	-2.44	-2.13	-1.70	-1.25	0.46

Sources of data: International Financial Statistics (IFS) CD ROM, 2010 and United Nations Congress on Trade and Development (UNCTADStat) online database

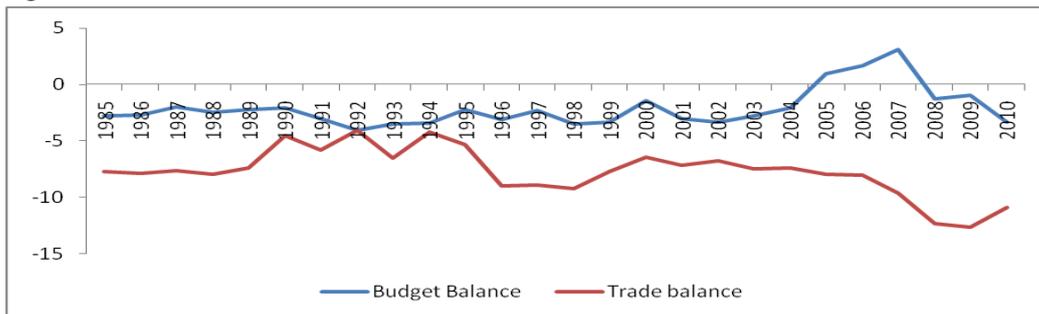
In terms of specific components, the trade balance has been the main driver of the current account. This is evident from the averages of the region as a whole. Also revealing from the table is the fact that most of these countries had been net consumers of foreign capitals as indicated in the overwhelmingly negative values of net income (debt servicing, dividend, etc) as a percentage of GDP. This confirms the huge debt profile of most countries in SSA.

For most of the countries on the table, the only component of the current account that has a positive value is net transfer as a percentage of GDP. The average value for all countries is 4.58%. This indicates that SSA countries had been net recipient of aid and remittances from abroad. All countries in the region, except for Botswana, Gabon, Namibia and Nigeria, had deficits in their current account. The deficit ranges from -0.76% in Angola to -40.6% in Sao Tome and Principe. Overall, twenty-four (24) countries in the region had maintained deficits above 5% of the GDP which is considered a sustainability threshold. The positive current account balances of Botswana, Gabon, Namibia and Nigeria over the past four decades reflect the impact of receipts from exports of natural resources on the current account balance.

2.1. Trade Balance and Fiscal Balance in SSA

Trade and fiscal deficits had been a common feature of SSA for most of the time covering 1985 to 2010 as reflected in Figure 2 below:

Fig .2: Trend in Fiscal Balance and Trade Balance in SSA from 1985-2010



Sources: World Economic Outlook online database and World Development Indicators online database

Figure 2 above suggests the presence of the twin deficits in SSA. The trade balance in most of SSA countries had been in deficit for most part the period covered. This suggests that SSA had not been taking advantage of favourable commodity prices in the world market. Also, considering the fact that about 80% of the region's trade relations is done with the Organisation for Economic Cooperation and Development (OECD) countries, development in these countries has implications on the trade balance of SSA countries. This is evident in the sharp decline of the trade balance starting from 2001 to 2009. Events in OECD countries (September 11 attack on the United States, the Dot.com bubble, the subprime financial crises, etc) significantly affected demand for SSA's export.

Another possible reason for the poor trade performance of SSA can be explained if we consider that most countries in the region rely primarily on commodity export (cotton, coffee, crude oil, etc), whose prices are subject to fluctuations in the international goods market, as a major source of foreign exchange earnings. The failure of SSA to diversify its export base has meant that the region has not been able to take advantage of trade initiatives such as the "all but arms" trade arrangement with the OECD, the European Partnership Agreements (EPAs) and the Africa Growth and Opportunity Act (AGOA)².

Majority of countries in SSA had implemented several price reforms aimed at improving price competitiveness through currency devaluation and demand management policies. However, these strategies have not yielded the expected outcome; possibly because, price competitions explains only a small fraction of the changes in the region's market share.

Also, evident from Figure 2 is that fiscal balance in SSA was in deficit until 2003 when it started to improve and reached its peak in 2007. This may be as a result of positive contributions of increasing oil and commodities prices on the fiscal positions of most countries in SSA. In addition, debt relief programs such as the Heavily Indebted Poor Countries (HIPC) Initiative and Official Development Assistance (ODA) greatly reduced the fiscal burden of the region.

3.0. Literature Review

A considerable level of understanding of the issues surrounding the relationship between budget deficit and the trade balance requires a review of previous studies that had been undertaking on it. There are generally three macroeconomic theories that have been adopted in deriving the relationship between budget deficit and current account balance. They are: the Keynesian national income identity, the Mundell-Fleming model and variants of the intertemporal model.

Studies that have adopted the Keynesian model started with the basic assumption that the current account balance is the difference between national savings and national investment. This relationship is derived from the basic national income accounting identity:

$$Y = C + I + G + NX \quad (1)$$

² See African Economic Outlook CD ROM.

From the equation above, Y represents national or total income of the economy, C is domestic consumption, I is investment, G , government expenditure and NX net export, $(X-M)$.

From the identity above, it can be shown that

$$NX = (S - I) + (T - G) \quad (2)$$

Equation (2) reveals an important identity in open-economy macroeconomics; that the current account is the sum of net private savings and net public savings. It also shows that any reduction in net public savings (budget deficit) holding net private savings constant will reduce the current account balance (current account deficit).

From equation two, the implication of the Ricardian theorem can be seen. If private savings (S) increase to offset the decline in net public savings, the trade balance might not be affected. One key feature of the equivalence theorem is that economic agents behave rationally; that is they are able to anticipate future increase in tax obligation perfectly well. Some studies that have adopted this framework include: Holmes (2011), Palhavani and Saleh (2009), Nickel and Vansteenkiste (2008), Marinheiro (2007), Zakaria and Ahmed (2007), Bartolini and Lahiri (2006), Corseti and Muller (2006), Hashemzadeh and Wilson (2006), Onofowora and Owoye (2006), Papadogonas and Stournaras (2006), Salvatore (2006), Alkswani (2001), Egwaikhide (1997) and Bernheim (1987).

The Keynesian model, though useful in explaining the direct link from budget deficit to trade deficit, does not capture the influence of mediating variables like interest rate and exchange rate. The Mundell and Fleming model captures these effects. Under a flexible exchange rate regime, a fiscal expansion will lead to a rise in both domestic interest rate and domestic output. Depending on the sensitivity of domestic investment to interest rates, domestic investment may actually fall. Portfolio investors will find increase in interest rate as an incentive to invest in domestic assets; resulting in an increase in demand for domestic currency which eventually results in exchange rate appreciation. The appreciation of the domestic currency, coupled with the increase in income, will tend to increase demand for import and reduce export. The overall effect is a deterioration of the trade balance.

Pervious works that had estimated the relationship between the twin deficits using the Mundell-Fleming model had proceeded with an estimation of a system of equations that shows the link running from a budget deficit to the interest rate; from the interest rate to the exchange rates and finally from the exchange

rate to the trade balance. Studies that have adopted this framework include: Kalou and Paleologou (2012), Endegnenew (2012), Kim and Roubini (2007), Chen (2006), Baharumshah et al (2006), Salvatore (2006), Basu and Datta (2005), Anoruo and Ramchander (1998) and Vinals (1986).

One drawback of both the Keynesian and Mundell-Fleming approaches is that they are both static models. They implicitly assume that a contemporaneous decrease in the fiscal balance will automatically deteriorate the external balance. They do not factor in the forward-looking behavior of economic agents. Theoretical models based on intertemporal optimization have incorporated the behavior of rational economic agents in the analysis of the twin deficits. A budget deficit that is financed through the sale of bonds or a reduction in taxes might be viewed by economic agents as increasing their future tax liabilities. In view of this, they would tend to save more and smooth the path of future consumption. This increased saving will tend to neutralize the effect of budget deficit on the economy. Variants of the intertemporal models are Blanchard's overlapping generation model and infinite horizon model. Studies that have adopted this framework include Chihi and Normandin (2012), Bussiere, *et al* (2010), Adam and Bevan (2004), Piersanti (2000), Enders and Lee (1990) and Cuddington and Vinals (1998).

Empirical results on the twin deficits had shown mixed results. These results can be divided into three broad categories: those that found a relationship between both trade balance and fiscal balance, those that confirm the Ricardian theorem and those that established reversed causation between both deficits.

Chihi and Normandin (2012) test for the comovement between the external and internal balance induced by shocks related to conditions in both sectors of the economy. The internal conditions are domestic resources and fiscal policy, while the exchange rate and the interest rate capture the external conditions. The study covered twenty-four developing countries (12 countries in Africa, 7 countries in the Americas, 4 countries in Asia and 1 from Oceania). The restricted VAR results reveal that the covariance between the two balances is positive for virtually all countries sampled. Also, that the covariance is induced by shocks which are mainly related to the internal conditions (domestic resources and fiscal policy) and to a much lesser extent to the external conditions (interest rate, exchange rate and terms of trade).

Holmes (2011) using a threshold cointegration analysis attempts a study of the short-run and long run behavior of the twin deficits in the United States. According to the author, there is a possibility that there exists some short-run

effects and regime change behind any long-run and short-run dynamics involving the budget deficit and current account deficit. In deriving his result, he used quarterly data covering 1947 to 2009. The test results show that there is a threshold cointegration between the budget deficit and current account deficit. The positive slope coefficient provides support for the Keynesian viewpoint of a twin deficit relationship. With regard to the short-run dynamics, the estimated threshold vector autoregressive result shows the speed of adjustment to long-run value to be -0.17.

Pahlavani and Saleh (2009) investigate the existence of the twin deficits in the Philippines using data from the country for the period 1970-2005 to test the relationship. The empirical results gives further support to the Keynesian view that a strong link exists between budget deficit and current account deficits in the Philippines. Using a modified Wald test for causality, proposed by Toda and Yomamoto, the researchers show that a bi-causal relationship exists between the budget deficit and the current account deficits in the Philippines.

Kim and Roubini (2008), in a classic paper that studies the trend in the government budget deficit and current account deficit in the US economy, identify the endogenous nature of these deficits. They are of the view that budget balance, for instance, might improve in response to a positive output shock and that the current account balance might also improve given a positive output shock. Therefore, linking the movement of current account to movements in budget balance might be misleading; the role of output shock will have to be considered. The test results show that in response to a positive government budget deficit shock, output and the real interest rate increase. However, the impact of a positive government budget deficit shock on the current account and the real exchange rate contradicts economic theory. The current account improves for about a year and the real exchange rate depreciates persistently. The researchers concluded that for the US economy, the twin deficit hypothesis is not valid within the sampled period rather we have a situation of "twin divergence".

Marinheiro (2008) using data from the Egyptian economy tests for the presence of the Ricardian Equivalence in the Egyptian economy. In testing for the impact of the budget balance on the current account, the author found a long-run relationship between both variables. Not satisfied with the result, the researcher attempted to test for the direction of causality using the vector error correction model (VECM). The result showed unidirectional causality running from the current account to the budget balance. One reason for this reverse causation put forward by the author is the over dependence of the Egyptian economy on

export revenue. Hence, the deterioration in the external balance is accompanied by a decrease in government revenues and consequently to a deterioration in the budget balance.

Giancarlo, *et al* (2007) examines the relationship between budget deficits and current account deficits in four industrialized economies (Australia, Canada, United States and United Kingdom). As an improvement over previous studies, the study incorporates the effects of degree of openness and the persistence of fiscal shocks in strengthening or weakening the twin deficits link. The authors started with a baseline assumption that the extent to which a fiscal expansion reduces trade balance depends on the degree of openness of the economy and the persistence of fiscal shocks. The empirical result showed that in the US and Australia, which are relatively less open, than Canada and UK, and where government spending shocks are less persistent, the current account impact of fiscal policy is rather small. Instead, domestic private investment responds substantially. The reverse is true for Canada and UK. The study concludes that the impact of budget cuts on US external balance is going to be muted by their positive effects on domestic investment. And that capital accumulation will enhance US ability to generate the resources required to service the country's external liabilities in the future.

Korsu (2007) investigates the effects of fiscal deficits on the external sector of Sierra Leone utilizing aggregate data from 1971 to 2005. Equations for money supply, price level, real exchange rate and the overall balance of payments were estimated using Three Stage Least Square (3SLS). Counterfactual policy simulation is performed and the results show that fiscal restraints improve the external sector of Sierra Leone by reducing the money supply and the price level. The results also point to the need for a sustained reduction in the budget deficit of Sierra Leone as this helps in achieving monetary restraints and low price level, which leads to real exchange rate depreciation and improvement in the external balance as the ultimate goal.

Onafowora and Owoye (2006) study the relationship between the budget deficits and the current account in Nigeria, an oil dependent sub Saharan African country, using cointegration and vector autoregressive analysis. The results show a positive relationship between the budget deficit and the current account balance in both the short-run and the long-run supporting the conventional Keynesian twin deficits. Using the standard Granger causality test, the researchers submitted that contrary to the conventional proposition that the budget deficit causes trade deficit, the results showed a reverse causation running from the current account to the budget deficit. According to the

authors, this should not come as surprise because Nigeria depends heavily on revenue from the export of crude oil.

Egwaikhide (1997) examines the effect of budget deficits on the current account position of Nigeria for the period covering 1973 to 1993. Using a counterfactual simulation exercise, he shows that budget deficits beyond 3% of GDP significantly deteriorate the current account balance of Nigeria regardless of whether the deficit is financed by bank credit or external borrowing. The first simulation exercise assumes a scenario in which the government maintains a 3% budget-to- GDP ratio between 1980 and 1993. The simulation result shows that financing the magnitude of such a deficit through central bank credits would generate fewer movements in the general price level since there is reduced expansion of the monetary base when compared to actual situation. Under this same experiment, it is shown that real output expanded, suggesting that a 3% deficit-to-GDP ratio that is financed by central bank credit tends to stimulate a moderate inflationary growth. From the experiment, it is suggested that an austere budgetary management would have improved the current account balance and reverse the rapid movement in the price level. The financing of the 3% deficit as a proportion of GDP from external borrowing represents the second simulation performed by the author. The results of this exercise show the price level would fall, real output increase, and there would be an improvement in the trade balance, but this improvement would not be as much as that generated from bank credit. All this shows that a rising government deficit above 3% of the GDP causes deterioration in the current account position during the reference period.

On the whole, the literature is replete with studies that attempt to establish the relationship between the budget deficits and the trade balance. Some studies have actually confirmed a causal relationship between fiscal deficit and trade deficit, while others have rejected the hypothesis that budget deficit causes trade balance (Giancarlo, *et al*, 2007). There are some other studies that confirmed that there exists a correlation between the deficits, but the direction of causality is reversed (Onafowora and Owoye, 2006). However, much of these studies focused on the economies of advanced countries, where there are little structural imbalances and distortions in the economy and the product and factor markets are well functioning. Moreover, little or no attempt has been made to test this relationship in SSA as a whole (Anoruo and Ramchander, 1998). Few studies that had actually focused on the region had been country-specific. In addition, previous studies on the interrelationship between the internal and external sectors of an economy had captured the external sector using the overall current account balance. In contrast, this study uses trade

balance to capture developments in the external sector of SSA. This idea is motivated by the fact that the trade balance is a major component of the current account balances of SSA countries. It therefore forms an important innovation of the research.

4.0. Theoretical Framework and Methodology

The theoretical foundation for this study is based on the Keynesian national income accounting framework. This theoretical framework is preferred to others because of its simplicity. In order to examine the theoretical underpinning between fiscal balance and the trade balance of the balance of payment of an open economy, we begin with the national income identity.

$$Y = C + I + G - T + (X - M) \quad (1)$$

Where y is defined as aggregate income, c is consumption expenditure, i , investment expenditure, g represents total government expenditure, t is government revenue generated from taxation and x and m stand for export of goods and import of goods respectively.

Substituting s for $Y - C$, we obtain

$$S = I + G - T + (X - M) \quad (2)$$

If we make $(M - X)$ stand alone, (2) becomes:

$$(M - X) = (I - S) + (G - T) \quad (3)$$

$$TD = NI + BD \quad (4)$$

Expression (4) states that the trade deficit (TD) is the sum of net domestic investment (NI) and government fiscal deficit (BD). From the expression, the twin deficit theory is easily explained. An increase in budget deficit, holding net investment constant is reflected one-to-one on the trade deficit.

Also, the implication of the Ricardian theory is seen. If budget deficit increases and economic agents expect a rise in future tax liabilities, they will tend to increase their savings and reduce net investment. This decrease in net investment will tend to offset the initial increase in budget deficit; thereby leaving the trade balance constant.

From the implications of the derivations from the previous section and in recognition of the fact that the trade balance responds to other variables like the terms of trade, degree of openness, GDP growth rate and growth in foreign GDP, the model for this study can be specified as

$$TD_{it} = \beta_0 + \alpha_1 BD_{it} + \mu GR_{it} + \Omega TT_{it} + \Pi DE_{it} + \partial FY$$

Where TD and BD are as previously defined, GR , DE , TT and FY are growth rate of GDP, degree of openness, term of trade and growth in foreign GDP respectively.

The model specified in the previous section shall be estimated using a panel regression analysis. In doing this, we will proceed with the estimation of a fixed effects model that takes care of the problem that may arise from omitting important variables from the model. We then proceed to the estimation of the random effects model that takes into consideration individual heterogeneity effects. It has been argued that the random effect model serves as an improvement over the fixed effect model because unlike the fixed effect model, degrees of freedom are not lost. To choose between the fixed effects and random effect results, the Hausman Specification test will be performed.

The test result will not be complete without taking time to establish the direction of causality between the budget balance and trade balance. This is needed in recognition of the well-known fact that correlation does not imply causality. Here, we adopt the test statistics proposed by Granger (1976).

This study uses annual time series data covering 1970 to 2010 from various sources. These sources include: IMF International Financial Statistics (both online and Year Book), World Development Indicators, World Economic Outlook and the United Nations Congress on Trade and Development (UNCTAD) online database.

Data on the trade balance as a percentage of GDP (TB), degree of openness (DE), growth rate of GDP (GR) and the term of trade (TT) were gotten from UNCTAD online data base. Values for the budget balance (BB) were gotten from various sources. The sources for the data include: World Development Indicators, World Economic Outlook and the International Financial Statistics. Growth in foreign GDP (GF), defined as average GDP growth of OECD countries, was obtained from World Development Indicators. It should be noted

that where necessary, various degrees of computations were carried out in obtaining these data.

5.0. Analysis and Presentation of Results

The Granger causality test result presented in Table 2 below rejects the null hypothesis that trade balance (TB) does not Granger-cause budget balance (BB) at 5% level of significance. Also, the null hypothesis that budget balance does not Granger-cause trade balance is accepted which is evident from the very low value of the F-Statistics. This implies a unidirectional causality running from the trade balance to budget balance. This result is consistent with previous studies on resource-dependent countries: Onofowora and Owoye (2006), Alkswani (2001) and Anoruo and Ramchander (1998).

Table 2: Granger Causality Test Result

Null Hypothesis	F- Stat.	Prob.
TB does not Cause BB	3.28688**	0.0377
BB does not Cause TB	0.16454	0.8483

Note that ** implies significant at 5% level

This unidirectional causality from trade balance to budget balance should not come as a surprise because most countries in SSA depend, to a great extent, on exports of natural resources for their foreign exchange earnings and major source of revenue. Therefore, any shock from external demand for exports of these countries will definitely have a ripple effect on their internal

Table 3: Presentation of Panel Regression Results

Variables	Pooled Regression	Fixed Effect	Random Effect
C	10.1*** (5.29)	11.8*** (8.44)	12.5*** (4.85)
GR	0.36*** (4.49)	0.02 (0.55)/	0.02 (0.70)
TT	0.03*** (2.84)	0.03*** (4.26)	0.03*** (4.31)
DE	-0.71*** (-23.6)	-0.76*** (-26.5)	-0.76*** (-27.1)
BB	0.52*** (7.54)	0.26*** (6.95)	0.27*** (7.10)

FY	-0.07 (-0.25)	0.20 (1.39)	0.20 (1.36)
R-Squared adjusted	0.46	0.88	0.44
D.W Statistics	0.16	1.34	1.32
Hausman Test:	Chi Square=17.44***	p-value= 0.004	

Note that *** implies significant at 1% level

Table 3 above presents the panel regression results obtained from E views 7 statistical software package. The second column shows the coefficients of each of the independent variables in the pooled regression model. The positive value of the coefficient of budget balance (BB) confirms our Keynesian theoretical expectation at all levels of significance. This finding is consistent with Endegnanew, *et al* (2012), Kalou and Paleologu (2012), Chihi and Normadin (2012), Egwaikhide (1997), etc on the relationship between the fiscal balance and trade balance. The implication of the result is that a 100% percent increase in the budget balance will lead to a 52% improvement in the trade balance of SSA countries and vice versa.

Another striking feature of the pooled regression result presented above is that the negative coefficient of the growth rate of GDP conforms to the absorption theory. The negative coefficient of GDP growth (GR) implies that an increase in GDP (domestic absorption) worsens the trade balance in SSA. Also, the relationship is significant at all standard levels of significance (1%, 5% and 10%).

The coefficient of the degree of openness shows a negative sign and it is significant at all levels. This implies that as SSA countries open their economies to international trade, they become worse-off in terms of the trade balance. This result can be justified given the over-dependent nature of the region on sophisticated consumer and producer goods from developed countries.

The coefficients of the terms of trade (TT) and growth in foreign income (FY) both showed positive and negative signs respectively. However, the coefficient of FY is insignificant. This implies that increases in the terms of trade of SSA countries translate to an improvement in the trade balance. Also, growth in foreign economies will discourage demand for exports from SSA contributing to deterioration in the trade balance. However, the very low values of the adjusted R squared and Durbin Watson Statistics signals the presence of autocorrelation in the model and as such, the results from the pooled regression may be bias.

To overcome this problem, we proceed with the estimation of the fixed effects model. The fixed effects result is presented on the third column of Table 3 above. The result shows that the coefficient of the budget balance is positive and significant at all levels. The coefficient of 0.26 implies that a 100% increase in the budget deficit will deteriorate the trade balance by 26%. This result also confirms the Keynesian Twin deficits in SSA.

Generally, the results from the fixed effects estimation are similar to that of the pooled regression except for the coefficient of foreign growth (FY) which showed a positive and insignificant sign. The positive coefficient of the terms of trade (TT) implies that an increase in the value of SSA's export relative to its import will improve the trade balance. Also, the negative coefficient of the degree of openness implies that as SSA countries open their economies to trade, their external balance declines. The fourth column of Table 3 presents the result of the random effects estimation. The positive and significant coefficient of the budget balance (BB) also confirms the Keynesian twin deficits in SSA.

Result from the Hausman specification test that is performed to choose between the fixed effect and the random effect estimation models is also presented in Table 3. From the result, the null hypothesis of no significant difference between the fixed effects and random effects estimations is rejected at all levels of significance. The probability of getting a Chi square value that is at least equal to or greater than the Chi square statistic on the table is 0.004. This implies that the random component of the model has been adequately captured by the fixed effect estimation method. The conclusion from the test is that the random effect model is not appropriate and that we are better off with the fixed effects result.

6.0. Summary, Conclusion and Policy Implications

The large and persistent fiscal and trade balance in several economies of the world had generated so much debate on the possible comovement between both variables. These debates have divided theoretical and empirical economists on the subject into two different camps. On one side of the divide are those that are of the view that both variables move in the same direction; that is improvement in one of the variables will automatically lead to an improvement in the other. This view is supported by the Keynesian twin deficits hypothesis.

On the other side are those that do not see any possible relationship between both variables. This idea is motivated by the Ricardian equivalence theorem. The equivalence theorem states that in the face of a budget deficit, rational

economic agents will anticipate future increases in taxes. Hence, they will tend to save for the "rainy days" in order to cushion the effects of increased taxation in the future.

The present study was motivated by the desire to establish the relationship between both variables in SSA from 1970 to 2010, given the fact that most studies that had been carried out on the subject had focused more on developed countries and regions of the world. Also, going by the fact that these variables had trended in the same direction, going by historical data, a statistical enquiry was pertinent.

A panel regression analysis was used in estimating the statistical relationship between the trade balance and budget balance. Based on the Hausman test, the fixed effect model was chosen over the random effect model. The fixed effect result showed a positive and significant relationship between both variables; confirming the Keynesian twin deficits in SSA. A Granger causality test was carried out to establish the direction of causality. A unidirectional relationship, running from the trade balance to the budget balance was established.

