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SECTORAL FLOWS OF FOREIGN DIRECT INVESTMENT: IMPACT ON ECONOMIC GROWTH IN ECOWAS COUNTRIES, BASED ON DYNAMIC PANEL DATA[1]

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Abstract

The main focus of this study is to determine the macroeconomic impact of FDI on the economic growth of the countries of the Economic Community of West African States (ECOWAS). This study takes a disaggregated approach and focuses on the impact on economic growth of FDI destined for the major sectors of these economies. In particular, the paper examines the impact on economic growth of FDI flows into (i) the primary sector (ii) the manufacturing sector and (iii) the services sector. The study utilizes several panel data estimating techniques including the fixed effects model and the random effects model, and the dynamic panel data estimator. The time component of the dataset is 2001 through 2013. The results obtained from this study indicate that the lagged value of growth, human capital. FDI flows into the service and the manufacturing sectors, and government expenditures are the main drivers of economic growth in ECOWAS countries. An important policy recommendation is that countries in the ECOWAS region should strive to attract foreign direct investment into their manufacturing and services sectors through targeted approach and improved domestic policy environment, as well as, provide incentives that would attract investments in the production chain of the primary sector by setting up industries that would process raw materials for exports.

JEL classification: E22, F21, F43, C33, C32

Keywords: Foreign direct investment; economic growth; ECOWAS; fixed effects model; random effects model; and dynamic panel data estimator.

1.0 Introduction

Foreign direct investment (FDI) is a non-debt creating inflow into the economy. It is recorded in the capital account of the nation's balance of payments. It potentially assuages the negative impact of debt overhang, encouraging a debtor country to incur more debt than it should sustainably incur. The sustenance of sound macroeconomic policies that reflect avoidance of the "impossible trinity" (trilemma) has tended to encourage inflow of FDI. In other words, the maintenance of a regime of independent monetary policy, flexible exchange rate and free capital mobility, promotes FDI inflows.

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1.1.1 Importance of FDI

An effective customs union would increase FDI flows and spur growth in the countries of the ECOWAS[3]. This is because FDI inflows provide physical capital, employment possibilities and technological transfer, as well as long-term economic development among developing countries. According to Aiyar et al, (2013, p 20), "Capital inflows have classically been regarded as conducive to growth, allowing capital to be allocated to wherever its marginal product is highest, besides facilitating consumption smoothing and diversification of idiosyncratic income risk". Thus, the importance of attracting FDI inflows by governments of the countries of the ECOWAS cannot be overemphasized. FDI is especially important for its potential to transfer knowledge and technology, create jobs, boost overall productivity, enhance competitiveness and entrepreneurship, and ultimately eradicate poverty through economic growth and development, (The Monterrey Consensus, 2002)[4].

There is no doubt that foreign direct investment will contribute immensely towards the economic growth of developing countries, given a conducive environment. Today, developing countries are ever more conscious of the position of FDI in their growth process, and have increasingly sought to attract massive FDI inflows through improved macroeconomic policy framework that would create a more investment friendly environment. In addition, they have been keen to provide attractive incentives, improve the infrastructure, entrench credible institutions, and encourage openness. FDI is particularly important because it complements domestic investment and facilitates the transfer of knowledge and technology. Thus, both physical investment and investment in human capital are critical for growth and are symbiotic in that they both reinforce each other. Therefore, many developing countries need a substantial inflow of external resources such as FDI in order to fill not only the saving and foreign exchange gaps, but also idea gaps, (Romer,1993); so as to accelerate and maintain sustainable growth levels in order to eliminate the current pervasive poverty in the sub-region, (Ajayi; 1999, 2000, 2003).