The coefficient of the degree of openness showed a negative but significant sign. The negative sign of the coefficient of the degree of openness implies that as SSA countries open their economies to trade, they become worse-off in terms of the trade balance. Also, the coefficient of the terms of trade reported a positive and significant sign. Also, the result reveals a negative and significant coefficient of GDP growth rate.

Based on the results obtained from empirical analysis, the study concludes that there is a positive relationship between fiscal balance and trade balance in SSA from 1970 to 2010. This relationship, however, runs from the trade balance to the fiscal balance. This implies that developments in the external sector of SSA have implications on its internal balance. In order to improve the trade position of SSA, other important factors to consider are terms of trade and degree of openness.

From the empirical findings it has been identified that both fiscal balance and trade balance tend to move in the same direction. This relationship was found to be generated from the trade balance; implying that developments in the external sectors of SSA countries have implications on their fiscal balance. This should not be surprising considering the resource-dependent nature of countries in the sub region.

Consequently, efforts should be made by policy makers to improve the persistent deficit in the trade balance in order to boost the fiscal positions of SSA countries. This is important because a favourable fiscal balance will go a long way in reducing the tendencies of these countries to acquire debts originating from foreign countries or multilateral organizations. A declining debt will reduce the burden of debt servicing; thereby freeing funds for development purposes. Also, an improved fiscal balance will have long-term benefits on the current account and to future generations.

In the light of this, aggressive exports promotion strategies should be pursued. These could take several forms such as: focusing on the development of the region's comparative advantage sector (natural resources), provision of export subsidies to manufactures, reductions on export duties, etc.

In view of the fact that a contemporaneous budget deficit may not immediately have an impact on the trade balance, it might be interesting to include the lagged values of the budget balance and estimate their influence on the trade balance. This would have required estimating a dynamic panel model. However, the present study does not consider this possibility; rather, only the effect of current budget balance is considered.

Also, the present study does not consider the effect of mediating variables (interest rate, price level and exchange rate) in estimating the interrelationship between fiscal and trade balance. Proper understanding of the transmission mechanism between fiscal balance and trade balance in SSA require incorporating these important variables.

As noted earlier, there are broadly two approaches in the literature that had been adopted in deriving the relationship between the fiscal balance and the trade balance. They are the direct and indirect approaches. The direct approach, which is adopted in the present study, captures the relationship between both variables without considering the possible impacts of important mediating variables such as interest rate, price level and exchange rate.

The indirect approach, on the other hand, takes into consideration the importance of these mediating variables in establishing the link between fiscal balance and trade balance. This is so, because from the Mundell and Fleming framework, the relationship runs from a budget deficit to a rise in interest rate, the price level, an appreciation of the domestic currency and finally to a deterioration in the trade balance. It will be very interesting and important to see how these mediating variables influence the trade balance in SSA.

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GENDER EMPLOYMENT AND PRIVATE SECTOR DEVELOPMENT IN ECOWAS COUNTRIES.

By Douglasson G. Omotor and Hilda E. Olele*

Abstract

In terms of international comparisons of the growth benefits associated with the demographic dividend, ECOWAS countries stand out in the contemporary discussions. The region like others in the African continent has enjoyed a relatively sustained growth with per capita income rising steadily almost exceeding the global average. However, very worrisome are signs that this growth may not have resulted in sustainable inclusive development, creation of decent jobs (mostly for the young) and poverty reduction. Some obstacles which have been identified for the abysmal mismatch are low rates of female labour-force participation and entrepreneurship. Recent research suggests a connection between development of private enterprises as the main source of new jobs and female employment in poverty reduction. The paper on the one hand examined the empirical key determinants of female employment using longitudinal data of some ECOWAS countries and in another strand establishes how private sector development can drive the process of sustainable development and poverty reduction in the region. The paper also tested for the Boserup (1970) assertion on the gap consequences between male and female employment over time. One implication of the findings is that government policy among ECOWAS states must prioritize the creation of inclusive productive employment through a robust enabling environment for a well functioning and effective private sector.

JEL Classification: C120, J16, J710, J180, O170

Keywords: Gender, Employment, Women, Private sector development, Boserup hypothesis, ECOWAS

1. Introduction

In recent years, there has been a revival of interest in the discussions of population issues and economic growth (Brooks and Go, 2012; Bhattacharya and Innes, 2006; Page, 2012; Anyanwu and Augustine, 2013). The population issues centre on (un)employment, gender, productivity, poverty, entrepreneurship and demographic bulge (McMillan and Rodrik, 2011; Anyanwu, 2013; Vossenbergh, 2013; Contessi, de Nicola and Li, 2013). The age and sex structure of the population have also been thematic in the discussions. This is particularly so because the age and sex structure of the population in the

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short and long term determine the challenges and opportunities required to support it. The implications of population structure are also enormous particularly in assessing a country's economic potentials (Population and Economic Development, 2012). For instance, when there are more people concentrated in the working-age group (ages 15-64), relative to the rest of the population, it could result to a demographic bulge which offers a possibility of a growth dividend. The growth implications could come through channels such as a swell in the labour force, increased female labour-force participation combined with technology, knowledge transfer, and physical and human capital accumulation due to increased savings (Institute of Policy Studies of Sri Lanka, 2013). The demographic dividend could also present gloomy predicaments if economic growth is not accelerated and sustained to absorb millions of young people entering the labour markets.

In terms of international comparisons of the growth benefits associated with the demographic dividend, ECOWAS countries stand out in bold relief in contemporary discussions. The West African region has enjoyed on the average over ten years of sustained economic growth which has exceeded both the African continent and global averages. Guengant (2012:15), reckons that the West African sub-region's average annual economic growth rates for the period 1995-2009 though relatively high, were unbalanced:

- From 5% to 6% for Burkina Faso (5.8%), Mali (5.4%) and Ghana (5%);
- From 4% to 5% for Nigeria (4.8%), Benin (4.5%), Senegal and Mauritania (4%);
- From 3% to 4% for Niger (3.7%), Togo (3.5%) and Guinea (3.4%);
- And less than 3% for Côte d'Ivoire (2.1%) and Guinea-Bissau (1%).

However, very worrisome are signs that these growth (which can be adjudged encouraging in relation to a decade-plus prior to 1995) rates may not have resulted in sustainable inclusive development, creation of decent jobs (mostly for the young) and poverty reduction. Some obstacles which have been identified for the abysmal mismatch are the strong population growth in the sub-region (between 2% and 3.5% per year); low female labour-force participation rates and entrepreneurship. Guengant (2012:16) further reported that the increased population growth rates slowed the increase in per capita GDP during the same period. In Burkina Faso, Ghana, Mali and Nigeria, the average per capita GDP increase was between 2% and 3% per year. It was between 1% and less than 1% per year for some of the other ECOWAS countries. Furthermore, the average five-year rates of economic growth for the three periods 1995–1999, 2000–2004 and 2005–2009 indicate that the renewed growth since the

mid-1990s is irregular. For most of the ECOWAS countries that reported average growth exceeding 4% per year between 1995 and 2009, only Ghana had increases from one period to the next. Benin, Burkina Faso, Mali and Senegal experienced declines in growth rates between 1995–1999 and 2005–2009. These growth rates no doubt are entangled with conditions relating to engagement of female labour-force.

Conditions of women's engagement in the labour market; economic growth and poverty reduction particularly in developing economies have important aggregate consequences and in recent times these issues have as well drawn the attention of academics and the development sector including international public organisations, donor agencies, tiers of governments, non-governmental organisations (NGOs), research and knowledge institutions, private and business associations. These institutions at various levels and times have also initiated several cross-cutting programs and policies to advance the frontier of these issues. For instance, the Millennium Development Goal No. 1 provides an impetus to eradicate extreme poverty and hunger; while Goal No. 3 seeks to promote gender equality and empower women. To complement this goal, the entire 2012 World Development Report: **Gender, Equality and Development** (WDR; World Bank, 2011) devotes Chapter 5 particularly to the study of gender differences in employment by focusing on productivity and earnings. The ECOWAS countries, among others, expressed their commitment in 2000 to the achievements of the Millennium Development Goals (MDGs) and at national levels; they have also developed their national MDGs Reports (United Nations Statistics Division, 2008). Despite these laudable initiatives and commitments aimed at alleviating poverty through increased women productivity and entrepreneurship by improving private sector development in developing countries and particularly in the ECOWAS region, gender gap still exists; women still own and manage fewer businesses than men; and women participate less actively politically than men. The implication is that issues of gender gap should not be overlooked in research. This paper proposes as does existing literature that there is a connection between developments of private enterprises as the main source of new jobs, and poverty reduction through female employment and generally as the engine of growth. It may be argued that the prevailing imperative to reap the demographic dividend is to generate productive employment opportunities for the growing labour-force, by providing support for private sector led development.

The study of gender equality matters for development for several reasons. First, in its own right, it matters as part of the development process as a core objective. Development should not only mean less income poverty or better access to

justice, it should also reflect narrower gaps in well-being of men and women (Sen, 1999). Thus, gender equality matters intrinsically, because the ability to live the life of one's own choice and be spared from absolute deprivation is a basic human right. Second, as a matter of smart economics; gender equality matters instrumentally, because greater gender equality contributes to economic efficiency and the achievement of other key development outcomes (World Development Report, 2012).

The paper is structured as follows: in the next section, the gender gaps *vis-a-vis* characteristics of female employment in ECOWAS region is discussed. In section 3 a brief review is undertaken of literature on the key factors which affect female employment and some indicators of macroeconomic development and demographic factors on the one hand and private sector development on the other hand. Section 4 presents the model and data while the empirical results are reported in Section 5. Section 6 summarizes our conclusions and proffers some recommendations.

2. Gender Gaps and Female Employment Characteristics in ECOWAS.

In 1970 Ester Boserup published her book titled *Woman's role in economic development*. The pacesetter book presented the path to understanding the position of women in developing economies and the adverse impact world capitalism had on them. Boserup opines that first, economic growth in developing economies of capitalist economic system does not necessarily benefit women and men equally. Her empirical explanations drawn from Africa, Asia and Latin America support the conclusions that women are being left behind, as subsistence producers using 'primitive techniques' in the agricultural sector; low paid workers in non-farm and urban sectors and as unpaid workers in rural areas, contributing to farm productivity following the outmigration of men (Okali, 2011). Since these academic provoking conclusions, discussions of this observed women inequality have brought to the fore feminist economics and economic development issues of developing countries (Brummet, 2008; Hass, 2006; Cuberes and Teignier, 2011; Anyanwu, 2012, Anyanwu and Augustine, 2012; Contessi, de Nicola and Li, 2013; Vossenber, 2013). Emphasis has also shifted in the discussion of women inequality towards gender and development and gender mainstreaming which are broader in outlook.

The gender gaps or gender differentials are commonly defined as the difference between men and women which puts women at a disadvantage in: unemployment, employment, labour force participation, in vulnerability, and in sectoral and occupational segregation (Global Employment Trends for Women, 2013). In addition to the anecdotal evidence of gender bias, the paper presents

some summary figures which measure female discrimination and their characteristics in ECOWAS.

2.1 Characteristics of female employment

All over the world female employment ratio has been consistently lower than male employment ratio. The average employment ratio for female using a sample of fourteen (14) states in the ECOWAS sub-region within the period 1991-2010 was found to be almost the same for the entire SSA and higher than world average employment ratio.

Fig.1: Average employment to population ratio for ECOWAS, SSA and World economy

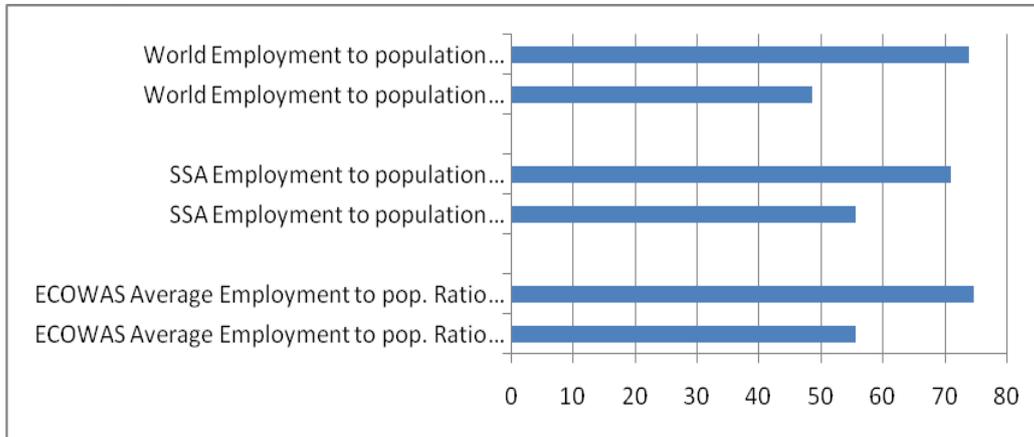


Fig. 1 presents the average employment ratio for both males and females in the ECOWAS, SSA and world economy. It shows that female employment has remained significantly lower than male. World average employment to population ratio stood at about 49% while the ECOWAS and SSA maintained about 56%. Male employment figures on the contrary lies above 70% for all economies. Fig.2 shows the ratio of female to male labor-force participation rate for ECOWAS, SSA and world economy. ECOWAS sub-region maintained an average of 77%, female to male labor-force participation rate in SSA recorded 81% and world economy figures stood at 69%.

The foregoing suggests that a huge disparity still exists in gender employment across the globe. However, considering the differentiated data on individual basis, it was observed that the gender gap in the ECOWAS sub-region appears to be closing up somehow though very slowly. Fig. 3 shows a narrowing in the gender gap in the ECOWAS sub-region. There is a noticeable marginal increase in female employment in the sub-region while male employment appears to be

declining. It is hoped that if this trend can be sustained, gender equality may ultimately be achieved in the ECOWAS sub-region. Fig. 4 and 5 suggest that a lot still remains to be done in order to reduce gender inequality in SSA and globally.

Fig. 2: Female to male labor participation rate

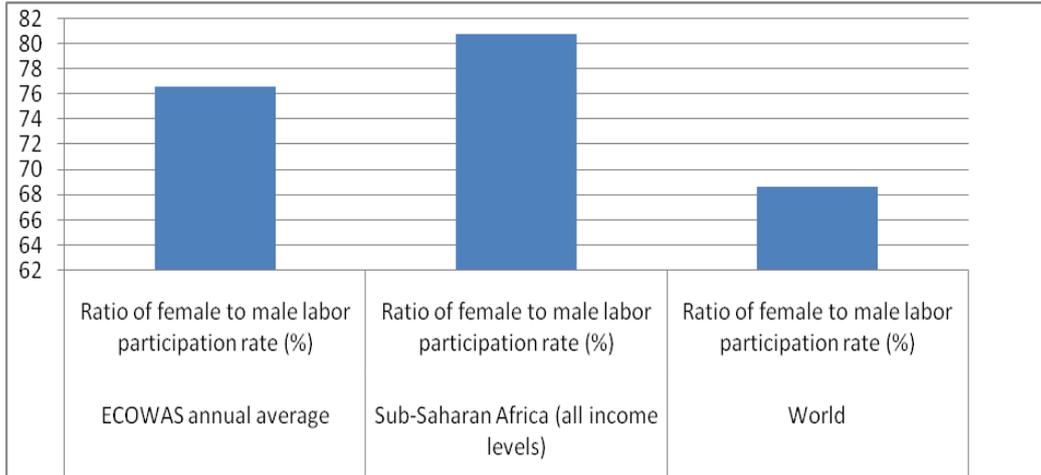


Fig. 3: Average employment to population ratio 15+ for male and female in the ECOWAS

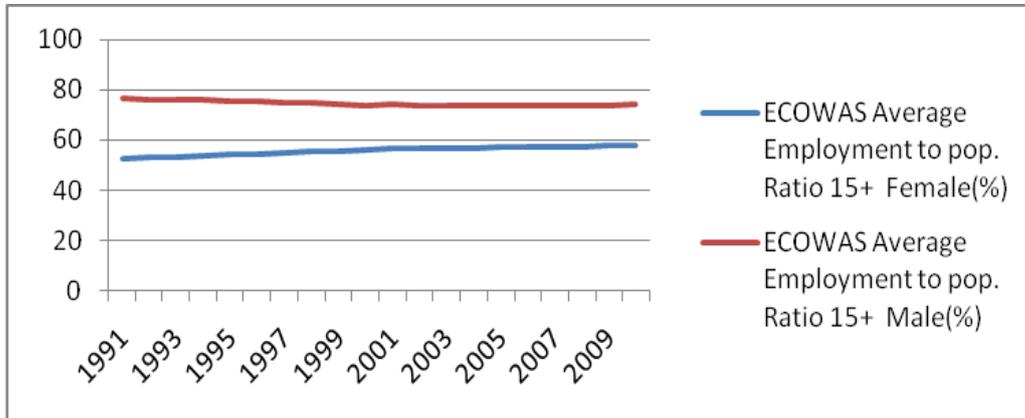


Fig.4: Average employment to population ratio 15+ for male and female in the SSA

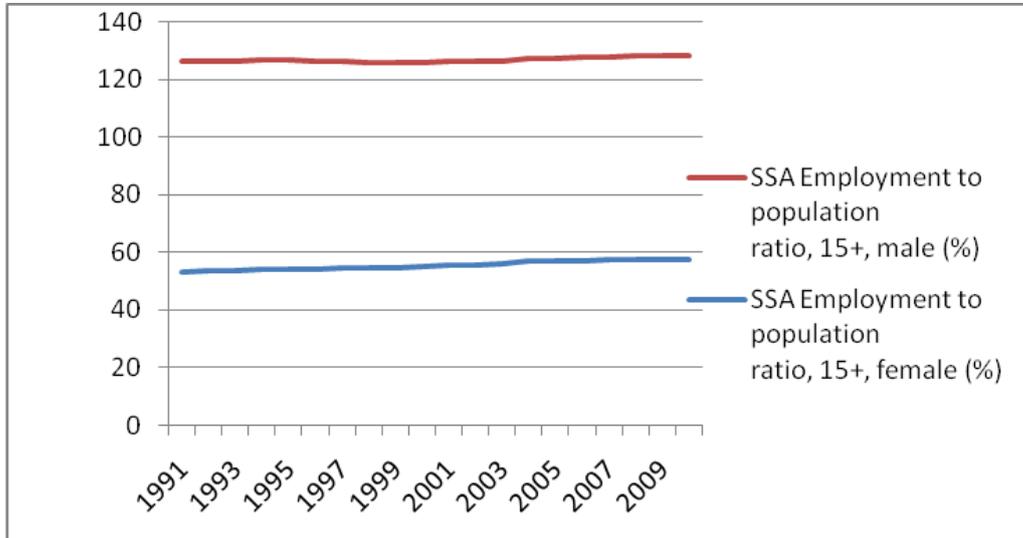
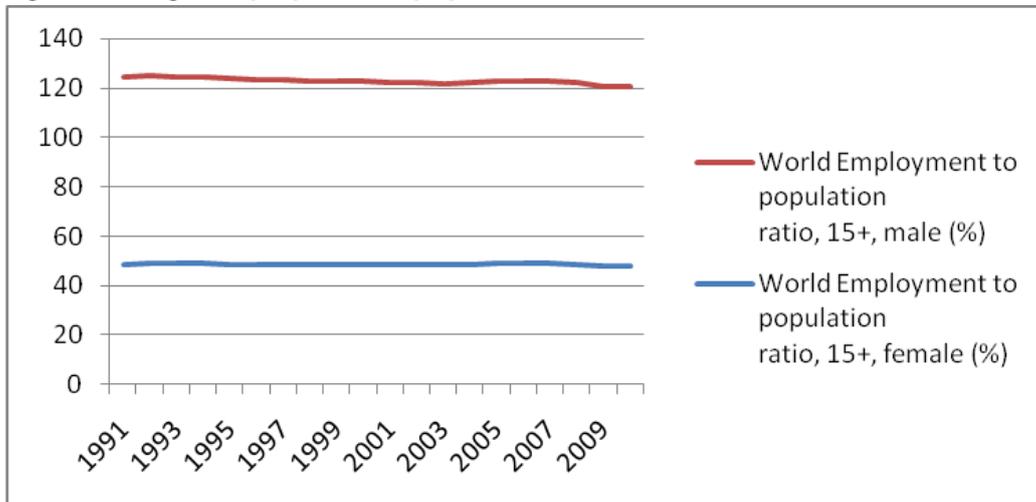


Fig. 5: Average employment to population ratio 15+ for male and female World



2.2 Ratio of female to male primary enrollment

The ratio of female to male primary enrollment in ECOWAS sub-region was barely 67% in 1990, rose to 78% in 2000 and to 88% in 2010. The region experienced a gradual increase in the ratio of female to male primary enrollment since 1997, meeting up with SSA ratio in 2005 and thereafter falling slightly below SSA ratio (Fig. 6 and 7).

Fig.6 : Ratio of female to male primary enrollment

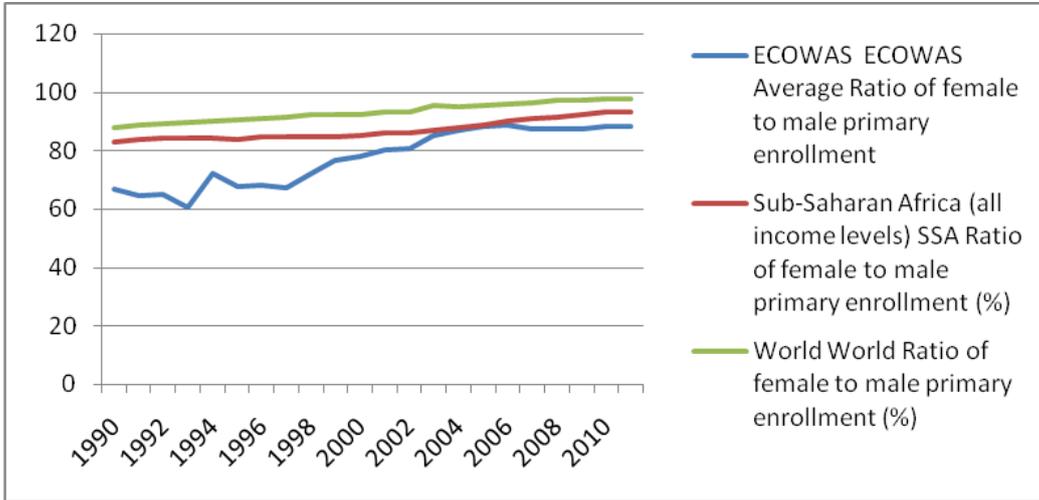
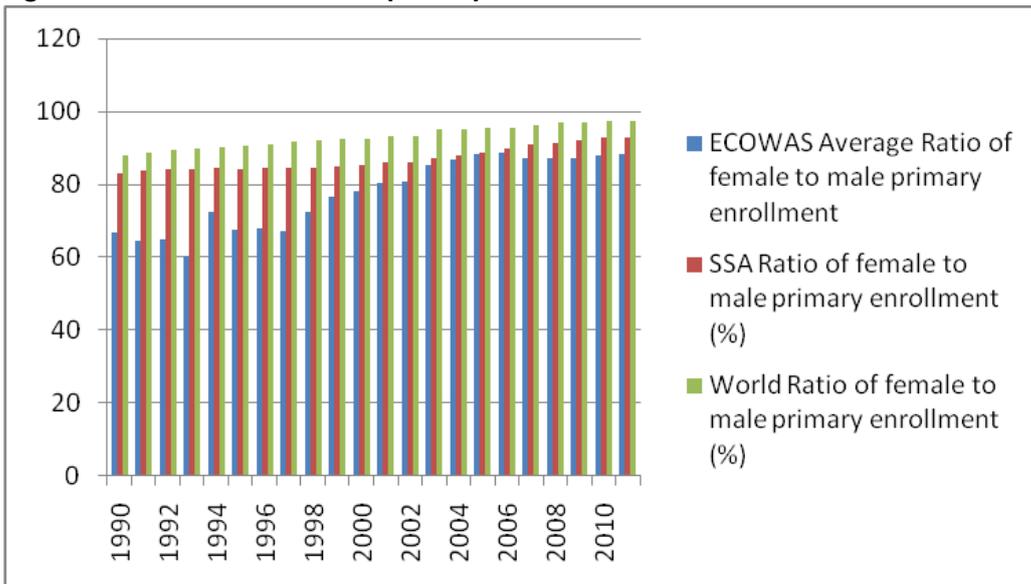
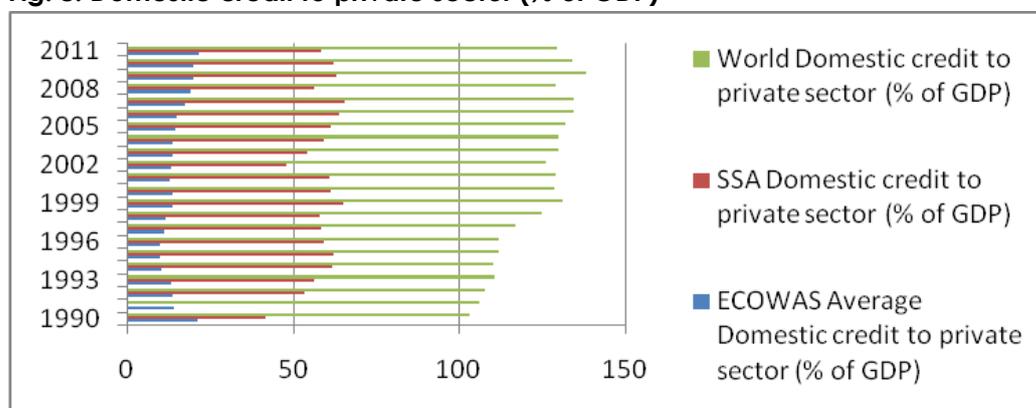


Fig.7: Ratio of female to male primary enrollment



2.3 Domestic credit to private sector

Fig. 8 shows the profile of domestic credit which is the bane of investment in any given economy. The growth of investment depends *inter alia* on credit availability. Average domestic credit in the ECOWAS is appallingly low (14.8%) compared with SSA (58.7%) and global average (123.2%). In order to spur the much needed sustainable economic growth, much needs to be done in this regard and this is informative.

Fig. 8: Domestic credit to private sector (% of GDP)

3. Brief Review of Literature

3.1 Private Sector Development in Africa

Research on the private sector in Africa which includes the ECOWAS countries is immutable. Bigsten, *et. al.* (2000), Eifert and Ramachandran (2004), UNIDO (2008), Dethier, Hirn and Straub (2010) and the African Development Bank (2012) are just a few which have articulated a number of explanations for Africa's poor performance in fostering labour-intensive manufacturing and private sector development. Others among these studies have also attempted to explain enterprise performance and creation of enabling environment for a robust private sector. The consensus of these studies among policy makers, private sector companies, donor countries and institutions is that for Africa to transit the vicious cycle of poverty, creating jobs is paramount; the key responsibility of the private sector.

Effective and sustainable job creation by the private sector is also predicated on an enabling environment. Dethier *et. al.* (2010), aver that the main hypothesis here is that the business environment affects economic activity through its influence on incentive to invest. A robust business environment increases returns to current lines of activities, creates new opportunities through trade, access to credit and new technology, greater competition, and innovation. The critical variables that collectively define the business environment for economic growth are infrastructure, access to finance and strong institutions to enhance security (absence of corruption and crime) and enhanced protection of property rights.

In a study of the impact of business environment on firm-level productivity in Africa, Eifert and Ramachandran (2004) using Investment Climate Survey data of the World Bank observe that the state of manufacturing in African countries is

small in absolute terms and as a share of GDP, particularly when compared with developing powerhouses such as China and India. With the exemption of Mozambique which grew at 9 percent over the period 2000-2002, most African countries studied grew at 3-5 percent range annually. The high rates recorded by Mozambique, as noted by the study produced few jobs at a relatively high cost and questionable in terms of sustainability and poverty impact. In addition, as the study equally demonstrated, large number of African firms operate at sub-optimum and inefficient levels. Capacity utilization for Nigeria and Ghana during the period was far less than 60 percent. These and other constraints such as high aggregate costs suggest low competition and inhospitable business climate which have inhibited development of the private sector.

The challenges faced by the private sector in sub-Saharan Africa according to the UNIDO (2008), report are manifold. They are derived primarily from the unfavourable characteristics of the sector in the continent. These challenges include upward immobility of micro, small and medium enterprises (MSMEs), widespread informality, low levels of inter-firm specialization, low quality standards and technological content and innovation capabilities, among others.

Recent findings of the Enterprise-level literature which relates firm performance to business climate indicators as reported in Dethier, *et. al.* (2010) reveal that Nigeria for instance had the worst public infrastructure performance in comparison with two other developing counties- Indonesia and Thailand (Lee, Anas and Ho, 1999). Although infrastructure plays a significant role in enterprise productivity, the most severe constraint in recent times is electricity. Consequently, many enterprises especially, micro, small and medium enterprises in the African continent have to contend with insufficient, poor-quality electricity, most times, opt for self-powered electric generation. Dethier *et.al.* (2010) in the analysis of the most severe constraints private sector enterprises perceive in Africa; electricity recorded 17.2 percent followed by access to finance, 15.2 percent; tax rates 9.8 percent, regulation, 7.8 percent; and crime, theft and disorder 7.6 percent. Other highly rated constraints are informal sector competitive practices, 9.2 percent; corruption, 5.8 percent and transportation, 5.7 percent.

The above notwithstanding, efforts to generate greater development impact of private sector development have been amplified at various fora. The African Development Bank (2012) Report maintains that broadening the participation and inclusion of the private sector constitute the key to spurring robust employment creation. Other findings of the report indicate that laws and

regulations and hence strong institutions are critical to private sector development.

In Africa, the private sector accounts for more than 80 percent of total production, two-thirds of total investment, and three-fourths of total credit to the economy in 1991-2008. The private sector as observed by the report was responsible for 90 percent of formal and informal employment. To partly summarize the forgoing, the World Bank reminiscence on employment is eulogized below:

"I've worked for 23 years, and I've never touched somebody else's property. But just look at my legs now- it was broken when I was stealing manganese from the railway station; the train pulled off just as I was trying to climb on board. Do you think that I would risk my life for nothing if I had a job? Do you know what it is like to have your children crying because they are hungry?" (World Bank, Voices of the Poor, 2009).

3.2 Female Employment and Macroeconomic Development

Anecdotal literature exists on the key determinants of female employment. A scan of the empirical studies suggests that the factors which influence female employment among others are inflation, foreign direct investment, credit to private sector, domestic investment, educational attainment, democracy and demographic factors. In this section, we shall present a brief summary review of these factors.

The works of Niemi and Lloyd (1982) and Cardos (1990) relate two strands in the opposing literature that support or reject the adverse effects of inflation on female employment. Niemi and Lloyd (1982) findings support the argument that inflation has positive and significant impact on women more than men as a result of their lower participation rate in the labour market. However, Cardos (1990) posit that women lower cash holding make them less vulnerable to the adverse inflationary consequences.

Findings of globalization impact on female labour-force participation indicate that foreign direct investment (FDI) and international trade can generate employment opportunity for women. Using firm-level data for Middle East and North African (MENA) countries, Contessi, de Nicola and Li (2013) conclude that evidence supports the view that exposure to international trade disproportionately affects firms in country/industry pair with comparative advantage in female employment and female entrepreneurship. Do,

Levchenko and Raddatz (2012) in earlier evidence observe that trade increases the demand for female employment, and induces increase in female wages. Oostendorp (2009) also avers that gender wage gap decreases with increasing trade and FDI.

Private sector development (PSD) has equally been associated with access to credit. Access to credit on the other hand is identified as a major constraint and driver of PSD. PSD especially of small firms has more positive effects on job creation generally. PSD improves the productivity of assets held by the poor and creates opportunity for entrepreneurship to thrive (Eggenberger-Argote, 2005 and Vossenbergh, 2013). Supporters of PSD have also argued that small and medium enterprises play leading role in creating employment, income and value-added; female shares of employment are relatively higher in these enterprises and characterize the business sector of many developing countries. However, women need appropriate education and training to take full advantage of these opportunities.

The importance of education in explaining the female–male gap in labour force participation cannot be overemphasized. The importance has been highlighted by a number of international conventions, including the Declaration of Human Rights and the Programme of Action of the 1994 and, the United Nations' articulated Millennium Development Goals (MDGs) among others. Women's literacy is recognized as key to empowering women's participation in decision making in society and to improving families' well-being. Thus, education is not only essential in building democratic societies and creating a foundation for sustained economic growth; it contributes directly to the growth of national income by improving the productive capacities of the labor force and is also a key strategy for reducing poverty (Roudi-Fahimi and Moghadam, 2013). Campa, Casarico and Profeta (2009) analyzed the extent gender culture affects gender gap in employment. Drawing on Italian data, they showed that index of gender culture based on firms' attitudes is significant in explaining gender gap in employment. Campa, et.al (2009) found a positive and significant effect of literacy and education on gender equality in employment.

In addition, the benefits of female education for women's empowerment and gender equality Roudi-Fahimi and Moghadam (2013: 2) observe the following:

- *As female education rises, fertility, population growth, and infant and child mortality fall and family health improves.*

- *Increases in girls' secondary school enrollment are associated with increases in women's participation in the labor force and their contributions to household and national income.*
- *Women's increased earning capacity, in turn, has a positive effect on child nutrition.*
- *Children — especially daughters — of educated mothers are more likely to be enrolled in school and to have higher levels of educational attainment.*
- *Educated women are more politically active and better informed about their legal rights and how to exercise them.*

However, some earlier studies albeit controversial, suggest that gender inequality in education might actually increase economic growth (Barro and Lee, 1994; Barro and Martin, 1995).

As with other development issues, it is contended that democracy together with women's suffrage will provide women opportunities to promote their interests, thereby increasing equity in gender employment. Anyanwu (2012) observes that democracy could increase women's employment by increasing expenditures on social programs. Beer (2009) using cross-national time-series data of 179 countries between 1960 and 2004, finds that while modernization and economic development are important in gender equity, long-term democracy is strongly related to greater gender equity in favour of women. Two implications can be deduced from this conclusion. First, technological progress and economic development are important drivers of gender parity. Second, democracy has a time effect relationship in gender equity.

Because extensive coverage of the literature is beyond the scope of this paper, this section is concluded by reviewing the U-shaped trajectory associated with female labour-force participation and rising economic development levels as espoused by the Boserup's hypothesis. Boserup (1970), argues that the initial stages of economic growth are characterized by a growing gender gap, which only begins to diminish once countries develop beyond a certain threshold. The explanation is that as a country develops, the growing industrial sector increases the demand for male employment, while not providing greater opportunities for female workers who may be engaged in "home industries" which produce hand-made items for sale. This initially results in a wage gap between men and women. As these industries gradually decline in importance in the economy and

economic development usher in large scale manufacturing –which provides more service sector jobs, opportunities for female labor-force increases, thus decreasing the gender earnings gap. For sake of emphasis, this curvilinear relationship between female employment and economic development implied a U-shape as asserted by Boserup (1970). As Forsythe, Korzeniewicz, and Durrant (2000) explain, studies following this approach consider that differences between men and women in employment, wages or poverty are due primarily to human capital differentials, which are the consequence of traditional structures likely to wither away over time (Cuberes and Teignier, 2011). Evidence of the curvilinear relationship has equally been established in the studies by Anyanwu (2012). However, as reported in Anyanwu (2013), the works of Eastin and Prakash (2013), and Tseloni, Tsoukis and Emmanouilides (2011) contradict the U-shaped relationship.

4. The Econometric Model and Data

In this section of the paper, the nature of the data employed in the study is discussed as well as the empirical model that is estimated and tested.

4.1 The Data

For the study a flexible definition of the ECOWAS countries is adopted as a result of inadequate data across countries; thus combining multiple data sources. Basically, the World Bank's World Development online database is used except as indicated in the appendix. Longitudinal data covering thirteen ECOWAS countries used to empirically study the key determinants of gender differentials or gaps, for the period 1990 to 2010. A gender differential in employment opportunities is measured as the ratio of female to male employment (15-64 age group %) and used as the dependent variable.

4.2 Independent Variables

Private Sector Development

The private sector as defined by the Department of International Development (2009) includes *any person who sells something aiming to make profit. It includes micro businesses such as small-scale farmers and sellers in the informal markets, small, medium and large businesses; and multinationals.* To control for the private sector, domestic credit to private sector as (% of GDP) is used. The 2013 World Bank World Development Indicators contend that tapping private sector initiative and investment for socially useful purposes—are critical for poverty reduction. Private markets are the engine of productivity growth, which create productive jobs and higher incomes. And with government playing a complementary role of regulation, funding, and service provision, private

initiative and investment can help provide the basic services and conditions that empower poor people especially women by improving health, education, and infrastructure. Among the incentives for private sector success are increased security, reduced risk and peace. A monotonic relationship is perceived as gender gap is expected to narrow as credit to the private sector increases. A quadratic term is included to test if as private sector develops, gender differential increases/decreases at intermediate level and subsequently falls/rise after a certain level of private sector development has been reached.

Level of Economic Development

Real gross domestic product per capita measured in 2000 dollars is used to capture level of economic development. Also included, is the quadratic of GDP per capita which is aimed at determining a non-monotonic relationship between gender gap and development. The term shall be used to test the Boserup's (1970) assertion that the gap between men and women increases at intermediate levels of economic development but subsequently dies off after a nation has achieved certain level of economic development (Anyanwu and Augustine, 2013).

Macroeconomic Stabilization

One indicator of economic stabilization- inflation rate is applied in the econometric analysis. One argument of the effect of inflation on employment contends that *Inflation* causes productive investment to fall because profitability falls, speculative investment rises which has a negative effect on *employment* and since women are more disproportionately represented among the poor, they're hurt more than men. We expect the coefficient to be negatively signed.

Democracy and Women Empowerment

It has been hypothesized that women's impact on economic development increases as governance systems become more inclusive, democratic and violence-free. The reason is that democratic regimes are assumed to be more tolerant and respect human rights and people's freedom more than totalitarian governments. The constructed annual measure of democracy from Polity IV Project is used as a proxy for institutional democracy. This democracy indicator is an additive eleven-point scale (0-10); implying a 21 point spectrum, ranging rightward from -10 for extreme autocracies to +10 for fully institutionalized democracies (Marshall, Gurr and Jaggers, 2013, and Anyanwu, 2012).

Demographic Factors

Other control variables included in the model are demographic factors captured by population growth rate and the share of urban areas in total

population. Increased population growth rate is expected to reduce the gender employment gap. The urban population share is an indication of labour market access and employment opportunities. It is hypothesized that residency in the urban area should provide more employment opportunities to both male and female; as the horizon of employment opportunities are broader in urban areas.

4.3 The Model

In order to elicit the relationship between gender equity in employment and the development of private enterprises as the main source of new jobs, in poverty reduction and generally as the engine of growth in ECOWAS, the Anyanwu (2012) model is followed which specifically builds on the frameworks of Chen (2004); Tseloni, Tsonkis and Emmanouilides (2011); and Eastin and Prakash (2013). The modified model to be estimated can be stated as:

$$\log GG_{it} = \beta_i + \delta_t + \alpha_1 \log(psd_{it}) + \alpha_2 \log(psd_{it}^2) + \alpha_3 gdp_{it} + \alpha_4 gdp_{it}^2 + \alpha_5 (X_{it}) + \varphi_{it} \quad (1)$$

($i = 1, \dots, n; t = 1, \dots, T; N = nT$ for a balanced panel).

where GG is the measure of gender equality in country i at time t . The first two terms on the right hand side in Equation (1) are intercept parameters that vary across countries (i), and years (t). Here the implicit assumption is that, although gender gap may be different between one country and the other at any given level of public sector development and economic growth, the elasticity of gender inequality with respect to private sector development α_1 and elasticity of income real per capita α_3 will be the same for all countries. α_2 and α_4 are the elasticities of gender gap with respect to quadratic private sector development and real per capita income. On the other hand, the time specific intercepts take care of time-varying variables that are omitted from the model, including stochastic shocks. The inclusion of country effects is generally justified, if per capita income or other explanatory variables are correlated with country-specific time invariant factors such as resource endowment. The control variables X , include inflation, education enrolment, population growth, urban development rate and trade openness. The pooled Least Squares (ELGS) fixed and random effects were estimated to investigate the key drivers of female employment. Fixed effects models treat β_i and δ_t as regression parameters, while random effects models treat them as components of the random disturbance. In this study, the Hausman test is used to choose between the relevant fixed and random effects models.

With respect to Boserup (1970) assertion which is construed to mean U-shaped trajectory associated with female labour-force participation and rising economic development levels, a quadratic equation is specified for ECOWAS countries of the form:

$$\log GG_{it} = \beta_i + \delta_t + \alpha_6 gdp_{it} + \alpha_7 gdp_{it}^2 + \vartheta_{it} \quad (2)$$

alternatively, The Boserup hypothesis holds when $\alpha_6 < 0$; $\alpha_7 > 0$ and all variables are as previously defined. Table 1 presents the descriptive statistics of the regression variables while the section that follows presents the model estimation results and their discussions.

Table 1. Descriptive Statistics of Main Regression Variables 1990 - 2010

Variable	Observations	Mean	Standard Deviation	Jaque-Bera (Probability)
Female to male population ratio	272	77.90	18.13	12.54 (0.001)
Inflation	272	10.04	17.57	4473.62 (0.00)
Credit to private sector-GDP	272	13.25	7.28	36.81 (0.00)
GDP per capita	272	417.83	299.86	1143.00 (0.00)
Openness	272	62.78	20.56	13.03 (0.00)
Education	272	76.07	26.84	6.42 (0.04)
Urban population share	272	36.53	11.05	5.22 (0.07)
Population growth	272	2.62	0.87	221.34 (0.00)
Economic growth	272	3.85	4.26	952.91 (0.00)
Democracy	272	2.86	4.44	18.66 (0.00)

Note: Raw data before natural log transformation of some of the variables.

5. Empirical Analysis and Discussion

The abridged econometric results of the analyses carried out on the database based on Equations (1) and (2) are presented in Table 2. In order to report a concise picture of the effect of gender equality in employment, only the fixed effects results are presented as the Hausman test statistic of 2.89 (p -value = 0.2034), fail to reject the null with the conclusion that random effects is not appropriate. The first two columns report the varied results of the Equation 1 while the last column report results of the Boserup hypothesis as highlighted in Equation 2.

First the paper analyzes whether credit to private sector plays a role in gender equity employment. It finds evidence suggesting that private sector credit is positive and significantly related in all samples with gender equality in employment. This is informative and suggests policy design to enhance private sector led growth and poverty eradication. This is also consistent with IFC (2012) which underscores the importance of finance in employment generation. Increased access to finance improves the productivity of assets held by the poor and creates opportunities for entrepreneurship to thrive (Eggenberger - Agorte, 2005; and Vossenber, 2013).

Table 2. Fixed-Effects Results: Pooled Least Squares gg = Dependent Variable

constant	13.03 (4.47)*	10.87 (3.64) *	4.50(63.64)*
gdp	-3.62 (-3.54) *	-2.65 (-2.54)**	
gdp ²	0.26 (3.13) *	0.18 (2.115)**	
dc	0.16 (3.13) *	0.16 (3.17) *	
fp	-0.53 (-4.83) *	-0.59 (-5.14) *	
td	-0.004 (-2.63) *	-0.01 (-3.74) *	
pse	-0.50 (-4.56) *	-0.52(-4.74) *	
pg	1.30 (7.63) *	1.34 (7.80) *	
upp	-0.25 (-2.30)**	-0.35 (-3.09) *	
gdpr	0.04 (1.14)	0.145 (2.50)**	-0.15(-3.08)*
gdpr(-2)		-0.16 (-2.77) *	
gdpr ²			0.02(2.26)**
dem	0.17 (27.28) *	0.18(26.68) *	
R-squared	0.81	0.84	0.041
Adjusted R-squared	0.806	0.83	0.034
F-statistic	113.877	112.29	5.80
Prob > F	0.000	0.00	0.003
N	273	247	273

Note: *t*-values are in parentheses; * = 1% significant level and ** = 5% level of significance

Source: Authors' estimations.

In all variants of the basic model analyzed, the elasticity coefficients associated with per capita GDP are negative and statistically significant. In order that the Boserup (1970) hypothesis which is construed to mean U-shaped trajectory relationship between female labour-force participation and rising economic development, the squared per capita GDP was included among the explanatory variables. The quadratic elasticity coefficient is positive and statistically significant at one percent level in all the samples. This is consistent

with the Boserup (1970) assertion of a curvilinear and U-shaped relationship between economic development and gender equity in employment¹. This also supports the findings of Anyanwu and Augustine, 2013; Cuberes and Teignier (2011) but at variance with the results of Tseloni, Tsonkis and Emmanoulides, 2011 and, Easton and Prakash, 2013.

Macroeconomic stabilization is captured using inflation as goal. The coefficient is negative and statistically significant in all versions of the empirical analyses. What this means is that rising inflation reduces households real wages and lowers female employment. This may imply that male could be hurt more than female since women hold less cash balances and makes them relatively less vulnerable (Cardoso, 1992). This could also result with time; female taking up some paid employment to supplement household earnings. As earlier noted in the literature, rising inflation causes productive investments to fall due to fall in profitability; and subsequently, a rise in speculative investment could result in employment decline.

The coefficient of institutionalized democracy is positive and statistically significant for ECOWAS countries. This supports the findings of Beer (2009), Tseloni, *et. al.* (2011), and Eastin and Prakash (2013). The results, however, contradict the findings of Anyanwu (2012) for Africa, Sub-Saharan Africa and North Africa. The implication is that as democracy accelerates and if eventually sustained in ECOWAS countries, all things being equal, female employment and hence gender equity would increase overtime as democratic institutions will be expected to increase expenditures on social programs that would increase female employment.

As shown in Table 2, the openness coefficient is negative and statistically significant. This fact is consistent with the evidence analyzed in Anyanwu (2012) for Sub-Saharan African counties. The export sector of ECOWAS countries is heavily dominated by exploration of natural resources such as minerals which are enclaves of capita-intensive industries operated to the disadvantage of female employment. The implication is that openness widens the gender gap in employment. A high import sector could also crowd-out female employment as domestic markets become more competitive.

The level of general education variable proxied by gross primary school enrollment is negative and statistically significant. This is at variance with the findings of Chen (2004), Campa, Casarico and Profeta (2009), and Anyanwu (2012). The negative relationship, though may be as a result of noise challenges in measurement, one potentially important pathway may be due to diminishing

quality of labour inputs as standards in education are perceived to be falling. The low quality of labour inputs may also be due to lack of employment opportunities which may make labour to be less productive in the workplace. The negative but statistically significant education coefficient could imply that education systems in ECOWAS countries are poorly suited to the needs of the labour markets, thus supporting the mismatch hypothesis.

Population growth and share of urban areas in total population are two indicators used to measure demographic variables in the paper. From the results, population growth is reported to be positive and highly significant predictor of female employment; while increasing urban rates are negative and statistically associated with declining gender-gap employment in ECOWAS countries. The negative impact of urbanization share in total population in female employment may reflect the large number of urban poor. Women generally are mostly affected in the competition for scarce resources including employment.

The economic growth (GDP growth) variable is included in the model alongside per capita GDP and its quadratic form to explain the effects of growth or development in gender-equity employment and hence, poverty status. The economic growth coefficient though positive, had insignificant effect on female employment. Consequent upon this, the empirical evidence of Eggenberger-Argote (2005) was adopted which opines that incidence of poverty is largely a reflection of a country's previous economic growth performance. The GDP growth variable with a period lag was included among the regressors. As Table 2 reports, the contemporaneous coefficient turned-out to be positive; while the two period lag GDP growth coefficient is negative but statistically significant. This further buttresses Eggenberger-Argote (2005) suggestion of poverty (in this case, female unemployment) being largely a reflection of a country's previous economic growth performance.

The significance of the constant terms may highlight the importance of country-specific policy recommendations which should integrate economic, sociological and cultural factors on the one hand and cross-country characteristics and time effects on the other hand.

6. Conclusion

This paper contributes to the growing literature on the relationship between female labour-force participation rate and private sector development in ECOWAS countries. It focuses on this relationship by additionally testing for the Boserup hypothesis on the gender-gap consequences between male and

female employment over time. The focus on ECOWAS countries is justified by the fact that this regional block has relatively enjoyed some growth with high per capita GDP over the last one decade. This growth which has been accompanied with a demographic bulge may not have resulted in a sustainable inclusive growth; particularly in increased female labour-force participation rate.