FDI inflows are beneficial to host countries. Low domestic savings in sub-Saharan Africa and in particular ECOWAS countries makes FDI inflows an important source

[3] ECOWAS comprises fifteen countries, namely, Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

[4] "The Monterrey Consensus, United Nations International Conference on Financing for Development, 2002, p.5" http://daccessdds.un.org/doc/UNDOC/GEN/N02/392/67/PDF/N0239267.pdf

of capital to narrow the investment-savings gap and avoid further buildup of debt which could retard economic growth. It also facilitates the extraction and distribution of raw materials produced in the recipient countries through improved infrastructure in terms of good road network, ports, communication, and power supply. The non-availability of infrastructural facilities generally impedes investment. In an empirical study of 18 countries in Latin America, Bengoa et al (2003) find a positive correlation between public investments in transport, communication, power etc., and FDI. To this end, governments in these countries have liberalized their FDI regimes in order to benefit from the positive effects of FDI inflows, particularly in terms of economic growth and poverty reduction. Unfortunately, in spite of the various structural adjustment programmes and investment opportunities, some of the ECOWAS countries have been unable to attract substantial FDI inflows.

It is widely believed that FDI can spur growth by providing the much needed capital for investment in both physical and human capital development, improve the efficiency and productivity of local firms, generate employment, facilitate access to foreign markets, improve the integration of the host country into the global economy and foster growth, (Ajayi, 2006). Schmidt (2008) avers that FDI may promote growth in certain countries, such as those with sufficient amount of FDI or level of development. If it does, and if the way FDI promotes growth is by transferring new technology, then it may also promote convergence among countries. If FDI facilitates convergence among some countries, it must also promote growth at least in the poorer of those countries. Therefore, FDI contributes to international integration since many foreign firms are well connected globally in terms of access to financial markets, consumer outlets and transportation networks. Thus, effort at regional integration is important in attracting market-seeking investments.

Although previous studies have dealt with the impact of FDI on growth in developing countries, arguably, there has been no major study examining the impact of FDI on the countries comprising ECOWAS. In addition, most of the studies reported in the literature have utilized data on aggregate FDI flows. Yet, the impact of FDI flows on economic growth is likely to be strongly dependent on the sectors to which FDI flows. Hence, for best results, disaggregation of FDI inflows according to major destination sectors, such as natural resources (oil, diamonds, etc.), manufacturing and services (telecommunications, banking and finance, etc.) would appear warranted. Thus, a major objective of this study is to fill this gap in extant literature, by investigating the existence of a foreign direct investment-economic growth nexus in the countries of the Economic Community

of the West African States. In addition, this study seeks to determine which FDI destination sectors in ECOWAS countries contribute most to economic growth.

The overall aim of the study is to examine the impact of FDI inflows on the economic growth of the countries of the Economic Community of the West African States. Specifically, it will among others, investigate whether FDI inflows contribute to rapid growth in the ECOWAS countries; determine which sectors in the countries of ECOWAS attract more FDI inflows and which sector-specific FDI flows contribute most to economic growth; and identify cross-country differences in the impact of macroeconomic policy variables and FDI on economic growth. Following the introductory section is section 2, which reviews relevant literature. Section 3 provides the stylized facts about FDI and sectoral analysis of FDI inflows to ECOWAS countries. Section 4 presents the theoretical framework and methodology, while section 5 analyzes the empirical results. Section 6 concludes the paper and presents the policy implications.

2.0 Literature Review

The role of FDI in economic growth, as well as, the importance of economic and institutional developments in facilitating FDI, received considerable attention in extant literature. Neo-classical economists contend that FDI affects only the level of income and leaves the long-run growth unchanged, (Solow, 1957; De Mello, 1997). Their argument is based on the fact that long-run growth is achieved as a result of technological progress as well as population growth, both of which are exogenous. Thus, the neoclassical models of economic growth posit that FDI will only be growth advancing if it affects growth endogenously. This implies increasing returns in production through externalities and spillover effects. Therefore, endogenous growth models consider FDI to be an important source of human capital and technological diffusion. Balasubramanyam et al (1996), utilizes the endogenous growth model in a cross-sectional analysis of 46 developing countries, and find that the growth-enhancing effects of FDI are stronger in countries that pursued a policy of export promotion rather than import substitution. Similarly, Borensztein et al (1998) determined the effect of FDI inflows on economic growth of 69 developing countries from 1970-1989 with an endogenous growth model. Their results indicated that FDI facilitates technological transfer and hence economic growth.