The empirical results using available longitudinal data over the period 1990 and 2010 suggest that in ECOWAS countries; access to credit by the private sector, quadratic per capital GDP, population growth and institutionalized democracy; increase female employment significantly. Inflation, openness, per capita GDP, level of education and urbanization share appear to lower female employment. Contemporaneous economic growth variable was found not be statistically significant in explaining gender-gap employment; but it did with the introduction of per capita GDP two period lag. What are some of the implications of these findings for ECOWAS countries?

First, the finding that access to credit by private sector is largely significant in gender equity employment underscores the fact that there should be focus on women in order to unleash their potential for entrepreneurship. This can be achieved by providing support for domestic-sector activity as openness has negative impact on female employment. One channel by which expansion of access to capital can be meaningful is through small and medium sized enterprises. There is the need for deliberate intervention to channel funds toward policies and programmes that promote women well-being. A second channel is by funding rural social infrastructure; lower rural-urban migration as rapid urbanization and slow economic growth could promote gender disparities. Third, develop and sustain public-private partnerships (PPPs), securing funds through multilateral sources etc and increased support from development partners to strengthen the private sector through value chain approaches. Fourth, removal of important constraints to private sector development (key among this is the shortage of energy and administrative bottlenecks). Fifth, improved governance and political will by policymakers to support trade inter-linkages among ECOWAS countries as the literature is immutable in support of this for promotion of youth and female employment. Governments can do a lot to prioritize the creation of inclusive productive growth through a robust enabling environment devoid of insecurity and difficult access to property titles for a well functioning and effective private sector to thrive. There is no doubt that this paper has modestly given fillip to the concern that relative deprivation of a group of people across the globe definitely warrants attention on its own for the benefit of today and future of the ECOWAS region. In this regard, attention

of policy makers is drawn to the following issues as UNIDO had canvassed in different fora:

- a) widespread and rising informality;
- b) a “missing middle” and lacking upward mobility of enterprises;
- c) weak inter-firm linkages;
- d) low levels of export competitiveness;
- e) lack of innovative capabilities; and
- f) economic diversification

Note

1. Estimated results of Equation 2 on rising economic development (α_6 and α_7) equally confirm the hypothesis.

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Appendix A
Variable Names, Definitions and Data Sources

Variable name	Definition	Data Source
gg	Ratio of female to male labour participation rate (%)	2012 WDI, World Bank
gdp	Per capita GDP (constant 2000 US\$)	2012 WDI World Bank
gdp2	Squared per capita GDP (constant 2000 US\$)	2012 WDI World Bank
dc	Domestic credit to private sector (% of GDP)	2012 WDI World Bank
fp	Inflation, GDP deflator (annual %)	2012 WDI World Bank
td	Trade (% of GDP)	2012 WDI World Bank
pse	School enrollment, primary (% gross)	2012 WDI World Bank
pg	Population growth (annual %)	2012 WDI World Bank
upp	Urban population (% of total)	2012 WDI World Bank
gdpr	GDP growth (annual %)	2012 WDI World Bank
dem	Institutionalized democracy	Polity IV project

Appendix B
List of ECOWAS Countries used in the Analysis

Benin, Burkina Faso, Cape Verde, Ghana, Gambia, The; Guinea, Ivory Coast, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo

IMPACT OF DEFICIT FINANCING ON ECONOMIC GROWTH, PRIVATE INVESTMENT AND UNEMPLOYMENT: FURTHER EVIDENCE FROM NIGERIA (1999 – 2013)

By Dr. Eboime I. Matthew and Dr. Ozurumba, A. Benedict*

Abstract

This study examines the long-run relationship between deficit financing, unemployment, private investment and economic growth in Nigeria. Quarterly data was employed covering the period 1999 -2013, which coincides with the commencement of democratic governance after a long period of military rule in the country. The technique of analysis used is the autoregressive distributed lag approach. Our finding supports the crowding in hypothesis between government deficit and private investment. In addition, fiscal deficit financing also has a negative and significant relationship to unemployment rate in the long term. Thus, in order to reduce widespread and endemic poverty in Nigeria, more of public resources should be channelled towards the provision of complementary investment (enabling environment) that promotes private sector participation in economic activities such as power, roads, and other infrastructure. Furthermore, avenues for leakages should be curtailed, including the reduction in recurrent expenditures in order to promote additional infrastructural investment. To finance deficits, options that minimize upward spiral in the domestic cost of funds should be employed.

Key Words: Fiscal Deficit, Economic Growth, Unemployment Rate, Private Investment.

JEL: C22, E22,E23,E62

1. Introduction

This paper is basically concerned with the impact of deficit financing on unemployment, private investment and economic growth in Nigeria. The rise in fiscal deficit is predicated on the Keynesian view that such intervention promotes economic growth and full employment, for instance, through human capital development, investment in public infrastructure, among others. However, on the other side of the theoretical divide, some economists believe that government budget deficits have a minimal impact on employment and output, especially in the long run (Chrystal and Thornton). It is feared that the government's role in the economy engenders inefficiency, inhibits private investment and consumption, and by extension, employment (Suranovic 2010).

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Empirical works have further served to deepen the debate on the desirability or otherwise of deficit financing. Studies have shown that there exists a positive and significant relationship between higher government deficit and economic growth or a significant correlation between reduced fiscal spending and economic recession (see Fatas and Mihov 1998; Bargawi and Mckinley 2011; Wosowei 2013; Haq 2003). Other researchers find that there is a negative or statistically insignificant relationship between public sector deficit and growth. The dust generated by the ensuing debate is far from settled.

Furthermore, the literature on the impact of budget deficits on private investment is delineated into three schools of thought, namely, the Neoclassical, Keynesian and Ricardian equivalence (Bernheim 1989). The neoclassical school maintains that fiscal deficit will crowd out private investment while Keynesians provide counter argument on the complementary or crowd-in effect of budget deficit and the Ricardian equivalence approach argues that when the present values of both total receipts and total spending are accounted for, private investment will remain unchanged. In addition, empirical studies produce divergent results on the relationship between fiscal deficit and private investment. Argimon et al (1997), and Arora and Dua (1993) find an inverse relationship while Aschauer (1989) finds that the net effect of a rise in public investment has a positive effect on private investment.

These theoretical and empirical divergences have continued to elicit public debate on the relevance or otherwise of deficit financing. Thus, it is important to investigate the results presented by Nigerian data in this regard. This is essential considering that a large number of contemporary economists still maintain that the government has a critical role to play growing the economy, reducing unemployment and widespread poverty but many in the government circle seem to think otherwise.

Therefore the primary research question of this paper is as follows: What is the impact of deficit spending on unemployment, private investment and economic growth in Nigeria? This work will extend the frontiers of literature in respect of the Nigerian experience as most of the previous studies have focused on either private investment or economic growth effects. Moreover, it employs the Autoregressive Distributed Lag (ARDL) approach.

Following the introduction, section two focuses on the trend of deficit financing in Nigeria, section three on literature review while section four dwells on methodological issues. Section five discusses empirical findings and the sixth section summarizes and concludes the paper.

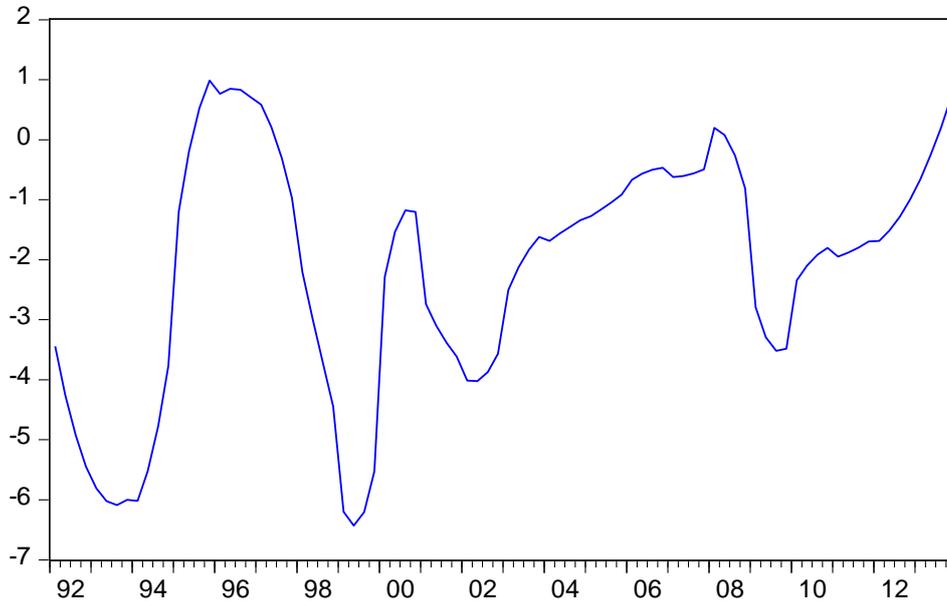
2. TREND IN DEFICIT FINANCING IN NIGERIA

Government budget is an itemized accounting of the payments received by government (taxes and other fees) and the payments made by government (purchases and transfer payments). A budget deficit occurs when a government spends more money than it takes in. The opposite of a budget deficit is a budget surplus.

The overall deficit as a percentage of GDP averaged 4.4 per cent from the early 1980s to mid 1990s. The fiscal operations of the Federal Government recorded surpluses of N1.0 billion and N37.1 billion in 1995 and 1996, respectively, partly as a result of enhanced revenue and the restraint on budgetary spending, which culminated in significant reduction in capital expenditure (Mordi, et al, 2010: 504). The trend soon reversed and fiscal deficits were N133.4 billion or 3.3 percent of GDP and N285.1 or 5.9 percent of in 1998 and 1999, respectively, reflecting the dwindling retained revenue of the Federal Government due to adverse oil price shocks. This development was also not unconnected with the general upward review of salaries and other emoluments and entitlements of civil servants. The cost of transiting from military to civilian administration in 1999 further deteriorated the overall fiscal position with the deficit standing at a staggering N285.1 billion or 5.9 percent of GDP.

The fiscal operations of the Federal Government improved in 2000, resulting in an overall deficit of N221.1 billion or 4.0 per cent of GDP. It nevertheless deteriorated to N301.4 billion or 4.4 per cent of GDP in 2002 before improving to N172.6 billion, N101.4 billion and N47.4 billion (1.5, 0.6 and 0.2 per cent of GDP) in 2004, 2006 and 2008, respectively (CBN annual reports, various years). In 2009, owing largely to the huge revenue decline from crude oil export, occasioned by the global financial and economic crises, overall fiscal balance worsened significantly to N810.0 billion, or 3.3 per cent of GDP and to N110.5 billion or 3.8 per cent recorded in 2010. The trend of budget deficits to GDP ratio has been on the rise thereafter. Figure 1 shows the trend of Nigeria's budget deficit as a percentage of GDP from 1992 to 2013.

Figure 1. Budget Deficit/Surplus to GDP in Nigeria (%) -1992 to 2013



The deficit was financed mainly from domestic sources, including excess crude oil receipts and borrowing from the banking system in the period 1999 to 2013. Government reliance on the banking system to finance its deficits in the latter years impacted negatively on various macroeconomic fundamentals (Mordi, et al, 2010). This period also witnessed the gradual build-up of external borrowing as well as domestic borrowing as a means of financing deficit which later resulted in debt overhang, until 2005, when Government achieved the debt exit deal from the Paris Club of creditors.

3. LITERATURE REVIEW

3.1 Brief Conceptual Overview

Several definitional strands of budget deficits are available in the literature. Perhaps, the measurement of budget deficit most commonly adopted in empirical research is the conventional deficit or surplus (also known as overall deficit or surplus). It represents the difference between total revenues of government and total expenditure (CBN 2013, and Haq 2003).

Some other ways of measuring fiscal deficits include but not limited to the following: **primary deficits**, which is total revenue minus total expenditure net of interest payments (Blejer and Cheasty 1991). In Wikipedia, the primary deficit definition is captured "as the difference between current government

spending on goods and services and total current revenue from all types of taxes net of transfer payments" while the **structural deficit** "is the deficit that remain across the business cycle". **Operational deficits** represent the summation of the primary deficits and the real component of interest payment. The inflation induced-portion of interest payments is subtracted from the primary deficit calculation (Blejer and Cheasty 1991).

The conventional measure of fiscal deficit is the definition employed in this study because of its simplicity. Another advantage of the conventional measure relates to its broad coverage of public sector operations (Haq 2003).

The model (sources) of financing fiscal deficit is presented algebraically below¹

$$G - T = \Delta(GC) + \Delta(GB) + \Delta(GP) \dots \dots \dots (1)$$

Where

- G = government expenditure on goods and services and transfer payments tax
- T = tax revenue
- GC = Central Bank claims in government
- GB = Commercial bank holdings of government securities
- GP = non-bank public holdings of government securities
- Δ = change operator

Substituting

$$G - T = (S - 1) + (M - X) \text{ and } \Delta GC = \Delta(G - T) - K \quad \text{in}$$

equation 1,

we would have,

$$G - T = GC + GB + GP + K \dots \dots \dots (2)$$

Where

K = capital inflows through loans, grants etc including inflows through sale of government securities.

1. Mr. Sam Omoruyi, the Debt Advisor at the West African Institute of Financial and Economic Management, Lagos, Nigeria contributed this section of the paper. We gratefully acknowledge the contribution

3.2 Theoretical Framework.

Extensive theoretical and empirical literature has been developed to examine the relationship between fiscal deficit, private investment, unemployment and growth variables. In this paper we considered three distinct theories, namely: the Keynesian, Neoclassical and Ricardian Equivalence theories.

As highlighted in the introduction, the Keynesian theory maintains that government spending enhances growth. The rise in fiscal deficits is predicated on this view that such intervention promotes economic growth and full employment, for instance, through human capital development and investment in public infrastructure. Many traditional Keynesians argue that deficits need not crowd out private investment. Eisner (1989, p. 83) is an example of this group, who suggests that increased aggregate demand enhances the profitability of private investments and leads to a higher level of investment at any given rate of interest. Hence, deficits may stimulate aggregate saving and investment, despite the fact that they raise interest rates. He concludes that "The evidence is thus that deficits have not crowded-out investment. There has rather been crowding in". It is worth noting the argument that public capital crowds out or crowds in private capital, depending on the relative strength of two opposing forces: (i) as a substitute in production for private capital, public capital tends to crowd out private capital; and (ii) by raising the return to private capital, public capital tends to crowd in private capital. Therefore, on balance, public capital will crowd out or crowd in private capital, depending on whether public and private capital are gross substitutes or gross complements (Aschauer, 1989).

The Neoclassical/Monetarist theory holds that government budget deficits constitute merely a transfer of resources from the private sector to the public sector with little or no effect on growth (Ahmad, 2000; Saleh, 2003; Dalyop, 2010). They further stress that since the private sector is more efficient than the public sector, such a transfer could have a negative effect on growth.

The Ricardian Equivalence theory states that fiscal deficits do not affect economic growth. Thus, the Ricardian equivalence approach argues that when the present values of both total receipts and total spending are accounted for, private investment will remain unchanged. Gray and Stone (2005) noted that Ricardian equivalence implies that taxpayers do not view government bonds as net wealth; hence, its acquisition by individuals does not alter their consumption behaviour. Thus, they conclude that the effects of government spending in a closed economy will be invariant to tax versus bond financing. Chakraborty and Chakraborty (2006) then stated that fiscal deficit represents a transfer of expenditure resources from the private to the public sector and budget deficit is neutral to economic activity.

3.3 Empirical Review

The impact of the budget deficit on economic growth is theoretically explained through the effect of the deficit on the flow of money into the economy and through the supply side (infrastructure, education, etc). The more that

government expenditures exceed revenue the more money will be circulated in the economy, which leads to higher employment and output (McCandless, 1991).

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

Nevertheless, in the face of market failures, some studies have pointed to the beneficial effects of government spending on infrastructure, health, education, and productive development projects. The pioneering work of Rao (1953) indicates that government spending on productive development projects in developing countries is not as inflationary as it might be assumed because of the greater output growth.

Eisner and Pieper (1987) report a positive impact of cyclically and inflation-adjusted budget deficits on economic growth in the United States and other Organization for Economic Cooperation and development (OECD) countries. Also, Nelson and Singh (1994) use data on a cross section of 70 developing countries during two time periods, 1970-1979 and 1980-1989, to investigate the effect of budget deficits on GDP growth rates. The GDP growth rate is used as the dependent variable. Among the explanatory variables in this study are government budget deficits, government revenue, defense spending, domestic private and public investment, population growth rate, per capita income, education, and the inflation rate. Their results suggest that public investment has a positive impact on economic growth in the 1980s but has no impact in the 1970s. This study concludes that the budget deficit has no significant effect on the economic growth of these nations in the 1970s and 1980s (Nelson and Singh, 1994, 183-184).

Arora and Dua (1993) examine the effects of budget deficits on investment and on trade deficits during the period from 1980 to 1989. This study suggests that "higher budget deficits crowd out domestic investment and increase trade deficits" (Arora and Dua, 1993, p. 42). Karras (1994) studies the effects of budget deficits on money growth, inflation, investment, and real output growth. He uses pooled annual data from 32 countries covering periods from the 1950s to the 1980s. This study concludes that deficits are negatively correlated with the rate of growth of real output; and increased deficits do appear to retard investment

usually after one or two years. Al-Khedair (1996) examines the relationship between the budget deficit and economic growth in the seven major industrial countries (G-7). The data utilized in this study covered the period from 1964 to 1993. Overall results conclude that the budget deficit seems to positively and significantly affect economic growth in all the seven major industrial countries (Al-Khedair, 1996, p. 132).

Asogwa and Okeke (2013) examine the crowding out effect of budget deficits on private investments in Nigeria's economy. They adopt the ordinary least squares (OLS) and Granger Causality test. The analysis confirms that budget deficits crowds out private investments and that private investments granger cause budget deficit with feedback. They recommend that stakeholders should reduce recurrent expenditure and increase its capital expenditure in order to encourage and make conducive environment for private investment to thrive which will ensure economic growth.

Ekpo (1999) using Nigeria's data observes that fiscal deficit crowds-out private investment leading to a possible hike in interest rate. If the government gathers a higher share of the borrowing from interest rate, the private sector will consequently have a lesser share. This will lead to a rise in interest rates and higher cost of capital for private investors.

Nigeria has one of the highest ratios of government spending to GDP amongst developing countries and yet does not have much to show for it (Ekpo, 2003). Government should be able to make each Naira it spends work much harder towards achieving its development goals. Fiscal sustainability and the achievement of these broad development objectives cannot be delivered without marked or dramatic efficiency with which public resources are used. The key issue in this regard is weak governance in public expenditure and budget management. Public expenditure programmes are poorly planned and often do not consider the cost-effectiveness of proposed programmes against other options; public contracts are highly inflated; there are considerable leakages of public funds; and monitoring of execution and outcomes is extremely weak or, for all practical purposes, non-existent. These underlying issues need to be addressed to ensure that public resources are put to more efficient use.

Ghali (1997) investigates the relationship between government spending and economic growth in Saudi Arabia using annual data over the period 1960-1996. It should be noted here that this study builds on Barro's (1990) endogenous growth model, to untangle the nature of the relationship between these

variables. The conclusion of this study “found no consistent evidence that changes in government spending have an impact on per capita real output growth” (Ghali, 1997, p. 171).

Ghali and Al-shamsi (1997) utilize cointegration and Granger-causality to investigate the effects of fiscal policy on economic growth for the small oil producing economy of the United Arab Emirates over the period 1973:1-1995:4. They decompose public spending into consumption and investment expenditures and show how multivariate cointegration techniques can be used to test for the long-run relationships and the intertemporal causal effects between government spending and economic growth. This study provides evidence that government investment has a positive effect on economic growth, whereas the effect of government consumption is insignificant (Ghali and Al-Shamsi, 1997, pp. 530-31). Monadjemi and Huh (1998) utilise the error correction model (ECM) to examine the relationship between private investment and government spending in Australia, UK, and the US over the period 1970:1-1991:4. Empirical results provide limited support for “crowding out” effects of government investment on private investment.

Ghali (1998) uses multivariate cointegration techniques to develop a vector error-correction model to investigate the long-run effects of public investment on private capital formation and economic growth. It is worth noting here that this study uses a neoclassical production function where the private and public capital stocks are treated as separate inputs. This study finds that in the long run, public investment is found to have a negative impact on growth and private investment. In the short-run, public investment has a negative impact on private investment and no effect on growth. Bahmani (1999) investigates the long-run relationship between U.S. federal real budget deficits and real fixed investment using quarterly data over the 1947:1-1992:2 period. The methodology in this study is based on the Johansen-Juselius cointegration technique. Their empirical results indicate that real budget deficits have crowded in real investment, supporting the Keynesians who argue for the expansionary effects of budget deficits, by raising the level of domestic economic activity, “crowd- in” private investment (Bahmani, 1999 p. 639).

Furthermore, many other studies result in a similar conclusion in both developed and developing countries and lend support to the existence of a significant crowding-in effect of private investment by public investment, through the positive impact of infrastructure on private investment productivity (e.g. Aschauer 1989; Miller and Russek 1997; Argimon et al. 1997; Ghali and Al-shamsi 1997; Bahmani 1999; and, Ahmed and Miller 2000). In contrast other studies

suggest different conclusions. Studies such as Landau (1983), Barro (1991) and Ghali (1998), find support for a negative relationship between public investment and economic growth. It is worth noting here that one of the important outcomes from these studies is that cross-section analysis cannot capture the country specific nature of the nexus of government spending and growth.

4. METHODOLOGY

The empirical approach used in this work involves examining the impact of fiscal deficit on certain macroeconomic variables, namely: unemployment, private investment and economic growth. The nexus between government deficit and each variable is considered separately. However, given that estimations hinged solely on bivariate relationships may suffer from problems of omitted variables, multivariate models were estimated by including some relevant determinants (which also serve as control variables) of the macroeconomic variables of interest (Jayaraman and Choong 2006).

4.1 Data Source and Descriptions

The study employs quarterly data ranging from 1999-2013 which were converted from annual series. The Central Bank of Nigeria data base constitutes the main source of data for the empirical analysis. The study period is marked by the notable political reform that led to the emergence of democratic governance in the country from 1999 onward as well as important economic and financial sector reforms. Furthermore, the nation had its fair share of the negative backlash from the global economic crisis or what has become known as the great recession during the period. Thus, it becomes expedient to examine the macroeconomic dynamics during this time in relation to the purpose of the study.

The list and definition of variables used in the study is presented in Appendix 1. All the variables are in percentage terms.

4.2 Unit Root Test

The variables were subjected to stationarity test based on the Phillips-Perron (PP) approach. It is important to determine the order of integration, *ab initio*, because the autoregressive distributed lag (ARDL) method can be applied to a mix of I (0) and I (1) variables. The ARDL model will crash in the presence of any variable integrated to the second order. Table 1 shows that at the PP critical value of 1%, all the variables turned out to be stationary after the first difference with the exception of GF CFG, INFL, RMLRATE and INFL.

Table 1. Stationarity Test

PHILLIPS-PERRON TEST STATISTIC AND CRITICAL VALUE			Order of Integration
Variable	Test Statistic	Critical Value	
BSDGDP	-4.866469	-2.604073***	1
CPSGDP	-5.130187	-3.544063***	1
FDIGDP	-7.580194	-2.604073***	1
GFCFG	-3.633677	-2.604073***	0
GFCFGDP	-4.573828	-3.544063***	1
INFL	-13.210095	-3.544063***	0
RMLRATE	-3.132914	-3.544063***	0
PRIGDP	-5.179375	-2.604073***	1
RGDPG	-3.802798	-2.604073***	1
TTGDP	-7.943165	-2.604073***	1
UNE	-3.989154	-3.544063***	1
PUBGDP	-4.578123	-3.544063***	1

*** stationary at 1%

According to Pesaran et al (see Jayaraman and Choong, 2006), all the regress and in the various equations should be I (1). This condition is satisfied in all the estimating equations used in this study. The lag length of order two was used in the analysis based on the Scharzt information criterion (SIC).

4.3 The Model

This paper examines the long run relationships between the various macroeconomic fundamentals using the autoregressive distributed lag (ARDL)

model (Perseran et al 2001). The model is particularly good in estimating long run economic relationship in developing countries where time series data are usually short (small sample size). ARDL model is also used for forecasting and estimating multiplier effects (Hill, Griffiths and Lim, 2007). Other desirable attributes of the ARDL approach include: the estimation is straightforward, involving least squares after determining the lag order; and it accommodates regressors that are I(1) or I(0).

Three sets of estimations were carried out in this paper, namely: fiscal deficit versus unemployment; fiscal deficit versus private investment; and fiscal deficit and economic growth.

(i) Fiscal Deficit and Unemployment Nexus

Theoretically and empirically, there are several determinants of unemployment (see Chowdhury and Hossain 2014, and OECD 2006). The ARDL approach in each category of estimation is comprised of three steps (Nyong 2013). In the first stage, the least square technique is employed to estimate the equation of the following form:

$$\Delta UNE_t = \alpha_0 + \dots$$

$$\alpha_1 BSDGDP_{t-1} + \alpha_2 RGDPG_{t-1} + \alpha_3 INFL_{t-1} + \alpha_4 GF CFG_{t-1} + \alpha_5 UNE_{t-1} +$$

$$\Sigma \phi_j \Delta BSDGDP_{t-k} + \Sigma \omega_i \Delta RGDPG_{t-k} + \Sigma \theta_r \Delta INFL_{t-k} + \Sigma \epsilon_k \Delta GF CFG_{t-k} + \Sigma \psi_k \Delta UNE_{t-k} +$$

$$V_{1t}$$

.....(3)

Where $\alpha_1, \alpha_2, \alpha_3,$ and $\alpha_4,$ are the long run multipliers of the model and α_0 is the drift. V_{1t} are the white noise errors.

Once cointegration is established in the first step, the conditional ARDL long run model for the unemployment equation can be estimated as:

$$UNE_t = \alpha_0 +$$

$$\Sigma \alpha_{1i} BSDGDP_{t-i} + \Sigma \alpha_{2i} RGDPG_{t-i} + \Sigma \alpha_{3i} INFL_{t-i} + \Sigma \alpha_{4i} GF CFG_{t-i} + \Sigma \alpha_{5i} UNE_{t-i} +$$

$$V_{1t}$$

.....(4)

In this study, the SIC was used to determine the lag order, and it is one (3). Thus, from equation (2), the a priori expectations are:

$$\frac{\partial UNE_t}{\partial BSDGDP_{t-1}} < 0, \frac{\partial UNE_t}{\partial RGDPG} < 0, \frac{\partial UNE_t}{\partial INFL_t} < 0, \frac{\partial UNE_t}{\partial GFCFG_t} < 0$$

In the third step, the short run dynamic parameters are obtained by estimating an error correction model associated with the long run parameters in step 2:

$$\begin{aligned} \Delta UNE_t = & \varrho_0 + \sum \varphi_j \Delta BSDGDP_{t-j} + \sum \omega_i \Delta RGDPG_{t-i} + \sum \theta_r \Delta INFL_{t-n} + \sum \zeta_r \Delta GFCFG_{t-m} + \\ & \sum \psi_k \Delta UNE_{t-k} \\ & + \pi ect_{t-1} + U_{1t} \dots \dots \dots (5) \end{aligned}$$

Where $\varphi, \omega, \theta,$ and ψ are the short run dynamic multipliers, π is the speed of convergence or adjustment to equilibrium and ect is the error correction term.

(ii) Fiscal Deficit and Private Investment Nexus

The determinants of private investment employed in this study include: FDGDP, LRGDP, LTRD, LFDI and LCPS (see Ozurumba 2008, Ayeni 2014 and Sisay 2010). The explicit relationships are depicted in equations (4), (5) and (6):

$$\begin{aligned} \Delta PRIGDP_t = & \lambda_0 + \\ & \lambda_1 BSDGDP_{t-1} + \lambda_2 RGDPG_{t-1} + \lambda_3 GFCFGDP_{t-1} + \lambda_4 TTGDP_{t-1} + \lambda_5 CPSGDP_{t-1} + \\ & \lambda_6 PRIGDP_{t-1} \\ & + \sum \eta_j \Delta BSDGDP_{t-j} + \sum \zeta_i \Delta RGDPG_{t-i} + \sum \beta_r \Delta LGFCFG_{t-r} + \sum \tau_k \Delta TTGDP_{t-k} + \\ & \sum \Gamma_k \Delta CPSGDP_{t-k} + \sum \tau_k \Delta PRIGDP_{t-k} + V_{1t} \dots \dots \dots (6) \end{aligned}$$

$$\begin{aligned} PRIGDP_t = & \lambda_0 + \\ & \sum \lambda_1 BSDGDP_{t-1} + \sum \lambda_2 RGDPG_{t-1} + \sum \lambda_3 GFCFGDP_{t-1} + \sum \lambda_4 TTGDP_{t-1} + \\ & \sum \lambda_5 CPSGDP_{t-1} + \sum \lambda_6 PRIGDP_{t-1} \\ & + V_{1t} \dots \dots \dots (7) \end{aligned}$$

The *a priori* expectations are:

$$\frac{\partial PRIGDP_t}{\partial BSDGDP_{t-1}} > 0, \frac{\partial PRIGDP_t}{\partial RGDPG_{t-1}} > 0, \frac{\partial PRIGDP_t}{\partial GFCFGDP_{t-1}} > 0,$$

$$\frac{\partial PRIGDP_t}{\partial TTGDP_{t-1}} > 0, \frac{\partial PRIGDP_t}{\partial CPSGDP_{t-1}} > 0$$

$$\Delta PRIGDP_t = a_0 + \sum b_j \Delta BSDGDP_{t-j} + \sum c_i \Delta RGDPG_{t-i} + \sum d_r \Delta GFCFGDP_{t-r} + \sum e_k \Delta TTGDP_{t-k} + \sum f_n \Delta CPSGDP_{t-n} + \sum g_p \Delta PRIGDP_{t-p} + \gamma ect_{t-1} + U_{1t}$$

.....(7)

(iii) Fiscal Deficits and Growth Nexus

Based on the modified aggregate production function, the nexus between fiscal deficits and economic growth was investigated with the following variables: FDGDP, LFDI, MLR and LTRD. The estimating equations are given below:

$$\Delta RGDPG_t = \lambda_0 + \lambda_1 \Delta FDIGDP_{t-1} + \lambda_2 \Delta BSDGDP_{t-1} + \lambda_3 \Delta TTGDP_{t-1} + \lambda_4 \Delta RMLRATE_{t-1} + \lambda_5 \Delta PUBGDP_{t-1} + \lambda_6 \Delta RGDPG_{t-1} + \xi_1 \Delta FDIGDP_{t-1} + \sum \beta_r \Delta BSDGDP + \sum \tau_k \Delta LTTGDP_{t-k} + \sum \Gamma_k \Delta RMLRATE_{t-k} + \sum \tau_k \Delta PUBGDP_{t-k} + \sum \tau_k \Delta LRGDP_{t-k} + V_{1t} \dots \dots \dots (9)$$

$$RGDPG_t = \lambda_0 + \sum \lambda_1 \Delta LFDIGDP_{t-1} + \sum \lambda_2 \Delta BSDGDP_{t-1} + \sum \lambda_3 \Delta TTGDP_{t-1} + \sum \lambda_4 \Delta RMLRATE_{t-1} + \sum \lambda_5 \Delta PUBGDP_{t-1} + \sum \lambda_6 \Delta RGDPG_{t-1} + V_t \dots \dots \dots (10)$$

The a priori expectations are:

$$\frac{\partial RGDPG_t}{\partial FDIGDP_{t-1}} > 0, \frac{\partial RGDPG_t}{\partial BSDGDP_{t-1}} > 0, \frac{\partial RGDPG_t}{\partial TTGDP_{t-1}} > 0,$$

$$\frac{\partial RGDPG_t}{\partial RMLR_{t-1}} < 0, \frac{\partial RGDPG_t}{\partial PUBGDP_{t-1}} > 0$$

$$\begin{aligned} \Delta RGDPG_t = & \alpha_0 \\ & \Sigma b_j \Delta FDIGDP_{t-j} + \Sigma c_i \Delta BSDGDP_{t-i} + \Sigma d_r \Delta TTGDP_{t-r} + \Sigma e_k \Delta RMLR_{t-k} + \\ & \Sigma_{ZW} \Delta PUBGDP_{t-W} + \Sigma f_n \Delta RGDPG_{t-n} \\ & + U_{1t} \dots \dots \dots (11) \end{aligned}$$

5. EMPIRICAL ANALYSIS

The analytical results are presented under the relevant categories.

5.1 Estimation Results for Fiscal Deficit and Unemployment Nexus

In determining the relationship between deficit financing and the unemployment rate, three equations were estimated. First, the estimation result of equation (3) is shown in Appendix 2. The coefficients of this regression – the long run multipliers - are of no direct interest (Pesaran and Pesaran 1997 cited in Fosu and Magnus, 2006). However, the coefficients are useful in carrying out the Wald joint test to find out if the multipliers are significantly different from zero. The F-statistic of 2.678864 at the 5% level of significance provides the rationale for rejecting the null hypothesis and this confirms the existence of long run relationship among the variables.

Wald Test for Long Run Multipliers (Eq. 3)

Equation: EQ0111_STEP_1

Test Statistic	Value	Df	Probability
F-statistic	2.678864	(5, 44)	0.0337
Chi-square	13.39432	5	0.0200

Following the existence of long run cointegration, the estimated parameters of the parsimonious long run equation (4) is displayed in Table 2. The key explanatory variable of interest - the fiscal deficit (BSDGDP) - came up with the expected negative sign and this indicates that fiscal deficit is inversely related to the unemployment rate in the long run. Moreover, the coefficient of deficit financing is statistically significant at the 10% level (p-value of 0.054). Thus, this finding seems to supports the Keynesian prescription that an increase in government spending will raise aggregate demand and increase production which will translate to a reduction in the unemployment rate.

Table 2. Long Run Parameters (Eq.4)

Dependent Variable: UNE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.350379	0.592043	-0.591813	0.5565
RGDPG(-2)	0.045389	0.090191	0.503258	0.6169
INFL(-1)	-0.034991	0.031185	-1.122060	0.2669
GFCFG(-1)	0.042220	0.012039	3.506934	0.0009
BSDGDP(-1)	-0.151524	0.076917	-1.969965	0.0541
UNE(-1)	1.534773	0.112025	13.70022	0.0000
UNE(-2)	-0.548959	0.117362	-4.677496	0.0000
R-squared	0.986269	Mean dependent var		15.83577
Adjusted R-squared	0.984715	S.D. dependent var		5.968514
F-statistic	634.4860	Durbin-Watson stat		1.897754
Prob(F-statistic)	0.000000			

The parsimonious error correction model in Table 3 indicates that in the short-run, the impact of fiscal deficit on the unemployment rate is not statistically significant but the parameter possesses the a priori negative sign. However, the real GDP growth variable is significant at the one percent level and possesses the right sign. This shows that growing the Nigerian economy will reduce the unemployment rate in the long run. In addition, the inflation variable, though not significant but it has the right sign, which suggest the existence of the Phillips curve. The dummy variable for the recent great recession or global financial crisis is not significant statistically in relation to the unemployment rate. Furthermore the speed of adjustment to short run changes is small, as UNE adjust to only 0.03% of the changes in the other variables within the previous period.

Table 3. Short Run Dynamic Multipliers and Adjustment (Eq. 5)

Dependent Variable: DUNE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000553	0.107793	-0.005129	0.9959
DRGDGP(-1)	-0.616511	0.239831	-2.570604	0.0131
DINFL(-1)	-0.018242	0.020303	-0.898496	0.3731
DGFCFG(-1)	0.050343	0.012097	4.161641	0.0001
DBSDGDP(-2)	-0.088873	0.181579	-0.489446	0.6266
DUNE(-1)	0.735649	0.119276	6.167616	0.0000
DUNE(-2)	0.211990	0.147816	1.434147	0.1576
DUM	0.005430	0.304899	0.017809	0.9859
ECM_111	-0.029550	0.021136	-1.398107	0.1681
R-squared	0.590626	Mean dependent var		0.335672
Adjusted R-squared	0.526411	S.D. dependent var		1.017139
F-statistic	9.197575	Durbin-Watson stat		2.038265
Prob(F-statistic)	0.000000			

5.2 Estimation Results of Fiscal Deficit and Private Investment Nexus

The outcome of the estimated long run multipliers for equation (6) is presented in Appendix 5. The associated Wald test indicates that the long run multipliers in the equation for private investment are statistically significant at the one percent level which provides evidence of a cointegration relationship. Furthermore, the estimation results for equation (7) give the long run parameters in Table 4. Here, the finding shows that in the long run, the relationship between the budget deficit and private investment is positive and statistically significant at the five percent level (p-value is 0.012). This result suggests that fiscal deficit "crowd in" private investment rather than "crowd out". This complementary role of fiscal deficit may come through the channel of public investment in infrastructure and other additions to the capital stock.

Wald Test for Long Run Multiplier (Eq. 6)

Wald Test:

Equation: Untitled

Test Statistic	Value	Df	Probability
F-statistic	3.941018	(6, 41)	0.0034
Chi-square	23.64611	6	0.0006

Table 4. Long Run Parameters (Eq. 7)

Dependent Variable: PRIGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.870854	1.041993	2.755156	0.0081
RGDPG(-2)	-0.087362	0.116245	-0.751537	0.4557
GFCFGDP(-2)	0.087700	0.102669	0.854203	0.3969
TTGDP(-1)	-0.023132	0.011862	-1.950164	0.0566
CPSGDP(-1)	-0.064051	0.028348	-2.259434	0.0281
BSDGDP(-2)	0.339889	0.130977	2.595026	0.0123
PRIGDP(-1)	1.202835	0.119181	10.09253	0.0000
PRIGDP(-2)	-0.271987	0.169222	-1.607279	0.1140
R-squared	0.889722	Mean dependent var		3.933573
Adjusted R-squared	0.874877	S.D. dependent var		2.143528
F-statistic	59.93383	Durbin-Watson stat		2.097154
Prob(F-statistic)	0.000000			

The error correction term in the short run dynamic multipliers came up with a counter intuitive sign and is not presented.

5.3 Estimation Results of Fiscal Deficit and Economic Growth Nexus

The test for the existence of long run relationship between economic growth and fiscal deficit involves the estimation of equation (9). The long run multipliers are shown in Appendix 8 and the Wald test for the joint significance of these coefficients indicate that the F-statistic is significant at the ten percent level

while the chi-square statistic is significant at the five percent level. Consequently, a long run relationship exists among the variables.

Wald Test for Long Run Multiplier (Eq. 9)

Wald Test:

Equation: EQ0333_STEP_1

Test Statistic	Value	Df	Probability
F-statistic	2.131572	(6, 39)	0.0714
Chi-square	12.78943	6	0.0465

The regression result of equation 10 is provided in Table 6. The outcome shows that there is a negative relationship between economic growth and fiscal deficit but not statistically significant. The sign contradicts *a priori* expectation. The short run dynamic multipliers presented in Table 7 indicate that the adjustment speed is quite small at 0.07%.

Table 6. Long Run Parameters (Eq. 10)

Dependent Variable: RGDPG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.033460	0.372573	-0.089808	0.9288
PUBGDP(-2)	0.005395	0.008441	0.639221	0.5255
BSDGDP(-2)	-0.009399	0.041932	-0.224151	0.8235
RMLRATE(-1)	0.018008	0.010614	1.696562	0.0958
TTGDP(-1)	-0.008587	0.005498	-1.561774	0.1244
FDIGDP(-1)	0.156621	0.091007	1.720977	0.0912
RGDPG(-1)	1.569529	0.107634	14.58205	0.0000
RGDPG(-2)	-0.621195	0.094677	-6.561217	0.0000
R-squared	0.966627	Mean dependent var		6.057377
Adjusted R-squared	0.962134	S.D. dependent var		1.736651
F-statistic	215.1616	Durbin-Watson stat		2.135385
Prob(F-statistic)	0.000000			

Budget deficit is positively correlated to economic growth in the short term but the relationship is not statistically significant. The relationship between foreign direct investment and economic growth is positive in the short run and significant at one percent level.

Table 7. Short Run Dynamic Multipliers and Adjustment (Eq. 11)

Dependent Variable: DRGDPG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.019974	0.050840	0.392880	0.6961
DPUBGDP(-1)	0.033434	0.016334	2.046954	0.0459
DBSDGDP(-2)	0.104935	0.083572	1.255634	0.2151
DRMLRATE(-1)	-0.015295	0.012414	-1.232018	0.2237
DTTGDP(-1)	0.007699	0.008143	0.945421	0.3490
DFDIGDP(-2)	0.079763	0.098311	0.811337	0.4210
DRGDPG(-1)	0.468442	0.168715	2.776535	0.0077
DRGDPG(-2)	-0.105397	0.154241	-0.683324	0.4976
DUM	0.162637	0.156716	1.037781	0.3044
ECM_333	-0.066428	0.051712	-1.284582	0.2049
R-squared	0.536053	Mean dependent var		0.067545
Adjusted R-squared	0.452543	S.D. dependent var		0.470507
F-statistic	6.419005	Durbin-Watson stat		2.173988
Prob(F-statistic)	0.000005			

5.4 Discussion of Results

A key outcome of this study is the finding that deficit financing by the Nigerian government has a negative and statistically significant impact on the unemployment rate. This is in tandem with the Keynesian postulates that increased public spending will lead to an expansion in aggregate demand, and in turn, national output will rise. Rising aggregate output signifies economic expansion or movement towards the crest of the business cycle which theoretically should lead to a fall in the unemployment rate. For instance, Denu, Tekeste and Deiji (2005) notes the following about Ethiopia, "It has been argued that youth unemployment rates are more sensitive to changes in aggregate

demand than adult rates for a number of reasons. Firstly, it is less costly for firms to fire young workers when aggregate demand falls, since young workers are likely to be less skilled and experienced than their prime age co-workers, embody lower levels of investment by firms in training, and are less likely to be subject to employment protection legislation. Moreover, during economic slumps, the first measure firms are likely to take is to stop recruiting new employees. Since youths are disproportionately affected by unemployment as new entrants to the labour market, this age cohort will be disproportionately affected. Creating decent employment opportunities for youth requires appropriate macroeconomic policies." Furthermore, the finding of this study differs sharply from that of Al-Sarairah (2014) who in the case of Jordan found a significant positive correlation between unemployment rate and government expenditure.

Another major finding of this study is the positive and statistically significant relationship between private investment and deficit financing in the long run. This result suggests that fiscal deficit "crowd in" private investment rather than "crowd out". This complementary role of fiscal deficit may come through the channel of public capital investment in infrastructure. Everhart and Sumlinski, 2001 (cited in Acosta and Loza, 2005) avers that the crowding in effect emphasizes the positive externalities which includes investments in infrastructure, anti-cyclical policies, public goods provision as well as the complementarity that public investment (fiscal deficits channeled to capital expenditure rather than recurrent expenditure) has by inducing higher levels of private investment. The evidence from this study that government deficit crowd in private investment agrees with that of Bahmani (1999) who investigated the long-run relationship between U.S. federal real budget deficits and real fixed investment. The empirical results indicates that real budget deficits have crowded in real investment, supporting the Keynesians who argue for the expansionary effects of budget deficits, by raising the level of domestic economic activity. However, the outcome of this paper differ from some other studies who found that budget deficits crowd out private investment (see Arora and Dua 1993, Asogwa and Okeke 2013, and Ekpo 1999).

Finally, the study finds that deficit spending in Nigeria has a negative but not statistically significant relationship with economic growth. Thus, this outcome suggests that deficit financing may hurt growth but not to any significant degree. This finding is in consonance with Ekpo (2003) who posits that Nigeria has one of the higher ratios of government spending to GDP amongst developing countries and yet does not have much to show for it. Furthermore, another Nigerian Study by Wosowei (2013) avers that fiscal deficit spending is

negatively related to economic growth, though the relationship is not statistically significant.

6. SUMMARY AND CONCLUSION

This paper represents an attempt to provide an in-depth analysis of the nexus between deficit financing and each of the following macroeconomic variables: unemployment rate, private investment and economic growth. Quarterly data was employed covering the time span 1999 -2013. The technique of analysis used is the autoregressive distributed lag approach.

The findings show that fiscal deficits significantly complement private investment in the long run and hurt economic growth, though not significantly. In addition, fiscal deficits have a negative and significant relationship to unemployment rate in the long term.

Thus, in order to reduce widespread and endemic poverty in the society, the government should channel its effort mainly towards the provision of supportive investment that promotes private sector participation in economic activities such as power, roads, etc. Furthermore, avenues for leakages should be blocked so that such resources may be re-invested into the provision of basic infrastructure. This will also include cutting down on certain recurrent expenditures. To finance deficit, government should explore options that minimize upward spiral in the cost of funds.

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Appendix 1. List of Variables

Variable	Definition
BSDGDP	Budget Surplus/Deficit to GDP (%)
CPSGDP	Credit to Private Sector to GDP (%)
FDIGDP	Foreign Direct Investment to GDP (%)
GFCFG	Gross Fixed Capital Formation Growth (%)
GFCFGDP	Gross Fixed Capital Formation TO GDP (%)
INFL	Inflation Rate (%)
RMLRATE	Real Maximum Lending Rate (%)
PRIGDP ¹	Private Investment to GDP (%)
RGDPG	Real GDP Growth (%)
TTGDP	Total Trade to GDP (%)
UNE	Unemployment Rate (%)
PUBGDP ²	Public investment to GDP (%)
DUM	Dummy variable specification to account for the recent great recession in 2008/2009

1. The private investment as used in this study is simply gross fixed capital formation minus the capital expenditure of the government. According to CBN 2013, Gross fixed capital formation is the expenditure on fixed assets (such as buildings, machinery) either for replacing or adding to the stock of existing fixed assets. Also, see Acosta and Loza, 2005 for definition on private investment.
2. The capital expenditure of government is used to represent public investment.