A number of studies have shown that FDI is positively correlated with growth, through its role as a conduit for advanced technology transfer and know-how, including managerial knowledge from advanced countries to developing countries, (Baliamount-Lutz, 2004; Asheghian, 2004; Lim, 2001; Borensztein et al,

1998; Balasubramanyam et al, 1996; and Tsai, 1994). Apart from bridging the gap in physical capital, FDI has been shown to close the gap in ideas, knowledge or human capital. (Fedderke et al, 2004). FDI interaction with the level of education of a country's labour force has a significant positive effect on growth. Its spillover effect was found to be positive on labour productivity growth. FDI impacts on long-run development via technological spillovers and knowledge transfers from the presence of multinationals from technologically advanced countries. Therefore, FDI impacts positively on efficiency and growth. These views, bolstered by recent developments in growth theory, have highlighted the importance of improvements in technology, efficiency and productivity in stimulating growth. They postulate that FDI increases the rate of technical progress in the host country through a contagion (externalities or spillovers) effect from advanced technology and management practices used by foreign firms. This contagion or knowledge diffusion, according to the theory, can result in improved production and efficiency of domestic firms in various ways, viz: imitation and internalization of new technology, as well as learning-by-doing, hence, improved productivity. These spillover effects can be achieved through the linkages between the multinational corporations (MNCs) or their affiliates.

However, Varamini et al (2010); Mencinger (2003); Zhang, 2001; Rodrik (1998); Grilli et al (1995); and Haddad et al (1993), contend that the impact of FDI on economic growth is either ambivalent or negative. In an empirical study of 10 emerging countries in Europe before they joined the European Union, Varamini et al (2010) provided mixed results on the causality relationship between FDI and economic growth. Their findings were both unidirectional and bi-directional. In a related study in 8 transition economies in Europe between 1994 and 2001, Mencinger (2003) found a negative causal relationship between FDI and economic growth. These controversial results were attributed to differences in the sets of countries regarding stages of their development, (Zhang et al, 2001); sample period, data and methodologies. Thus, the impact of capital flows on host countries are not clear, (Varamini et al, 2010).

The difficulty in finding a robust relationship between FDI and growth probably arises because the potential role of FDI depends on context. That is, it may contribute to macroeconomic growth in some situations but not in others, (Schmidt, 2008; Alfaro et al, 2004; and Borensztein et al, 1998). For example, countries may need to attain a certain level of income before they can benefit from FDI. Thus, Schmidt (2008) finds that an FDI-growth threshold estimated rather than imposed beforehand, explains previous difficulties in finding a strong and positive role for FDI in macroeconomic growth. However, given the FDI-growth threshold, evidence does not support the idea that countries need to reach a

minimum level of development before they can benefit from FDI. Studies investigating such a possibility divide countries by starting income level, and then check for differences in estimated model parameters. Blomstrom et al (1992) find in a small sample of developing countries that there is a statistically significant relationship between FDI and growth among middling countries, but not among poor countries (see also Blonigen and Wang, 2005).

Ample evidence abounds in the literature concerning the positive externalities derived from FDI inflows to recipient countries in the form of technological transfer, improved balance of trade and knowledge spillovers. FDI stimulates not only growth but also affects other variables that impact positively on growth. These variables include investment climate, good macroeconomic policies, such as tax policy, financial incentives, trade policy (openness, export promotion, import duties reduction), and subsidies, and have impacted positively on FDI inflows, (Moran et al, 2005; Oxelheim et al, 2004; and UNCTAD, 2000). The importance of a liberal investment climate cannot be overemphasized. Such liberal investment conditions would generate stronger spillovers and attract more dynamic FDI flows that would exhibit cutting edge technology and managerial acumen, and encourage the setting up of export-oriented operations, which would promote trade, (Lim, 2001). On the other hand, a restrictive investment climate with conditions like mandatory joint partnership, licensing or domestic content requirements is likely to promote FDI that demonstrates a slower rate of technology transfer, older technology and less efficient management systems.