Appendix 2. Long-run Multipliers (Unemployment Equations)

Dependent Variable: DUNE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.212624	0.580409	-0.366334	0.7159
RGDPG(-1)	0.082196	0.094942	0.865747	0.3913
INFL(-1)	-0.113772	0.065101	-1.747617	0.0875
GFCFG(-1)	0.022506	0.015014	1.498981	0.1410
BSDGDP(-1)	-0.140993	0.080117	-1.759845	0.0854
UNE(-1)	-0.019934	0.021421	-0.930599	0.3571
DRGDPG(-1)	-0.532068	0.337574	-1.576155	0.1222
DRGDPG(-2)	0.122669	0.310576	0.394971	0.6948
DINFL(-1)	0.070650	0.048263	1.463846	0.1503
DINFL(-2)	0.068210	0.032144	2.122038	0.0395
DGFCFG(-1)	0.038725	0.017049	2.271343	0.0281
DGFCFG(-2)	0.002736	0.015113	0.181033	0.8572
DBSDGDP(-1)	0.008535	0.189882	0.044949	0.9644
DBSDGDP(-2)	0.083842	0.203088	0.412837	0.6817
DUNE(-1)	0.655096	0.165585	3.956246	0.0003
DUNE(-2)	0.170313	0.178637	0.953404	0.3456
R-squared	0.691864	Mean dependent var		0.335672
Adjusted R-squared	0.586818	S.D. dependent var		1.017139
F-statistic	6.586278	Durbin-Watson stat		2.114460
Prob(F-statistic)	0.000000			

Appendix 3. Non-parsimonious Long Run Parameters (Eq. 4)

Dependent Variable: DUNE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.013902	0.107761	-0.129004	0.8979
DRGDPG(-1)	-0.705101	0.323597	-2.178952	0.0343
DRGDPG(-2)	0.233365	0.315284	0.740173	0.4628
DINFL(-1)	-0.003332	0.022540	-0.147850	0.8831
DINFL(-2)	0.031489	0.023043	1.366493	0.1782
DGFCFG(-1)	0.057372	0.012790	4.485853	0.0000

DGFCFG(-2)	0.014921	0.014430	1.034073	0.3063
DBSDGDP(-1)	-0.012418	0.201741	-0.061555	0.9512
DBSDGDP(-2)	-0.098345	0.201093	-0.489052	0.6270
DUNE(-1)	0.731239	0.174222	4.197175	0.0001
DUNE(-2)	0.220326	0.181777	1.212069	0.2314
ECM_111	-0.031297	0.020945	-1.494248	0.1417
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R-squared	0.615928	Mean dependent var	0.335672	
Adjusted R-squared	0.527912	S.D. dependent var	1.017139	
F-statistic	6.997874	Durbin-Watson stat	1.935818	
Prob(F-statistic)	0.000001			

Appendix 4. Non-parsimonious Short Run Dynamic Multipliers and Adjustment (Eq. 5)

Dependent Variable: DUNE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.011827	0.110455	-0.107076	0.9152
DRGDPG(-1)	-0.706545	0.327232	-2.159155	0.0360
DRGDPG(-2)	0.233287	0.318579	0.732273	0.4676
DINFL(-1)	-0.003186	0.022813	-0.139643	0.8895
DINFL(-2)	0.031521	0.023286	1.353636	0.1823
DGFCFG(-1)	0.057471	0.012953	4.436777	0.0001
DGFCFG(-2)	0.014982	0.014591	1.026838	0.3098
DBSDGDP(-1)	-0.019306	0.212947	-0.090661	0.9281
DBSDGDP(-2)	-0.103006	0.207424	-0.496598	0.6218
DUNE(-1)	0.735582	0.180273	4.080381	0.0002
DUNE(-2)	0.224167	0.186858	1.199664	0.2363
DUM	-0.036041	0.322228	-0.111850	0.9114
ECM_111	-0.031703	0.021473	-1.476424	0.1465
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R-squared	0.616030	Mean dependent var	0.335672	
Adjusted R-squared	0.517996	S.D. dependent var	1.017139	
F-statistic	6.283792	Durbin-Watson stat	1.942776	
Prob(F-statistic)	0.000002			

Appendix 5. Long-run Multipliers (Private Investment Equation)

Dependent Variable: DPRIGDP

Included observations: 60

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.675017	1.473949	3.171764	0.0029
RGDPG(-1)	-0.155885	0.192719	-0.808873	0.4233
GFCFGDP(-1)	0.068248	0.132032	0.516904	0.6080
TTGDP(-1)	-0.031396	0.015852	-1.980528	0.0544
CPSGDP(-1)	-0.075797	0.035910	-2.110753	0.0409
BSDGDP(-1)	0.502237	0.175766	2.857419	0.0067
PRIGDP(-1)	-0.139956	0.166314	-0.841515	0.4049
DGFCFGDP(-1)	-0.309308	0.260221	-1.188634	0.2414
DGFCFGDP(-2)	-0.285217	0.280696	-1.016106	0.3155
DRGDPG(-1)	0.651790	0.354140	1.840486	0.0729
DRGDPG(-2)	-0.018009	0.371199	-0.048516	0.9615
DTTGDG(-1)	0.018738	0.021251	0.881724	0.3831
DTTGDG(-2)	0.010789	0.019479	0.553855	0.5827
DCPSGDP(-1)	-0.013925	0.070113	-0.198606	0.8436
DCPSGDP(-2)	-0.012214	0.076786	-0.159066	0.8744
DBSDGDP(-1)	-0.494881	0.452582	-1.093461	0.2806
DBSDGDP(-2)	-0.771348	0.474135	-1.626852	0.1114
DPRIGDP(-1)	0.207177	0.290483	0.713216	0.4798
DPRIGDP(-2)	-0.100282	0.306127	-0.327584	0.7449
R-squared	0.545873	Mean dependent var		-0.095681
Adjusted R-squared	0.346500	S.D. dependent var		0.925785
F-statistic	2.737951	Durbin-Watson stat		2.063793
Prob(F-statistic)	0.003814			

Appendix 6. Non-parsimonious Long Run Parameters (Eq.7)

Dependent Variable: PRIGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.519658	1.262543	1.995701	0.0518
RGDPG(-1)	0.456118	0.303051	1.505088	0.1390
RGDPG(-2)	-0.437612	0.263455	-1.661051	0.1034
GFCFGDP(-1)	-0.244369	0.230043	-1.062276	0.2935
GFCFGDP(-2)	0.254886	0.244116	1.044119	0.3018

TTGDP(-1)	-0.010698	0.018388	-0.581807	0.5635
TTGDP(-2)	-0.014422	0.019497	-0.739693	0.4632
CPSGDP(-1)	-0.073156	0.070120	-1.043309	0.3021
CPSGDP(-2)	0.021503	0.070165	0.306461	0.7606
BSDGDP(-1)	-0.126241	0.406219	-0.310772	0.7573
BSDGDP(-2)	0.532239	0.427585	1.244756	0.2194
PRIGDP(-1)	1.142082	0.283814	4.024059	0.0002
PRIGDP(-2)	-0.127694	0.268822	-0.475014	0.6370
R-squared	0.897231	Mean dependent var	3.933573	
Adjusted R-squared	0.870992	S.D. dependent var	2.143528	
F-statistic	34.19470	Durbin-Watson stat	2.069307	
Prob(F-statistic)	0.000000			

Appendix 7. Long-run Multipliers (Growth Equation)

Dependent Variable: DRGDPG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.119905	0.634268	-0.189044	0.8510
PUBGDP(-1)	-0.004622	0.010831	-0.426748	0.6719
BSDGDP(-1)	0.023614	0.064600	0.365547	0.7167
RMLRATE(-1)	0.036078	0.018874	1.911567	0.0633
TTGDP(-1)	-0.014066	0.008246	-1.705936	0.0960
FDIGDP(-1)	0.239948	0.125210	1.916364	0.0627
RGDPG(-1)	0.000762	0.073165	0.010411	0.9917
DPUBGDP(-1)	0.017869	0.026111	0.684359	0.4978
DPUBGDP(2)	-0.001507	0.034365	-0.043867	0.9652
DBSDGDP(-1)	-0.010670	0.148298	-0.071950	0.9430
DBSDGDP(-2)	0.053064	0.162154	0.327248	0.7452
DRMLRATE(-1)	-0.037285	0.017434	-2.138607	0.0388
DRMLRATE(-2)	-0.010701	0.015408	-0.694528	0.4915
DTTGDP(-1)	0.013944	0.012930	1.078358	0.2875
DTTGDP(-2)	0.018436	0.013856	1.330572	0.1911
DFDIGDP(-1)	-0.085757	0.172457	-0.497265	0.6218
DFDIGDP(-2)	-0.162400	0.184298	-0.881185	0.3836
DRGDPG(-1)	0.304177	0.206683	1.471705	0.1491
DRGDPG(-2)	0.005929	0.209711	0.028273	0.9776
R-squared	0.648708	Mean dependent var	0.067270	
Adjusted R-squared	0.486573	S.D. dependent var	0.478687	

F-statistic	4.001039	Durbin-Watson stat	2.047208
Prob (F-statistic)	0.000143		

Appendix 8 Non-parsimonious Long Run Parameters (Eq. 10)

Dependent Variable: RGDPG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.210276	0.479965	-0.438107	0.6633
PUBGDP(-1)	0.019030	0.021564	0.882487	0.3820
PUBGDP(-2)	-0.018771	0.021000	-0.893866	0.3759
BSDGDP(-1)	0.000892	0.118899	0.007499	0.9940
BSDGDP(-2)	0.011997	0.128801	0.093141	0.9262
RMLRATE(-1)	-0.004407	0.013080	-0.336938	0.7377
RMLRATE(-2)	0.034508	0.013048	2.644743	0.0111
TTGDP(-1)	0.001415	0.011133	0.127129	0.8994
TTGDP(-2)	-0.009263	0.011585	-0.799559	0.4280
FDIGDP(-1)	0.082336	0.142224	0.578920	0.5654
FDIGDP(-2)	0.068129	0.140838	0.483740	0.6308
RGDPG(-1)	1.390489	0.124038	11.21016	0.0000
RGDPG(-2)	-0.403223	0.114420	-3.524070	0.0010
R-squared	0.972553	Mean dependent var	6.057377	
Adjusted R-squared	0.965545	S.D. dependent var	1.736651	
F-statistic	138.7834	Durbin-Watson stat	2.125756	
Prob(F-statistic)	0.000000			

Appendix 9. Non-parsimonious Short Run Dynamic Multipliers and Adjustment (Eq.11)

Dependent Variable: DRGDPG

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006146	0.057582	0.106741	0.9155
DPUBGDP(-1)	0.027110	0.023682	1.144746	0.2586
DPUBGDP(2)	0.012777	0.031424	0.406602	0.6863
DBSDGDP(-1)	0.006783	0.123790	0.054797	0.9566
DBSDGDP(-2)	0.155656	0.170127	0.914945	0.3653

DRMLRATE(-1)	-0.014534	0.013982	-1.039461	0.3044
DRMLRATE(-2)	0.011543	0.012991	0.888572	0.3792
DTTGDP(-1)	0.007127	0.012472	0.571420	0.5707
DTTGDP(-2)	0.009249	0.013409	0.689732	0.4941
DFDIGDP(-1)	0.008633	0.179834	0.048007	0.9619
DFDIGDP(-2)	-0.023044	0.178650	-0.128989	0.8980
DRGDPG(-1)	0.520579	0.208216	2.500191	0.0163
DRGDPG(-2)	-0.103013	0.212320	-0.485179	0.6300
DUM	0.194152	0.183174	1.059930	0.2951
ECM_333	-0.060511	0.056995	-1.061676	0.2943

R-squared	0.553863	Mean dependent var	0.067270
Adjusted R-squared	0.408610	S.D. dependent var	0.478687
F-statistic	3.813075	Durbin-Watson stat	2.356532
Prob(F-statistic)	0.000353		

DOES MONEY CAUSE OUTPUT GROWTH IN NIGERIA? AN EMPIRICAL INVESTIGATION

By Hassan Ojor OZEKHOME and Nuhu MOHAMMED*

Abstract

This paper investigates the empirical nexus between money and output growth in Nigeria between 1980 and 2013, Employing Cointegration, Error correction techniques and Granger causality test, the paper finds that money growth has a positive (albeit low predictive power) in explaining output growth. Investment and oil earning are both found to have significant positive effect on output. Evidence of a long run equilibrium relationship is found between money growth and output growth in Nigeria. The causality test reveals that a feedback relationship (bi-directional causality) exists between changes in money growth and output growth, giving credence to the existence of both the monetary-induced business-cycle and Real Business-cycle in Nigeria. A feedback relationship is also found between investment and output growth, while unidirectional causation runs from oil earnings to output. The paper recommends, among others, that money growth be linked to the objective of enhancing growth (output) and stabilizing prices (taming domestic inflationary pressures) that might result from money and the harmonization of both the contractionary and expansionary policies to reduce the rate differential between productive and unproductive credit in order to minimize output fluctuations in Nigeria .

Keywords: Money Growth, Output Growth, Monetary Business cycle, Real Business Cycle, Transmission Mechanism

JEL:E5, E51, E52, O4, O42, O47

1.0 Introduction

Recently, theoretical and empirical research has sought to examine the relationship between money supply and output growth in a more coherent, and rigorous analytical framework. Empirical torchlight has sought to examine the connection between both variables than any other subject matter in the field of monetary economics in recent years. Persistent attention has always been given among monetary economists to examining the relationship between money and output growth, reflecting the prime importance of economic (output) growth among macro-economic objectives of nations (developed and developing).

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(Mckinnon; 1973; Shaw, 1973; Levine, 1997). Economists differ on the effect of increase in money supply on output growth. While some agree that variation in the quantity of money is the most important determinant of economic growth (output growth), and that countries that devote more time to studying the behaviour of aggregate money supply rarely experience much variation in their economic activities. Others express a skeptical disposition about the effect of money on output. Kuznets (1955) holds the view that financial markets begin to grow as the economy approaches the intermediate stage of the growth process and develop once the economy becomes matured. This implies that economic growth drives financial development, exemplified in the supply-led hypothesis. Domingo (2001) cited in Ogunmuyiwa and Ekone (2010) explains that there may not be possibility of economic growth without an appropriate level of money supply, credit and financial conditions in general.

The neoclassical synthesis suggests a set of major conclusions about the role of monetary policy (in which money supply belongs). First, it suggests that monetary policy actions can have an important effect on real economic activity, persisting over several years, due to gradual adjustment of individual prices and the general price level. Second, even in settings with costly price adjustment, the models suggest little long run tradeoff between inflation and real activity. Third, the models suggest significant gains from eliminating inflation, which stems from increased transactions efficiency and reduced relative price distortions. Fourth, the models imply that credibility plays an important role in understanding the effects of monetary policy. These four ideas are consistent with the public statements of central bankers from a wide range of countries (Goodfriend and King, 1997). For example, post-war U.S data support the conclusion that exogenous increases in the supply of money generate substantial, persistent declines in short-term interest rates, leading to increase in investment, and consequently increase in output. This view contrasts sharply with that of the traditional literature on the subject, which has tended to conclude that money supply shocks raise, rather than lower, short-term interest rate (Reichenstein, 1987) cited in Christiano and Eichenbaum (1992). The generic implication of these models is that, if money growth displays positive persistence, then unanticipated shocks to the growth rate of money drives the nominal interest rate up, but employment and output down. This reflects the fact that, in these models, money shocks affect interest rates exclusively through an anticipated inflation effect. The only way for an exogenous shock to the money supply to drive the interest rate down in these models is for the shock to signal a subsequent decline in money growth. Not surprisingly, this requires grossly counterfactual assumptions about the law of motion for money supply (Christiano and Eichenbaum, 1992). Thus, the channel through which money

growth affects output is basically through the interest rate mechanism. Evidence in the Nigerian economy has shown that since the 1980's, some relationship exists between output and money supply growth. Over the years, Nigeria has been controlling her economy through variation in the stock of money. Consequent upon the effect of the collapse oil price in 1981 and the BOP disequilibrium experienced during this period, various methods of stabilization ranging from fiscal to monetary policies were used. Ikhide and Alawode (1993) while evaluating the effect of Structural Adjustment Programme (SAP) concludes that reducing money stock through increase in interest rate would lower output. Thus, the notion that stock of money varies with economic activities applies to the Nigerian economy (Laider, 1993). Given the expansionary monetary policy-particularly money growth that has been witnessed in Nigeria in recent years when juxtaposed with output, there is need for a more rigorous empirical examination of the output growth-money-supply growth nexus. This is the crux of this study. This paper thus seeks to empirically examine the money and output growth correlation in Nigeria.

2.0 LITERATURE REVIEW

2.1 Theoretical Issues

Monetary policy takes its root from the works of Irving Fisher (Diamond, 2003) who lays the foundation of the quantity theory of money through his equation of exchange. In his proposition, Fisher avers that money has no effect on economic aggregates but price. However, the role of money in an economy got further elucidation from Keynes (Keynes, 1930 P. 90) and other Cambridge economists who propose` that money has indirect effect on other economic variables by influencing the interest rate which affects investment and cash holding of economic agents. The position of Keynes is that unemployment arises from inadequate aggregate demand which can be increased by increase in money supply which generates increased spending, increased employment and economic growth. However, he recommends a proper blend of monetary and fiscal policies as at some occasions, monetary policy could fail to achieve its objective. The role of monetary policy which of course encompasses influencing the volume, cost and direction of money supply was effectively canvassed by Friedman. (Friedman, 1968. P. 1-17). He contends that inflation, is always and everywhere a monetary phenomenon while recognising in the short run that increase in money supply can reduce unemployment but can also create inflation and so the monetary authorities should increase money supply with caution.

2.2. Monetary Policy Transition Mechanism

There are different transmission channels through which monetary policy affects economic activities and these channels of transmissions have been broadly examined under the monetarist and Keynesian schools of thought. The monetarist postulates that change in the money supply leads directly to a change in the real magnitude of money. Describing this transmission mechanism, Friedman and Schwartz. (1963) assert that an expansive open market operations by the Central Bank, increases stock of money, which also leads to an increase in Commercial Bank reserves and ability to create credit and hence increase money supply through the multiplier effect. In order to reduce the quantity of money in their portfolios, the bank and non-bank organisations purchase securities with characteristics of the type sold by the Central Bank, thus stimulating activities in the real sector. This view is supported by Tobin, (1978) who examines transmission effect in terms of assets portfolio choice in that monetary policy triggers asset switching between equity, bonds, commercial paper and bank deposits. He says that tight monetary policy affects liquidity and banks ability to lend which therefore restricts loan to prime borrowers and business firms to the exclusion of mortgages and consumption spending thereby contracting effective demand and investment.

Conversely, the Keynesians posit that change in money stock facilitates activities in the financial market affecting interest rate, investment, output and employment Modigliani (1963) supports this view but introduces the concept of capital rationing and argues that the willingness of banks to lend affects monetary policy transmission. In their analysis of use of bank and non bank funds in response to tight monetary policy Oliner and Rudebush, (1995) observe that there is no significant change in the use of either but rather larger firms crowd out small firms in such times and in like manner Gertler and Gilchrist, (1991) support the view that small businesses experience decline in loan facilities during tight monetary policy and they are affected more adversely by changes in bank related aggregates such as broad money supply.. Further investigation by Borio (Borio, 1995) who investigates the structure of credit to non government borrowers in fourteen industrialised countries argues that monetary policy or money stock has been influenced by factors such as terms of loan, interest rates, collateral requirement and willingness to lend.

2.3 The Transmission Mechanism of Changes in Money Supply

The review of available literature indicates that money supply has a powerful effect on economic activity. Two transmission mechanisms exist to balance the variables in the model: the indirect mechanism which works through interest rates leading to increased consumption with a delayed impact on prices and

the direct mechanism which works through aggregate demand and thus has a more immediate and potent impact on prices. The indirect channel involves the manipulation of interest rates by the central bank. For instance, lowering interest rates spurs investments subsequently. Business firms then respond to increased sales arising from the excess money supply by ordering more raw materials and increasing production. The spread of business activity increases the demand for labour and raises the demand for capital goods. In a buoyant economy stock market prices rise and firms issue equity and debt. If the money supply continues to expand, prices begin to rise especially if output growth reaches capacity limits. As the public begins to expect inflation, lenders insist on higher interest rates to offset the expected decline in purchasing power over the life of their loans. The opposite effects occur when the supply of money falls or when its rate of growth declines. In this case, economic activity declines leading to either a disinflation (reduced inflation) or deflation (falling prices). The transmission of excess money to inflation through the direct aggregate demand channel is very potent and has a telling effect on macroeconomic stability as it involves putting more money in the hands of consumers (making them feel wealthier and thus stimulating spending). The increase in aggregate demand exerts an upward pressure on the general price level in the domestic economy, with the extent of its impact depending on the elasticity of supply. The more inelastic is aggregate supply in the economy, the greater the impact on inflation. In addition, the increase in demand may also cause a rise in imports, culminating in a downward pressure on the exchange rate as attempts are made to settle the increasing imports bill, thereby, causing a further increase in inflation. Furthermore, the corresponding increase in the demand for labour following the demand for higher production will cause a rise in money wages and unit labour costs. This may cause cost-push inflation. In conclusion, the above review shows that excess money supply, whether created through the direct or indirect channels, influences economic activity (growth) and may provide downside risks on macroeconomic stability, raising inflation, interest rates and exchange rate.

2.4 Review of Empirical Studies

A number of empirical studies have shown that money supply exerts considerable influence on economic activities (output) in both developed and developing economies. According to these studies, the low level of supply of monetary aggregates in general and money stock in particular has been responsible for the fundamental failure of many African countries to attain rapid growth and development.

In investigating the relationship between money and output growth, empirical researches have largely focused on addressing two issues. First, to examine if money supply forecast output given the predictive power of past values of output and if so, to examine the stability of such relationship overtime. Some researchers have found evidence of the output growth-money supply nexus (Krol and Chanian, 1993). Hum (1993) using evidence from South African data examines the output growth-money supply relationship. Using the causality approach, he finds that causality does not run from money to output. Jeong (2000) using Thailand socioeconomic survey concludes that growth and inequality are strongly associated with money supply and financial deepening.

Mansour (2005) examines the relationship between money and output growth in Malaysia. Using Vector Error Correction Model (VECM), he finds the existence of a positive and significant relationship between income growth rate and money supply.

Owoye and Onafowora (2007) examine the stability of real broad money supply and the effects of deviations of actual real broad money supply growth rates from targets on real GDP growth and inflation rate on the Nigerian economy since the introduction of the Structural Adjustment Program (SAP) in 1986. They employ cointegration and vector error correction methodology using quarterly data from 1986:1 to 2001:4. The results indicate that a long-run relationship exists between the real broad money supply, real GDP, inflation rate, domestic interest rate, foreign interest rate, and expected exchange rate.

A study conducted by the West African Monetary Agency (WAMA) (2009), indicates that the correlation between money supply and output is generally not significant (above 0.7) for the fifteen participating West African Countries. In all the fifteen countries examined, the expansion in money supply exceeds the real GDP growth rate. The disparity was significant in most countries, especially, Benin, Cape Verde, Gambia, Ghana, Liberia, Niger, Nigeria, Sierra Leone and Togo, with that of Nigeria being so pronounced. Nevertheless, there is weak correlation between money supply growth and output growth in few other countries.

Nevertheless, a positive but moderate correlation is observed in Burkina Faso, Cote d'Ivoire, Mali, Senegal and Togo (between 0.4-0.6). The degree of positive correlation is weak in Benin, Guinea Bissau, Guinea, Sierra Leone, Cape Verde and Liberia below (0.3). On the other hand, negative correlations are found in the case of Niger, The Gambia, Ghana and Nigeria (with a correlation coefficient of -0.0147) , providing an indication that an increase in money supply

is likely to lead to a reduction in real GDP. This negative correlation is, however, insignificant in these countries, with the exception of Niger where the relationship is moderately significant. A further review of the conduct of monetary policy appears to explain this negative correlation in The Gambia, Ghana and Nigeria where interest rates (the prime or monetary policy rate) is used as a key monetary policy instrument in reaction to high inflationary pressures. The increases in interest rates (the cost of capital) tend to affect output adversely. On the other hand, it was observed that interest rates bear a positive relationship with real GDP growth in Guinea, Nigeria and Sierra Leone. This finding suggests the likelihood that increases in interest rates impacts positively on economic activity. As this observation contradicts economic activity, it may be necessary to ascertain the determinants of real GDP growth in these countries in order to facilitate appropriate policy formulation. The differences in relationship between these two variables arise from the divergence in interest rate policies prevailing in the various countries. In certain countries, interest rates are key monetary policy measures whilst it is not in other countries.

Ojo (1993.) adopts Chetty's theoretical approach with the use of 1961-1979 data and finds that wider definition of money is more appropriate when measuring output in the Nigerian economy.

Asogwu (1998) examines the influence of money supply and government expenditure on Gross Domestic Product. He adopts the St Louis model on annual and quarterly time series data from 1960-1995. He finds money supply and export being significant.

Nwaobi (1999) examines the interaction between money and output in Nigeria between the periods 1960-1995. The model assumed the irrelevance of anticipated monetary policy for short run deviations of domestic output from its natural level. The results indicate that unanticipated growth in money supply would have positive impact on output. A clear examination of the above shows that there is no general agreement on the determinant of economic growth in Nigeria.

Findings of Saidu (2007) also confirm the existence of a strong relationship between money supply and output growth.

Folawewo and Osinubi, (2006) investigate how monetary policy objective of controlling inflation rate and intervention in the financing of fiscal deficits affect the variability of inflation and real exchange rate. The analysis is based on a

rational expectation framework that incorporates the fiscal role of exchange rate. The paper reflects that the effort of the monetary authority to influence the finance of government fiscal deficit through the determination of the inflation-tax rate affects both the rate of inflation and the real exchange rate, thereby causing volatility in their rates. It further reveals that inflation affects volatility of its own rate as well as the rate of real exchange. The policy implication of the paper is that monetary policy objective should be well defined. Sanusi (2002) holds that the ability of the CBN to pursue an effective monetary policy in a globalised and rapidly integrated financial market environment depends on several factors which include, instituting appropriate legal framework, institutional structure and conducive political environment which allows the Bank to operate with reference to exercising its instrument and operational autonomy in decision-making; other factors include the degree of coordination between monetary and fiscal policies to ensure consistency and complementarity, the overall macroeconomic environment, including the stage of development, depth and stability of the financial markets as well as the efficiency of the payments and settlement systems, the level and adequacy of information and communication facilities and the availability of consistent, adequate, reliable, high quality and timely information to Central Bank of Nigeria.

Adefeso and Mobolaji (2010) employ Johansen maximum likelihood co-integration procedure to show that there is a long run relationship between economic growth, degree of openness, government expenditure and broad money (M2). The authors conclude that that monetary policy exerts significant impact on economic activity in Nigeria.

Ogunmuyiwa and Ekone (2010) investigate the impact of money supply on economic growth in Nigeria between 1980 and 2006. Applying econometric technique of OLS, causality test and Error correction model (ECM) to time series data, they find that although money supply is positively related to growth the result is, however, insignificant in the case of GDP growth rates on the choice between contractionary and expansionary money supply.