FDI may need some complementary domestic institutions to be present to a sufficient extent or depth before it benefits macroeconomic growth. Countries may need to start out with a well-educated labour force, (Borensztein et al, 1998) or a sophisticated financial system (Alfaro et al, 2004). These studies just cited supportive evidence for such dependencies using explanatory growth variables that multiply together FDI and a particular domestic institution. In his own contribution, Iyoha (2007) opined that East Asian countries have attracted massive and growing flows of FDI because they were growing rapidly and steadily and because they had sound economic fundamentals. Also, higher per capita income seems to have played a positive supporting role. In contrast, FDI flows to Africa have been small and unimpressive. Explaining this situation, Iyoha (2007) averred that Africa consists of mainly low-income countries, many of which are small in size and whose export orientation and economic fundamentals are weak. Thus, it is not surprising therefore that Africa's share of FDI flows has been extremely low. Since foreign direct and portfolio investments are subject to many of the same "push" factors -- globalization, financial integration, and technological innovation -- and "pull" factors -- large market size and high per capita income; economic, political

and social stability; favourable investment climate; liberalized trade and financial regime; and active privatization policy -- the aggregate private capital flows into African countries is predictably quite low.

Iyoha (2009) maintains that globalization has accelerated the pace and expanded the scope of liberalization, which attracted substantial amounts of FDI into the developing countries towards the end of the 20th century. However, the inflow has been uneven in terms of distribution and it is even on the downward side, and suggested conducive macroeconomic policy environment through the design and implementation of policies and measures which would make the policy environment investment friendly. But, Ajayi (2006), found evidence of some developing countries which were able to attract FDI even with an environment that was not patently conducive. According to him, the capacity of Africa to attract FDI is determined principally by its natural resources and the size of its local markets. It was found that Nigeria and Angola were able to attract FDI because of their oil endowments, the unconducive nature of their political systems notwithstanding. Ajayi (2006) however concurs with the fact that right policies matter in order to benefit from globalization.

There has been extensive literature on the determinants of investment. Some are confusing and conflicting. Improved macroeconomic framework that creates investment friendly environment, strong institutions and enforcement of rule of law, openness to trade, availability of infrastructure ,market size, stable inflation and exchange rates, human capital development, and political stability are among the factors that attract FDI into a country (Ajayi, 2006; Khan et al, 2006; and Ekpo,1997). However, Siphambe, (2006) in his study on Botswana, notes that even though macroeconomic policies are necessary, they are not sufficient to attract FDI, rather, the availability of abundant natural resources, relatively low labour costs, high cost of utilities and transport, excessive bureaucracy in dealing with business issues, and shortage of skilled personnel, also determine FDI inflows. In a similar study for Cameroon, Khan et al (2006) find that the level of infrastructure is the most important determinant of FDI, while exchange rate, level of political risk, rate of inflation and agglomeration effects (herding behaviour) have no effect on FDI inflows to the country.

Generally, political and institutional uncertainty, inadequate legal and judicial systems, governance failures, insecurity, corruption, lack of transparency and accountability, policy credibility problems, poor infrastructure (transport, power, telecommunication), and high production costs, poor liberalization policies, macroeconomic policy failures and policy somersault in inflationary pressures, exchange rate instability and excessive budget deficits, have been identified as

deterrents to FDI inflows. (Iyoha, 2009; Ajayi, 2006; Khan et al, 2006; Siphambe, 2006; and Ekpo, 1997).