2.5 A Quantitative Profile of Money Supply and Output Growth in Nigeria.

Official statistics from (WAMA) (2013) in assessing the contribution of the banking system to the convergence process particularly, with regard to performance on inflation, interest rate, exchange rate and output indicate that growth in money supply in Nigeria was 21.6 in 2002, 24.1 in 2003, 14.0 in 2004, 31.3 in 2005, 21.4 in 2006, 22.6 in 2007, 22.5 in 2009, and 27.2 in 2012, while the real GDP growth rates for these years were 4.6, 9.6, 6.0, 6.5, 6.0, 6.4, 6.4, 6.1, and 7.2, respectively. In

terms of the correlation between money supply and output growth in Nigeria, a correlation coefficient of -0.0147 is found. In its conclusion, it avers that Nigeria records the highest broad money supply growth rate of 57.8 percent in Nigeria in ECOWAS in 2008, noting that the country had since 2005 pursued expansionary monetary policy. The main components that contributed to this expansion were credit to the private sector and net foreign assets. Recent improvements in fiscal policy enabled the government to avoid accommodation by the banking system with the resultant effect that the government's net position to the banking sector improved over the years.

In Nigeria, however, the influence of money supply on output growth was mixed in the review periods. According to Ogunmuyiwa and Ekone (2010), between 1971 and 1975, the growth rate of the economy measured by the percentage change in the real GDP ranged from 21.3% in 1971 to 3.0% in 1975. By 1981, the growth rate ranged from 26.8% and remained negative till 1984. A simple variance analysis shows that between 1971 and 1986, the mean spread of the GDP had a variance of 9.1. The variability of the GDP was much higher before deregulation, while it became lower during and after the deregulation of the economy.

Both M1 and M2 had little correlation with growth of real GDP before the deregulation in 1986. M2 was observed to have a variance of 362.6 and a correlation coefficient of 0.21. The period of 1986-1994 had a lower correlation of 0.16 between broad money (M2) and growth of real GDP. The Mean spread of M2 was 289.2 against 108.7 for the real GDP. The correlation between M1 and GDP between 1970 and 1986 was 0.22 and for 1986-1994, it was 0.33. This analysis does not suggest any strong relationship between money supply and output growth in Nigeria.

2.6 Monetary Policy Framework in Nigeria

In Nigeria, the overriding objective of monetary policy is price and exchange rate stability. The monetary authority's strategy for inflation management is based on the view that inflation is essentially a monetary phenomenon. Because targeting money supply growth is considered as an appropriate method of targeting inflation in the Nigerian economy, the Central Bank of Nigeria (CBN) has relied on a monetary targeting policy framework to achieve its objective of price stability. With the broad measure of money (M2) as the intermediate target, and the monetary base as the operating target, the CBN utilizes a mix of indirect (market-determined) instruments to achieve its monetary objectives. These instruments included reserve requirements, open market

operations on Nigerian Treasury Bills (NTBs), liquid asset ratios and the discount window (**IMF Country Report**, 2003) cited in Owoye and Onafowora (2007).

The CBN's focus on the price stability objective was a major departure from past objectives in which the emphasis was on the promotion of rapid and sustainable economic growth and employment. Prior to 1986, the CBN relied on the use of direct (non-market) monetary instruments such as credit ceilings on the deposit money of banks, administered interest and exchange rates, as well as the prescription of cash reserves requirements in order to achieve its objective of sustainable growth and employment. During this period, the most popular instruments of monetary policy involved the setting of targets for aggregate credit to the domestic economy and the prescription of low interest rates. With these instruments, the CBN hoped to direct the flow of loanable funds with a view to promoting rapid economic development through the provision of finance to the preferred sectors of the economy such as the agricultural sector, manufacturing, and residential housing.

During the 1970s, the Nigerian economy experienced major structural changes that made it increasingly difficult to achieve the aims of monetary policy. The dominance of oil in the country's export basket began in the 1970s. For example, in 1970, the share of oil revenue in total export value was about 58 percent, and this increased to over 95 percent during the 1980s. The increased revenue from oil to the government led to a rapid increase in Nigeria's external reserves in the 1970s. Furthermore, the rapid monetization of the increased crude oil receipts resulted in large injections of liquidity into the economy, which induced rapid monetary growth. Between 1970 and 1973, government spending averaged about 13 percent of gross domestic product (GDP), and this increased to 25 percent between 1974 and 1980. This rapid growth in government spending came not from increased tax revenues but the absorption of oil earnings into the fiscal sector, which moved the fiscal balance from a surplus to a deficit that averaged about 2.5% of GDP a year. This new era of deficit spending led the government to borrow from the banking system in order to finance the domestic deficits. At the same time, the government was saddled with foreign deficits, which had to be financed through massive foreign borrowing and the drawing down on external reserves. To reverse the deteriorating macroeconomic imbalances (declining GDP growth, worsening balance of payment conditions, high inflation, debilitating debt burden, increasing fiscal deficits, rising unemployment rate, and high incidence of poverty), the government embarked on austerity measures in 1982. The austerity measures were successful judging by the fall in inflation rate to a single digit, the significant improvement in the external current account to positions of balance,

and the 9.5 percent growth in real GDP in 1985. However, these improvements were transitory because the economy did not establish a strong base for sustained economic growth.

To put the Nigerian economy back on a sustainable growth path, the government adopted the comprehensive Structural Adjustment Program (SAP) sponsored by the International Monetary Fund (IMF) in June 1986. The SAP was a structural and sectoral macroeconomic policy reform whose main strategies were (a) the liberalization of the external trade and payment systems, (b) the adoption of a market-based exchange rate for the domestic currency – Naira, (c) the elimination of price and interest rate controls, and (d) the reliance on market forces as the major determinants of economic activity.

According to Nnanna (2001), the adoption of SAP marked the beginning of reforms in the financial sector as the banking system witnessed free entry and exit, and the use of indirect but market-based monetary control instruments for implementing monetary policy in Nigeria.

The CBN reached an important milestone in 1986 when it decided to adopt M2 as an intermediate target for monetary policy. While this choice raises a key question in terms of why the CBN considered M2 as the appropriate intermediate target instead of interest rate or nominal GDP or inflation targeting, however, the more important questions and issues for empirical analyses are: (1) the commitment of the CBN to its annually announced M2 target growth rates and whether or not rules apply, (2) was the real M2 money demand function stable to warrant the choice of M2 money stock as an intermediate target?, (3) what are the macroeconomic outcomes from the targets in terms of the overall objectives (lower inflation rate and real GDP growth) of monetary policy?

Given the fact that interest rates and prices were controlled pre-SAP, it is not difficult to see why the CBN ruled out interest rate targeting or inflation targeting as viable policy options. Furthermore, the structure of the financial markets in less developed countries renders interest rate targeting ineffective. As Taylor (2004) cautions, "if financial markets are weak, the effectiveness of transmitting policy through interest rates will be limited." With these controls and the constraints due to weak financial markets, nominal GDP targeting may not have succeeded. As for the commitment to rules, many countries apply rules because policy rules may aid in focusing policy discussions in terms of intermediate and operating targets. Over the past decade, many countries adopted the Taylor rule, which Taylor (1993) developed for the United States. Taylor (2004) believes that these rules can also be part of the monetary policy strategy in emerging market

economies. More recently, Batini (2004) argues that for Taylor rule to be applicable to emerging market economy such as Nigeria, modifications have to be made because of the specific features of the emerging market economies. If one examines the modifications suggested by Batini (2004) and the fact that rules assume that policymakers seek to stabilize output and prices along paths that are considered to be optimal, then one can conclude that the CBN's M2 growth rate target can (and was meant to) influence output and prices if there is commitment to announced rules. The key issue with the application of Taylor rule to monetary policy making in Nigeria is commitment to target rules. Batini (2004) identifies six aspects including : (i) the feedback parameter on inflation must be set to a larger value than that commonly used for developed countries and (vi) in emerging market economies, it may on occasion be sensible to consider policy rules based on money rather than interest rates as instruments. (a) what appeared to be upper and lower bounds for M2 growth targets, and (b) deviations in two subperiods: 1986-1996 and 1997-2004. The CBN kept M2 growth targets within bounds, except for 1992 when it exceeded the upper bound. Based on these bounds, one may conclude that the CBN followed a policy rule that allowed for feedbacks from the economy. As Handa (2000) points out, "the credibility of policy rule usually requires that the policy function be a simple and transparent rule so that the public can easily judge the policy maker's adherence to or deviations from it." As for deviations, the CBN's monetary policy appeared to be excessively expansionary compared to what its policy rules prescribed between 1986 and 1996. In 1996, the actual M2 growth rate was exactly the 16.8% that the CBN targeted. In 1997, the CBN exceeded its target of 15.0% by 1.9 percentage point (actual M2 growth was 16.9%). Since 1997, monetary conditions seemed excessively expansionary contrary to policy rule prescriptions. Finally, in 2004, the actual M2 growth rate of 15.2% exceeded the target level by 0.2 percentage point. The annual reports and speeches of the Governor of the CBN alluded to these deviations from targets. From the visual inspection, one can conclude that the CBN was not strongly committed to its annual M2 targets, but more significantly, the lack of commitment to rules calls to question the issue of credibility of the CBN (Owoye and Onafowora, 2007).

3.0 EMPIRICAL METHODOLOGY

3.1 Model Specification

In order to examine a more systematic relationship between money and output growth, the following model is specified:

$$\Delta Y = (\Delta MS) \dots \dots \dots (1)$$

ΔY = output Change; ΔMS = Change in Money Supply

Adding other growth-inducing variables, we have

$$\Delta \text{RGDP} = \beta_0 + \beta_1 + \beta_2 \text{MSS} + \beta_3 \text{INV} + \beta_4 \text{OIL} + e_t \dots \dots \dots (2)$$

Where;

ΔRGDP = Change in RGDP (a measure of output change)

MSS = Money Supply;

INV = Investment;

OILP = Oil Earnings

3.2 Method of Data Analysis and Sources of Data

The study employs unit root testing, Cointegration, Error correction Model (ECM) and Granger causality testing to examine the money output growth correlation. Specifically, the causality test is used to investigate whether changes in money growth precedes or causes changes in output growth or vice versa. As a prelude to this, the unit root properties of the time series variables are investigated in order to avoid spurious and inconsistent parameter estimates. The study covers the period of (1980 – 2013). The relevant data are obtained from the Central Bank of Nigeria (CBN) **Statistical Bulletin**.

4.0 EMPIRICAL RESULTS

Unit Root Test

A time series is stated as non-stationary if mean and variance of the time series is changing over time or time dependent.

On the other hand, a time series is stated as stationary if the mean and variance is constant over time. Most economic time series are non-stationary and only achieve stationarity at the first difference level or at a higher level (Gordon, 1995).

Generally, unit root test involves the test of stationarity for variables used in regression analysis. The importance of stationarity of time series used in regression derives from the fact that with a non-stationary time series it is not possible to generalize to other time periods apart from the present. This makes forecasting based on such non-stationary time series to be of little practical value. Moreover, regression of a non-stationary time series on another non-stationary time series may produce spurious results.

The Augmented Dickey Fuller (ADF) test is employed in order to analyze unit roots in this study.

The results are presented in Table 1 below:

Table 1: Unit Root Test for Variables in levels and First Difference

Variable	ADF Test Statistic	Order of Integration	Remark
$\Delta\Delta\text{RGDP}$	-5.2491**	I(1)	Stationary
$\Delta\Delta\text{MS}$	-3.8242*	I(1)	Stationary
ΔINV	-3.2654*	I(1)	Stationary
ΔOIL	-6.3291**	I(1)	Stationary

* (**) significant at the 5% (1%)

A cursory examination of the unit root test results indicate for all the variables, the null hypothesis of no unit root could not be rejected, implying that the variables were non-stationary at levels. However, after first differences, the variables became stationary. This implies that the variables are difference-stationary. They are thus integrated of order one (i.e. I [1]).

4.2 Test of Cointegration

Having established that the series in the analysis are not stationary in their levels, we move on to determine if they are cointegrated. The Johansen Cointegration method is used for this analysis because the study involves the use of multivariate estimations. The results from the multivariate cointegration test are presented in Table 4.2 below. As can be observed from the table, the λ -max test statistic indicates that there are at least four cointegrating vectors in the relationship. This implies that a long run equilibrium relationship exists between money and output growth in Nigeria.

Table 2: Johansen Multivariate Cointegration Tests Results.

Maximum Eigenvalue Test			
Null Hypothesis	Test Statistic	Critical Value at 5%	Hypothesized No of CE(s)
$r = 0^*$	294.39	93.21	None**
$r \leq 1^*$	172.50	65.26	At most 1**
$r \leq 2^*$	105.84	42.19	At most 2**
$r \leq 3^*$	53.89	27.23	At most 3**

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

4.3 Error Correction Model

The short-run dynamic changes of output growth with respect to money growth and other explanatory variables can be analyzed in the context of an error correction model (ECM) presented in table 3 below. Given the R-Squared value of 0.72, it can be concluded 72 percent of the net systematic variation in output is explained by the combined explanatory variables of money, investment and oil price earnings. The F-Value of 54.19 is highly significant at the 1 percent level, an indication that the explanatory variables jointly explain variation in output during the period of study. Thus the hypothesis of significant linear relationship between money and output growth and other variables is confirmed. The DW statistic of 1.92 indicates the absence of serial correlation in the model. The error correction term is appropriately negative and significant at the 5 percent level. Thus, any short term disequilibrium in the system will be restored back to the system. All the three variables have the correct signs, with that of investment and oil earnings passing the significance test at the 5 percent level, while that of money (our variable of prime interest) is not significant, suggesting an insignificant relationship between money and output growth in Nigeria. This observed weak positive relationship between money and output growth substantiates the earlier results of Ogunmuyiwa and Ekone (2012).

Table 3: Error Correction Model (ECM): Dependent Variable is Δ RGDP

Variable	Coefficient	T-ratio
C	1.02	2.05
Δ MSS	0.0	1.52
Δ INV	0.16	2.60
Δ OIL	0.11	2.41
ECM (-1)	-0.75	-3.22
R ² =0.91	F= 54.19	DW Statistic=1.92

4.4 Granger Causality Testing

The causality test is used to investigate the direction of causation among the variables, particularly to determine whether changes in money growth precedes (causes) changes in output growth, or vice versa. The causality results reveal that changes in money tend to lead to output growth and at the same time, changes in output growth generates changes in money growth (output causes money), thus giving credence to both the monetary-business-cycle theory as well as the real-business cycle model in Nigeria. The test result also shows that there exist a feedback relationship between investment and output. Thus, while increase investment generates a higher output, vice versa, a given change in output simultaneously induces a concomitant change in investment, giving rise to the accelerator theory of investment. Finally, a

unidirectional causation is found to run from oil to output, implying that changes in price of oil granger causes change in output (fluctuation in output/ business cycle).

Table 4. Granger Causality Test results

Null Hypothesis:	F-Statistic	Decision	Causality
<i>LMSS does not Granger Cause LRGDP</i>	5.30	Reject	Feedback
<i>LRGDP does not Granger Cause LMSS</i>	5.26	Reject	
<i>LINV does not Granger Cause LRGDP</i>	6.40	Reject	Feedback
<i>LRGDP does not Granger Cause LINV</i>	5.38	Reject	
<i>LOIL does not Granger Cause LRGDP</i>	3.72	Reject	Unidirectional
<i>LRGDP does not Granger Cause LOIL</i>	1.79	Accept	

SECTION FIVE

CONCLUSION AND POLICY IMPLICATIONS

This study investigates the empirical nexus between money and output growth in Nigeria. Based on cointegration, error correction model and Granger causality test, the findings reveal that money growth has a positive (albeit insignificant) impact (low predictive power) in explaining output growth and that a feedback relationship (bi-direction causality) exists between changes in money growth and output growth. Investment and earnings from oil are found to have significant positive effect on output. This is so because the bulk of economic activities in Nigeria virtually depends on them. Based on these findings, the following policy implications are generated:

- Expansion in money supply should be closely tied to the objective of spurring growth. This is necessary so as not to subject the economy to undue over-heating and inflation;
- Monetary policy management should be pursued with the objective of stabilizing prices and growth so as to minimize the dampening effects of inflationary pressures on growth;
- There is need to strengthen the liquidity management mechanisms of the central bank and comply strictly with the money supply growth targets; and

- Monetary authorities should harmonize the two policies (contractionary and expansionary) to reduce the rate differential between productive and unproductive credit in order to minimize fluctuations in output (monetary- induced business-cycles) and consequently generate higher growth.

- Policies to minimize the effects of fluctuations in oil price caused by external shocks as a result of the vagaries in the international market should be put in place in order to reduce fluctuation in output, giving rise to business cycles.

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ECONOMIC GROWTH AND UNEMPLOYMENT IN NIGERIA: AN EMPIRICAL VERIFICATION OF OKUN'S LAW

By Oziengbe Scott AIGHEYISI*

Abstract

The purpose of this paper is to empirically verify the validity of Okun's law in Nigeria. Annual time series data spanning the period from 1982 to 2012 are used for the analysis which involves cointegration and error correction modeling. The analysis finds evidence in support of Okun's law as it shows that economic growth (measured as real GDP growth) significantly reduces unemployment rate in the short run. The long run effect of economic growth on unemployment is however found to be statistically insignificant. The analysis also finds evidence in support of the Philips curve, as significant inverse relationship is observed between inflation and unemployment rate in the short run. Furthermore, trade openness is found to have helped reduce unemployment rate significantly in the short run. The paper recommends *inter alia*, design and implementation of policies that are targeted at accelerating the growth of Nigeria's economy, maintenance of inflation at the levels consistent with growth, greater openness of the economy to international trade, guarded increase in government final consumption expenditure and human capacity development, as measures to tackle the problem of unemployment in the country.

Keywords: Economic Growth, Unemployment, Okun's Law, Philips Curve, Nigeria

JEL Classification Codes: E24, E31, F31, H53, J64, O40

Economic Growth and Unemployment in Nigeria (1982-2012): An Empirical Verification of Okun's Law.

1. Introduction

Unemployment is a situation where people are willing to work and actively looking for jobs but are unable to find appropriate or suitable jobs. It has been described as a waste of the all-important *human* resource resulting from underutilization of labour, and identified as one of the major problems plaguing all countries (Romer, 1996; Oner, 2012; Levine, 2013; Anyanwu, 2014). Unemployment is pervasive in Nigeria and has continued to constitute serious problems for the country's policy makers (Iyoha, Adamu and Sulaiman, 2013;

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Oaikhenan and Aigheyisi, 2014). In spite of the impressive growth rates recorded by Nigeria's economy in recent times as reported by the nation's Central Bank and the National Bureau of Statistics which recently rebased the nation's GDP, ranking it as the largest economy in Africa and also as the 26th largest economy in the world. The enhanced GDP has reflected the contribution of the service sector (particularly entertainment) which hitherto had not been captured in the nation's GDP. In spite of this, the rate of unemployment in the country has been alarming and has been blamed as partly responsible for the failure of the country to achieve the targets of Millennium Development Goal-1(MDG1).For instance, as poverty rate in the country as reported by the Millennium Development Goal 2013 Report stands at over 62% (Oaikhenan and Aigheyisi, 2014). This goes to show that the country has been experiencing jobless, non-inclusive growth, and the situation has been described as a paradox (Teriba, 2014).

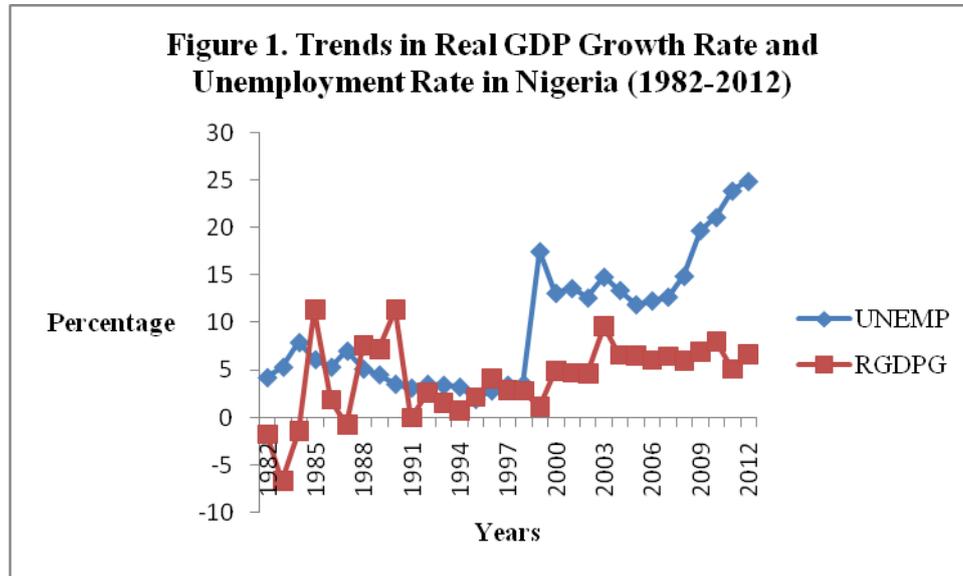
Scholars (Nwokoma, Eregha and Omojolaibi, 2014; Ogunyiola and Garba, 2014) have argued that Nigeria's economic growth has defied economic growth and development logic as a country according to the stages of growth model articulated and propounded by Rostow (1960).Under this growth model, a country is expected to grow through various stages (about five stages) in succession, i.e. from the traditional stage in which it relies on primary production to the transitional stage in which the precondition for growth are laid down, to the take-off stage (which is the beginning of economic growth process, to the drive towards maturity stage, and then to the development stage also known as the age of industrialization, high mass production and consumption where it could be defined as being in a state of self-sustaining growth. At that stage growth is driven by manufacturing and industry and the service-sector (Todaro and Smith, 2005). The "sudden jump" of Nigeria's economy from being primary production-driven to "self-sustenance" and being service-sector-driven speaks volume of Nigeria's pattern of growth and development, and calls for a revisit of existing knowledge on the stages of growth theory. The failure of economic growth to engender reduction in unemployment could be blamed on the source of the growth, or the sectors of the economy driving it, or whether or not labour is replaced by machines or technology in the production process. If growth is driven by sectors that employ (directly or indirectly) very small percentage of the population, or by sectors whose activities are detrimental to, or have severe negative externality effects on the development of other sectors of the economy, it is quite unlikely that such growth would result in reduction in unemployment. Output expansion resulting from application of technology could engender increase in unemployment rate if the application of technology displaces labour in the production process.

Okun's law, which constitutes the theoretical foundation of this research, suggests that an inverse relationship exists between economic growth and unemployment. This law holds good for the United States' economy as the empirical work carried out by Okun (1962) shows that for every 1% rise in economic growth rate proxied by growth rate of GNP, the rate of unemployment declines by about 0.3%. The objective of this paper is to empirically verify the applicability or otherwise, of Okun's law to Nigeria's economy using annual time series data covering the period 1982 through 2012 on the relevant variables. The key research question of the study relates to whether or not Nigeria's economic growth has helped to reduce unemployment in the country, the null hypothesis being that economic growth has not had significant effect on unemployment rate in the country. A major contribution of the paper to existing literature is the estimation of an Okun's coefficient for Nigeria's economy. Whereas previous studies in this regard used pre-rebased real GDP figures, this study makes use of the rebased real GDP figures (for 2011 and 2012).

The remainder of the paper is organized as follow: Section 2 contains the stylized facts on the relationship between economic growth and unemployment in Nigeria in the period from 1982 to 2012. Section 3 contains a review of existing literature on the issue being investigated. Section 4 presents the methodology and specifies the model employed for the investigation/verification. In section 5 the results of estimation of the model are presented and discussed. Section 6 concludes the paper and also presents policy recommendations based on the empirical evidence.

2. Stylized Facts on the Relationship between Economic Growth Rate and Unemployment Rate in Nigeria.

Figure 1 presents the stylized facts on the relationship between economic growth and unemployment in Nigeria in the 1982-2012 sample period using annual time series data sourced from the National Bureau of Statistics and the Central Bank of Nigeria's **Statistical Bulletin** (2012).



The trends show that the relationship between economic growth and unemployment rate in Nigeria has been characterized by two main facts. First is that an inverse relationship existed between unemployment and real GDP growth rate in most part of the period between 1982 and 1998. Though increase (decrease) in real GDP growth was associated with decline (increase) in the unemployment rate, the change in unemployment was not as significant as the change in the real GDP growth rate. Second, within the period 1999 through 2012, unemployment rate was consistently higher than real GDP growth rate. These observations suggest that since 1998, the economy has been a jobless growth economy, characterized, (Teriba, 2014,p.8) by "low job creation since 2008 and high job destruction since 2008". The implication is that the observed growth of the economy since 1998 has not helped to stem the rising trend in the rate of unemployment prevailing in the country. Thus, though the observed relationship between the two variables in the 1982-1998 period upholds the Okun's law, this cannot be inferred from the observed relationship between the variables from 1999 to 2012.

3. Literature Review

Economic growth and employment have been described as two sides of the same coin, reason being that increase in economic activities engenders output expansion which requires engagement of more labour to sustain it. Decrease in economic activities (as in a recession) causes the reverse effect on employment of labour. This suggests that unemployment is countercyclical – rising in prolonged economic downturn (or depression) and falling in economic

expansion or boom, though the decline does not transpire in lockstep with economic recovery as businesses may have to make use of existing labour at the early stage of recovery from a depression (Levine 2011; Oner, 2012). However if sustained expansion of output results from improved technology which may take the place of labour in the production process, this could adversely affect employment rate in the economy.

Researchers in various countries have attempted to investigate the effect of economic growth on unemployment. In this section a brief review of their findings is undertaken.

Amezaga (n.d.) employs ordinary least squares (OLS) estimation techniques to investigate the validity of Okun's law in Peru using monthly data covering the period 2001-2012. The analysis gives evidence that strongly supports the Okun's law, with an Okun's coefficient of 0.13. The research also investigates the relationship between economic growth and unemployment in Lima (the capital and largest city of Peru) using same methodology, and the result was in consonance with the result for the entire country, that is, an inverse relationship exists between economic growth and unemployment.

Calmfors and Holmlund (2000) examine the relationship between economic growth and unemployment in Sweden. The study indicates that significant inverse relationship exists between economic growth and unemployment in the short run, but could not conclude on the long-run relationship between the variables as higher long-run growth rate resulting from rapid structural change or technological improvement (which engenders higher productivity) tends to either increase structural unemployment or reduce unemployment rate generally.

Kreishan (2011) employs cointegration tests and simple regression to investigate the relationship between economic growth and unemployment in Jordan in the 1970-2008 sample period. The analysis reveals that the effect of economic growth on employment within the sample period was not significant.

Ozel, Sezgin and Topkaya (2013) employ panel data regression analysis to investigate the effect of economic growth on unemployment for the G7 countries within the 2000-2011 period and also in the 2000-2007 and 2008-2011 sub-periods. The study reveals that productivity and economic growth variables significantly reduced unemployment in the pre-crisis period. However, in the period following the crisis, the effect of productivity on unemployment became

insignificant, while the effect of economic growth on unemployment was still significant.

Anyanwu (2013) investigates the characteristics and macroeconomic determinants of youth unemployment in Africa in the period 1991-2009. The empirical estimates show amongst others, that real GDP growth positively and significantly affects youth employment. This suggests that the growth of real GDP helps reduce unemployment in the continent. Similar outcome was found in a research by Anyanwu (2014).

Madito and Khumalo (2014) employ the vector error correction modeling technique to invest the economic growth-unemployment nexus in South Africa using quarterly data spanning the period 1967Q1 to 2013Q4. The analysis shows that a significant negative relationship exists between unemployment and growth in the country.

Rosoiu and Rosoiu (2014) employ least squares estimation technique to investigate the validity of the Okun's law for the U.S. economy in the period 1977-2012. The study yields evidence that strongly upholds the Okun's law: a significant inverse relationship exists between economic growth and unemployment and, a 1% rise in economic growth was associated with about 0.3% decline in the rate of unemployment in the sample period.

Bayer (2014) investigates the effects of economic growth, export, and foreign direct investment inflows on unemployment in Turkey during the period 2000Q1 to 2013 Q3, using the ARDL bounds approach to cointegration to test for long run relationships among the variables, and an error correction model to investigate the dynamic (short-run) relationship among them. The study finds that the variables are cointegrated. It further finds *inter alia* that economic growth helps to reduce unemployment rate in both the long and short run.

Abbas (2014) investigates the long term effect of economic growth on unemployment in Pakistan using data spanning the period 1990 to 2006. In view of the small sample size, the ARDL Bounds approach to cointegration is employed to test for long run relationship between the variables, while the error correction modeling technique is employed to estimate the short-run effects of economic growth on unemployment in the country. The findings are that a significant inverse long term relationship exists between economic growth and unemployment in the country, while the short run relationship between the variables is not significant.

4. Methodology, Models Specification and Discussion of Variables

4.1. Methodology and Models Specification

The paper employs the methodology of cointegration and error correction modeling (ECM) to investigate the long run and short run effects of economic growth on unemployment in Nigeria, using annual time series data spanning the period from 1982 to 2012. The cointegration test is preceded by the unit root test (or the stationarity test) for the variables using the ADF test, while the Johansen approach to testing for cointegration is employed to test for cointegrating (long-run) relationship(s). A standard error correction model shall be estimated to investigate the short-run relationship. The data used for the study were sourced from the National Bureau of Statistics, the Central Bank of Nigeria **Statistical Bulletin** (2012) and the World Bank's **World Development Indicators** (2012). Following Okun (1962) the basic model is specified in its empirical form as:

$$\Delta \log(U_t) = \beta_0 + \beta_1 \Delta \log(\text{RGDPG}_t) + \mu_t \dots \dots \dots (1)$$

Where Δ represents "change" or first difference, \log = natural logarithm, U = Unemployment Rate calculated as the percentage of population of the unemployed in the labour force; and RGDPG = Real GDP growth, proxy for economic growth. μ_t is the residual (error) term.

Considering that unemployment rate is also affected by other factors apart from RGDPG , the Okun's economic growth-unemployment relation is modified to incorporate some other relevant variables (acting as control variables) identified in the literature as affecting unemployment. These variables include inflation (INF), trade openness (TOPN), FDI-GDP ratio, domestic investment-GDP ratio (DINV-GDP), government final consumption expenditure as percentage of GDP (GCE-GDP), etc. (Anyanwu, 2013). In view of the foregoing, the model is modified /respecified as follows:

$$\Delta \log(U_t) = \beta_0 + \beta_1 \Delta \log(\text{RGDPG}_t) + \beta_2 \Delta \log(\text{INF}_t) + \Delta \beta_3 \Delta \log(\text{TOPN}_t) + \beta_4 \Delta \log(\text{FDI_GDP}_t) + \beta_5 \Delta \log(\text{DINV_GDP}_t) + \beta_6 \Delta \log(\text{GCE_GDP}_t) + \mu_t \dots \dots \dots (2)$$

The variables are as previously defined. μ_t is the residual (error) term. The theoretical signs (or *a priori* expectations) are:

$$\beta_1 < 0, \beta_2 < 0, \beta_3 < 0, \beta_4 < 0, \beta_5 < 0, \beta_6 < 0.$$

Equation 2 is a static (long-run) model to be estimated with the classical least squares estimation technique. The estimated parameters therefore represent the long-run impacts of the explanatory variables on the dependent variables. The associated (short-run) error correction model is specified as:

$$\begin{aligned} \Delta \log U_t = & \alpha_0 + \alpha_1 \Delta \log U_{t-1} + \sum_{i=0}^m (\alpha_i \Delta \log \text{RGDP}_{t-i}) + \sum_{w=0}^s (\theta_w \Delta \log \text{INF}_{t-w}) + \sum_{l=0}^q (\phi_l \Delta \log \text{TOPEN}_{t-l}) \\ & + \sum_{j=0}^n (\chi_j \Delta \log \text{FDI_GDP}_{t-j}) + \sum_{k=0}^p (\beta_k \Delta \log \text{DINV_GDP}_{t-k}) + \sum_{x=0}^u (\psi_x \Delta \log \text{GCE_GDP}_{t-x}) \\ & + \Omega \text{ECT}_{t-1} + \xi_t \end{aligned} \quad \dots\dots\dots(3)$$

ECT_{t-1} is one-period lagged values of residuals from the static model (equation 3), and it is included in the model as the error correction term. Its coefficient is expected to be negatively signed and statistically significant for it to play the role of error correction in the model. m, n, p, q, s, u are appropriate number of lags of the respective variables. The parameters of the model (Equation 3) represent short run effects of changes in the explanatory variables on the dependent variable. ξ_t is the residual (error) term.

All estimations are done with the aid of Microfit 4.1 interactive computer program.

4.2. Discussion of Variables

Unemployment Rate

Unemployment rate refers to the proportion of a country's labour force that is actively looking for jobs. It is measured as unemployed population divided by the labour force. In Nigeria, unemployment statistics is reported by the National Bureau of statistics. Unemployment rate is the dependent variable in this study.

Real Gross Domestic Product Growth rate (Proxy for economic growth)

The commonest way to measure the economy is the real GDP (Bank of Canada, 2014). GDP refers to the market value of goods and services produced within a country in a year, while real GDP refers to GDP adjusted for inflation. The growth of the economy is measured as the growth of real GDP. Thus, real GDP growth is used to proxy economic growth, and for this study, it is measured as the percentage change in real gross domestic product. According to Okun's law, an inverse relationship exists between economic growth and unemployment. Real GDP data is sourced from the Central Bank of Nigeria **Statistical Bulletin** (2013).

Inflation

Inflation refers to appreciable and sustained rise in aggregate price level. It is measured as (monthly, quarterly, annual, etc.) percentage change in the consumer price index (CPI). The Philips curve theorizes a trade-off (that is, an inverse relationship) between inflation and unemployment. This suggests that some level of inflation is tolerable and needed to reduce the rate of unemployment. Several studies have shown that inflation positively affects economic growth below some threshold inflation rate, and beyond that threshold, its effect becomes adverse (Salami and Kelikume, 2010; Basse and Onwioduokit, 2011; Bawa and Abdullahi, 2012; Danladi, 2013; Doguwa, 2013), etc. In this light, it could be argued that the positive effect of (below-threshold) inflation rate on economic growth could be attributed (partly) to its effect on unemployment, considering that reduction in unemployment rate, or increase in employment rate (associated with increase in inflation rate so long as it does not go beyond the threshold), enhances economic growth. Inflation data used for this study were obtained from the Central Bank of Nigeria **Statistical bulletin** (2013).

Trade Openness

Trade openness is a measure of the degree of integration of the economy with the global market. It is usually measured as the ratio of total trade (export plus import) to GDP. Openness to trade has always been prescribed by the Breton Woods institutions and the multination corporations as the panacea to the ailing economies of the less developed countries (Aigheyisi and Edore 2014). This prescription is based on international trade theories which suggest that trade is a key driver of economic growth and poverty reduction (Fosu and Mold, 2008). Consequently, considering the expected relationship between growth and unemployment, an inverse relationship is also expected between trade openness and unemployment on the condition that trade is not characterized by preponderance of imports, a situation which could lead to crowding out of local infant industries, engendering increase in unemployment rate. Data on import, export and GDP used for the computation of trade openness were obtained from the Central Bank of Nigeria Statistical bulletin (2013).

Investment (Foreign Direct Investment and Domestic Investment)

Foreign direct investment inflows refers to the flow of long term foreign capital from a foreign firm to acquire controlling stake in a firm, enterprise or venture in another country. It usually involves building of new assets/facilities for productive activities. On the other hand, domestic investment refers to increase in domestic capital stock. It is measured as gross fixed capital formation plus increases in stock. All things being equal, increase in investment engenders increase in

employment or, decrease in unemployment, except where it engenders structural unemployment as a result of substitution of machines for labour, owing to technological progress. The "Modigliani Puzzle" explained in Blanchard (2000) suggests that a strong inverse relationship exists between investment and unemployment: increase in investment leads to reduction in unemployment. This transpires through the effect of investment on output. Investment, according to the neoclassical growth theories, leads to expansion of output (Shapiro, 1986), and output expansion, according to Okun's law is associated with decrease in unemployment rate. FDI and domestic investment are both expected to boost output, and the (expected) expansion in output level creates room for engagement of more labour and hence reduction in unemployment rates, on the condition that FDI does not crowd out domestic investment, but complements it. The relative shares of these variables in the GDP are obtained by dividing them by GDP (and multiplying the quotient by 100%). Data for FDI and domestic investment are obtainable from the Central Bank of Nigeria Statistical bulletin (2013).

Government Final Consumption Expenditure

Government final consumption expenditure consists of current expenditure incurred by the government on goods and services (such as education, security/safety, health, agriculture, etc., including employees' compensation) for the direct satisfaction of the needs of the population. The goods and services are either provided free of charge or at rates less than the acquisition cost. Thus by providing these goods/services, the government is said to be consuming them itself. Provision of these consumption goods and services by the government entails direct and indirect creation of employment. Expansion of educational services for example may require recruitment of additional teachers (direct job creation). Teaching and learning materials used in schools are procured from the private sector which also contributes significantly to job creation (indirect job creation by the government through the private sector). Government patronage of the private sector contributes significantly to their continued existence. Thus *ceteris paribus*, government final consumption expenditure positively affects employment. In other words it is inversely related to unemployment. The relative share of this variable in GDP is obtained by dividing it by the GDP (and multiplying the quotient by 100%). Data for government final consumption expenditure are obtainable from the Central Bank of Nigeria Statistical bulletin (2013).

5. Results

5.1. Unit Root Test for Variables

The unit root test results for the variables are presented in Table 1. The 95% critical value for the ADF Statistic for the variables in levels and first difference are -3.5731 and -3.5796 respectively. The DF regressions include an intercept and a linear trend.

Table 1. ADF Unit Root Test for variables.

VARIABLES	LEVELS		FIRST DIFFERENCE		ORDER OF INTEGRATION
	ADF Test Stat.	Inferences	ADF Test Stat.	Inferences	
Log(U)	-1.7437	Non-stationary	-4.0759	Stationary	1
Log(RGDPG)	-6.7984	Stationary	-7.3479	Stationary	0
Log(TOPN)	-1.9466	Non-stationary	-5.1836	Stationary	1
Log(INF)	-3.4271	Non-stationary	-5.8244	Stationary	1
Log(FDI_GDP)	-2.0813	Non-stationary	-5.8967	Stationary	1
Log(DINV_GDP)	-1.4506	Non-stationary	-4.5716	Stationary	1
Log(GCE_GDP)	-2.2977	Non-stationary	-4.1761	Stationary	1

Source: Author's Estimations using Microfit 4.1 computer program

The results indicate that apart from LRGDPG series which was stationary at levels, other series were stationary at their first difference forms. Next, we proceed to investigate whether or not the variables are cointegrated as the existence of long run relationships among the variables improves the reliability of the model for policy.

5.2. Cointegration Test

The Johansen approach to cointegration was employed to test for cointegration among the variables. The test results are presented in Table 2.

Table 2. Johansen Maximum Likelihood Test for Cointegration

Maximal Eigenvalue of the Stochastic Matrix					
Null	Alternative	Statistics	95% Critical Value	90% Critical Value	
r = 0	r = 1	67.7047	49.3200	46.5400	
r ≤ 1	r = 2	43.6423	43.6100	40.7600	
r ≤ 2	r = 3	36.8594	37.8600	35.0400	
r ≤ 3	r = 4	33.1591	31.7900	29.1300	
r ≤ 4	r = 5	16.6281	25.4200	23.1000	
r ≤ 5	r = 6	14.9186	19.2200	17.1800	
r ≤ 6	r = 7	5.4223	12.3900	10.5500	
Trace of the Stochastic Matrix					
Null	Alternative	Statistics	95% Critical Value	90% Critical Value	
r = 0	r = 1	218.3345	147.2700	141.8200	
r ≤ 1	r = 2	150.6299	115.8500	110.6000	
r ≤ 2	r = 3	106.9876	87.1700	82.8800	
r ≤ 3	r = 4	70.1282	63.0000	62.8800	
r ≤ 4	r = 5	36.9690	42.3400	39.3400	
r ≤ 5	r = 6	20.3409	25.7700	23.0800	
r ≤ 6	r = 7	5.4223	12.3900	10.5500	

Source: Author's Estimations using Microfit 4.1 computer program

The Maximum Eigenvalue test indicates three cointegrating vectors, while the Trace test indicate four cointegrating vectors among the variables at the 95% critical level. On the strength of these, we infer that the variables are cointegrated. The long run estimates (using the ARDL approach) are presented in Table 3.

Table 3. Estimated Long Run Coefficients using the ARDL Approach ARDL(2,1,0,2,0,0,2) selected based on Schwarz Bayesian Criterion

Dependent variable is LU		
29 observations used for estimation from 1984 to 2012		
Regressor	Coefficient	T-Ratio
LRGDPG	-5.0012	-1.3260
LINF	-.77252	-1.3250
LTOPN	1.9246	1.6822
LFDI_GDP	.62688	.67421

LDINV_GDP	1.5371	2.7443
LGCE_GDP	.025361	.035606
C	7.0745	.74508

Source: Author's Estimations using Microfit 4.1 computer program

The estimated long run results reveal that the long-run relationship between real GDP growth rate and unemployment is negative, but statistically not significant. Same can be said of inflation-unemployment relationship. The long run effects of the other variables, apart from domestic investment, on unemployment are also not statistically significant. Domestic investment is observed to have significant positive impact on unemployment. Contrary to expectation, this suggests that domestic investment in Nigeria is "job-destroying" in the long run. Specifically a 1% permanent rise in domestic investment is associated with 1.5% increase in the rate of unemployment in the country in the long run.

5.3. Error Correction Results

The associated short run (error correction) model result is presented in Table 4.

Table 4. Error Correction Representation for the Selected ARDL Model ARDL(2,1,0,2,0,0,2) selected based on Schwarz Bayesian Criterion

Dependent Variable is dLU		
29 observations used for estimation from 1984 to 2012		
Regressor	Coefficient	T-Ratio
dLU1	-.29630	-2.1651
dLRGDPG	-.61762	-3.0025
dLINF	-.14618	-3.0735
dLTOPN	-.20889	-1.0300
dLTOPN1	-.49403	-2.0934
dLFDI_GDP	.11862	.84279
dLDINV_GDP	.29086	2.2759
dLGCE_GDP	-.44814	-2.2818
dLGCE_GDP1	-.58850	-2.9889
dC	1.3387	1.0765
ecm(-1)	-.18923	-1.7530
R-Squared = .86853; R-Bar-Squared = .75459		
F-stat. F(10,18) = 9.9095; DW-stat. = 2.1663		

Source: Author's Estimations using Microfit 4.1 computer program

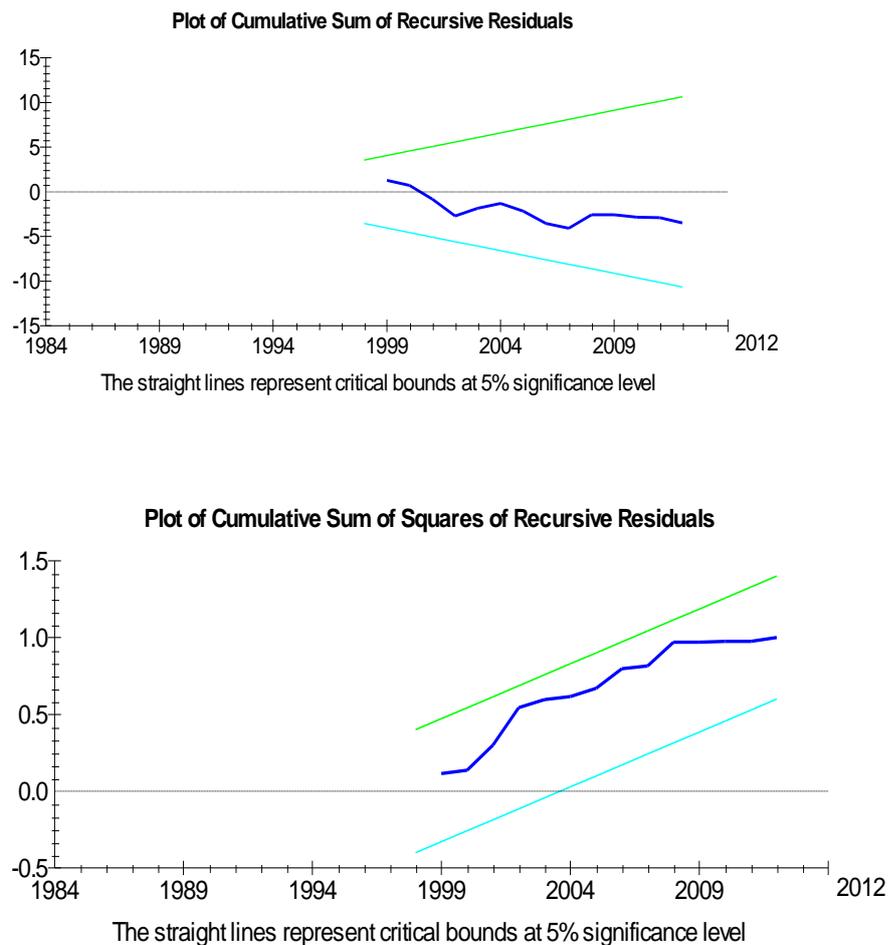
The error correction estimates reveal a significant inverse relationship between real GDP growth and unemployment in the short run. This is in consonant with the Okun's law. A 1% rise in the growth rate of real GDP is associated with 0.6% decline in the rate of unemployment in the country. Thus the Okun's coefficient for Nigeria's economy is estimated at 0.6. This observed significant negative short run relationship between economic growth and unemployment is also consistent with the finding of Calmfors and Holmlund (2000) for the Swedish economy. The observed negative and significant relationship between inflation and unemployment is in consonance with the Philips Curve. A 1% rise in the rate of inflation is associated with 0.14% decrease in unemployment rate in the short run. The observed significant and negative relationship between trade openness and unemployment uphold the recommendations/ suggestions of international trade theories. Unemployment responds to trade openness with a one-period lag. A 1% increase in the degree of trade openness depresses the rate of unemployment after a one-year lag by about 0.5%. The relationship between FDI as percentage of GDP and unemployment rate is statistically not significant. This implies that FDI inflows have not helped to solve the unemployment problem in Nigeria. This finding is in consonant with that of Anyanwu (2013). As in the long run equation, domestic investment as percentage of GDP is observed to have the contrary sign, suggesting that increase in domestic investment has been associated with increase in unemployment rate. This may be attributed to structural unemployment engendered by deployment and utilization of improved technologies in businesses/industries, which take up the jobs of labour (employees) without the requisite skills. Government final consumption expenditure is observed to have helped reduce unemployment significantly in the sample period. A 1% increase in government final consumption expenditure is associated with 0.45% decrease in unemployment rate contemporaneously, and a decrease in unemployment rate of 0.59% after a one-year lag. The coefficient of the error correction term is as expected, negatively signed and, statistically significant at the 10% level. The coefficient in absolute term implies that about 19% of short-run deviation of unemployment from its equilibrium is offset annually to maintain the equilibrium. This suggests that the speed of adjustment to equilibrium in the event of short-run deviation there from, is rather slow.

The coefficient of determination (R-squared) and adjusted coefficient of determination (R-Bar-Squared) both indicate that the model has an impressive goodness of fit. The F-statistic is highly significant and implies that the explanatory variables are jointly significant in the determination of unemployment rate in Nigeria. The DW-statistic indicates absence of autocorrelation. Thus model can be relied upon for policy.

5.4. Model Stability Test

The plots of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) were used to test the structural stability of the model. The plots are shown in Figure 2.

Figure 2. Plots of CUSUM and CUSUMSQ



Since both plots lie between the straight lines representing the critical bounds at the 5% level, the implication is that the model is structurally stable. This further improves its reliability.

6. Conclusion and Policy Recommendations

The following conclusions can be drawn from the analysis. First, for Nigeria's economy, an inverse and significant relationship exists between economic growth and inflation in the short run, the Okun's coefficient being 0.6. This suggests that a 1% increase in the growth rate of the country's economy could engender 0.6% decrease in unemployment rate. Second, the relationship between the variables is not significant in the long run. Thus it could be plausibly (or reasonably) concluded that economic growth only helps reduce unemployment rate in the short run in the country. Based on the empirical evidence, the following are recommended for policy consideration:

- ⊕ formulation and implementation of policies that are germane to accelerating the growth of real GDP such as infrastructural development, favourable tax regimes, etc.
- ⊕ use of monetary and fiscal policies to prevent deflation and maintain inflation at levels that are not injurious to the economy;
- ⊕ greater openness of Nigeria's economy to international trade;
- ⊕ guarded increase in government final consumption expenditure and ensuring that wastage is avoided and embezzlement, prevented;
- ⊕ human capacity development/training, to avoid redundancy of labour, thus preventing structural unemployment.

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