3. Stylized facts about FDI and Sectoral Analysis of FDI inflows to ECOWAS countries

The trend of FDI inflows to the ECOWAS countries in the new millennium indicates tremendous increase from US$133.2million in 2001 to US$423.5million in 2005, US$791.8million in 2010 and US$872.2 in 2013. (WDI, 2015). The impact of FDI on growth differs considerably among countries in the ECOWAS sub-region. Available data made it possible to identify critical differences among the ECOWAS countries in terms of FDI-growth nexus. In recent times, economic growth in the ECOWAS countries has been encouraging with the exception of the "fragile" economies. The countries reporting the highest growth rates have been identified as the mineral producing countries like Nigeria, Ghana, Liberia, and Sierra Leone, with exceptional growth of 7%. With the relatively high GDP growth and the potential market size in terms of large population, some of these countries (especially Nigeria and Ghana) should be in a position to attract more FDI inflows, but with the prevalence of unconducive investment environment, the quantum of FDI inflow has been below expectations. The FDI Contribution Index of UNCTAD indicates that foreign affiliate's contribution in terms of value added, employment generation and capital formation through FDI flows in developing countries, especially Africa is higher. This confirms the assertion that policy matters for maximizing positive and minimizing negative effects of FDI. Also, the UNCTAD FDI Attraction Index, a measure of the success of countries in attracting FDI, ranked Ghana and Nigeria as 16 and 23, respectively, (UNCTAD, 2011).

An analysis of FDI flows by sectoral destination indicates tremendous increases in the share of FDI into the natural resources (primary) and service sectors in the countries of ECOWAS. For instance, of the average amount of FDI inflows of $135.3m to Benin during the period 2001-2013, the stock of FDI in the primary sector was $48.36m; service sector had $67.69m, while the manufacturing had only $11.23m. (See Table 1 below for details). Overall, Nigeria, Ghana, Liberia, Cote d'Ivoire and Côte d'Ivoire had the highest share of FDI inflows to all the sectors, but more in natural resources and service sectors, while The Gambia, Guinea Bissau performed dismally.

Table 1: Sectoral and Total FDI Inflows to ECOWAS, 2001 - 2013 (Average -$m)

	FDI	FDIAS	FDIMS	FDISS
Benin	135.33	48.36	11.23	67.69
Burkina Faso	129.27	29.35	11.94	65.97
Cape Verde	107.13	9.41	6.34	79.94
Côte d'Ivoire	322.52	75.10	44.93	172.19
Gambia	48.73	14.49	2.41	26.81
Ghana	1418.15	384.23	98.89	692.89
Guinea	242.33	55.41	16.83	86.40
Guinea-Bissau	12.89	5.84	1.19	5.27
Liberia	351.05	182.24	14.53	143.33
Mali	275.01	108.10	8.95	105.68
Niger	381.90	149.94	19.89	168.45
Nigeria	5248.21	1567.25	246.00	1958.80
Senegal	208.56	33.84	29.97	124.85
Sierra Leone	158.21	89.27	3.76	55.41
Togo	122.15	39.90	10.15	62.43

KEY: **FDIAS** = FDI Flows into Natural Resources Sector
FDIMS = FDI Flows into Manufacturing Sector
FDISS = FDI Flows into Service Sector

Source: Author's Computation from WDI 2015

4.0 Theoretical Framework and Methodology

The extant literature is replete with studies investigating the impact of foreign direct investment on economic growth in developing countries. For many reasons including the important contribution to the development literature of McKinnon's 2-gap model, the positive contribution of foreign direct investment to economic growth in developing countries has been widely recognized. Note that FDI augments domestic investment in addition to providing much needed foreign exchange resources. In addition, it contributes positively to an improvement in the balance of payments, increases aggregate employment, and provides highly-valued technological transfer and entrepreneurship.

Based upon previous studies, it is postulated that FDI would boost the growth performance of the recipient country. The empirical analysis in this study is based on a sound theoretical framework which draws on neo-classical growth theory. FDI is seen to have a positive impact on growth because it increases capital and improves the quality of labour via technological transfer, with the possibility of

increasing the total factor productivity. In the neo-classical growth literature, FDI is associated positively with output growth because it increases the volume of investment and/or productivity, (Borensztein et al, 1998). This puts the economy on a higher trajectory of long-term growth.

In an exogenous growth model, FDI has only a level effect in the steady state and no permanent impact on the growth rate, except during the transitional dynamics to the new steady state, Hunya (2006). But if growth is endogenous, FDI-promoting policies would induce permanent increases in the rate of output growth by making the host country more appealing to foreign investors, (Adamu et al, 2013a, 2013b, 2012; De Mello Jr., 1997). Therefore, it can be said that FDI can permanently increase the growth rate through spillovers and the transfer and diffusion of technologies, ideas, management processes, etc.

The importance of a certain amount of absorptive capacity of host countries in the FDI-growth relationship has been validated in many empirical studies, (Adamu et al, 2013a, 2013b, 2012; Blonigen and Wang, 2005; Borensztein et al, 1998; De Mello, 1999; Markusen and Rutherford, 2004). A minimum threshold level of human capital for the productivity-enhancing FDI in the host country has been emphasized in the literature, (Hunya, 2006), and hence cross-country heterogeneity is an important determinant or feature of FDI on growth.

Accordingly, it may be postulated that the effect of FDI depends critically on the characteristics of the receiving country. However, this cross-country heterogeneity has been neglected in most of the empirical literature. It was also observed that the potential for positive spillovers does not solely depend on a country's overall absorptive capacity, but also on the industrial structure of the economy, (Castejon and Wörz, 2006). Thus, the impact of FDI differs depending on country-specific absorptive capacity or stage of development, as well as, on the sectoral and industrial structure and allocation of FDI. A high structural match between the donor and the host country would imply proximity in stage of development, and thus also a good precondition for the absorptive capacity of the receiving country to be high, (Hunya, 2006). Also, the level of past FDI inflows can influence current FDI inflows. A higher level of past FDI inflows is an indicator of the soundness and viability of the economy. Hence, potential investors would perceive the economy as an investment-friendly environment. This will attract more FDI inflows.

Macroeconomic policy-related variables are expected to affect domestic investment and influence FDI, (Fischer, 1991; Iyoha, 2008, 2009). The degree of macroeconomic stability, achieved through the implementation of appropriate

monetary and fiscal policies to control inflation, and the type of trade regime of the host country that promotes trade liberalization, in conjunction with the necessary institutional framework for property rights and cross-border legal financial settlements, would attract FDI inflows and stimulate growth. Therefore, it can be argued that positive spillovers will only occur in a conducive environment and suitable setting. If the host economy does not provide an adequate environment in terms of human capital, private and public infrastructure, legal environment, etc., many of the spillovers that may potentially arise from FDI cannot materialize. Public infrastructure such as educational institutions and publicly-funded R&D collaborations can significantly support potential positive spillovers.

In general, the presence of good macroeconomic policy attests to the credibility of government's ability to effectively manage the economy. This will encourage inflows of FDI. Conversely, the absence of coherent macroeconomic policies creates uncertainty and gives the wrong signal to economic agents, which leads to inefficient allocation of resources. This deters inflow of FDI. Some of such relevant macroeconomic policy variables include: inflation rate, budget deficit, real exchange rate, debt-service ratio, and credit to private sector. Let us briefly discuss the effects of these variables on FDI flows.

Financial development in terms of financial deepening and intermediation has also been found to increase profitability of capital which is capable of increasing investment as well as improving the efficiency of investment, (King and Levine, 1993). A high ratio of external debt to GDP reduces the incentives for investment. This dampens private investment and encourages capital flight, (Ajayi, 2006). Therefore, economic 'policy volatility' indicators such as, inflation rate, budget deficit, real exchange rate, debt-service ratio, interest rate, and credit to private sector should be quite useful in explaining variations in growth across countries, (Nkurunziza, 2003).

The empirical analysis in this study is clearly neoclassical. Basically, it draws on neoclassical growth theory and augment of the neoclassical growth model framework, which consists of initial income, capital stock, labor force and trade, with foreign direct investment and human capital. Although the theoretical model underlying modern empirical FDI-growth nexus has moved beyond the Harrod-Domar model, foreign direct investment is still expected to impact on growth via capital accumulation. This follows from the fact that investment drives growth and FDI is an addition to total investment. Accordingly, a growth regression model is stimulated in which per capita income is explained by a vector of variables that includes foreign direct investment and human capital

explicitly. In order to ensure that all sources of capital accumulation are accounted for in the regression, gross (private and public) domestic investment, foreign direct investment, and a measure of human capital are included. The measure of human capital used is secondary school enrolment. All the 15 countries of ECOWAS are included in the study and data for the analysis covers the period from 2001 through 2013. This length of time is chosen to avoid problems of extra 'noise' induced by cyclical and demand related factors, Kraay (2004).

4.1 The model

Consider the standard neoclassical production function:

$$Y=F(A,K,L) \quad \text{.....} \quad (1)$$

Where *A* is the level of technology, *K* is the capital stock, *L* is the quantity of labor and *Y* is output. Assume that the production function is twice differentiable and subject to constant returns to scale, and that technical change is Hicks-neutral.

Differentiation of (1) with respect to time, dividing by *Y* and rearranging the terms yields

$$\acute{Y}/Y = \acute{A}/A + (F_K K/Y) \cdot (\acute{K}/K) + (F_L L/Y) \cdot (\acute{L}/L) \quad \text{.....} \quad (2)$$

Where: $\acute{Y}/Y$ is the continuous time rate of growth of output, $\acute{K}/K$ is the rate of growth of capital stock and $\acute{L}/L$ is the rate of growth of labor force; F_K and F_L are the (social) marginal products of capital and labor, respectively; and $\acute{A}/A$ is the Hicks-neutral rate of change of technological progress. Thus, the basic Solow (exogenous) growth model gives the growth rate of output or income as depending on the rate of growth of technical change, capital stock and labor or population.

In empirical applications, this basic Solow model has been modified to obtain the augmented Solow growth model in which the rate of growth of income for a given country depends not only on technical change, labor and capital but also on policy variables such as trade, fiscal policy, and monetary policy. For details, see, Ologu (2003), Easterly and Levine (2001), Mankiw et al (1992), and Barro (1991).

FDI has been shown to close the gap in physical capital, ideas, knowledge or human capital. (Fedderke et al, 2004). FDI interaction with the level of education of a country's labor force has a significant positive effect on growth. Its spillover effect was found to be positive on labor productivity growth. FDI impacts on long-run development via technological spillovers and knowledge transfers from the

presence of multinationals from technologically advanced countries. Therefore, FDI affects economic growth positively on efficiency grounds. In this paper, we expand the list of policy variables to include capital inflows, with FDI representing private foreign capital inflows. Adding sectorally disaggregated FDI to the augmented Solow Neoclassical theory of economic growth yields the following specification for the determinants of economic growth in any country in any given year:

$$ln\ PCY_t = \eta_1 ln\ POPGR_t + \eta_2 ln\ INV_t + \eta_3 In\ HK_t + \theta_1\ ln\ GEXP_t + \theta_2 ln\ MS_t + \theta_3 \ln XP_t + \theta_4 lnFDIAS + \theta_5 ln\ FDIMS + \theta_6 ln\ FDISS + \varepsilon_t \quad (3)$$

Where:

ln stands for logarithms;

PCY is real income per capita;

POPGR is population growth rate;

INV is the ratio of physical investment to income;

HK is an indicator of human capital development (measured by secondary school enrolment);

GEXP is the ratio of government expenditure to income;

MS is financial depth (measured by the ratio of broad money supply to GDP);

XP represents exports;

FDIAS is for foreign direct investment flows into the natural resources sector;

FDIMS is for foreign direct investment flows into the manufacturing sector;

FDISS is for foreign direct investment flows into the services sector;

η_i is the vector of coefficients of the basic Solow (exogenous growth model) variables;

θ_i is the vector of coefficients of policy-related variables;

t is time (year); and

ε_t is the stochastic error term.

***A priori* expectations**

It is expected that FDI inflows, the quality of human capital, investment, government expenditure, financial depth and exports will be positively related to

per capita income, a measure of economic growth. Population growth is expected to be inversely related to per capita real income. Exports will normally be positively related to economic growth because of the role of international trade in the growth of developing countries. Hence, the higher the level of exports is, the faster will be the rate of economic growth. Domestic investment connotes the willingness to invest by the people, reflecting higher growth and hence, increased FDI. Therefore, the higher the domestic investment, the more FDI will flow into the country and the faster will be the growth of income. Financial depth and development will foster FDI inflows because of low capital transaction cost. Hence, a positive correlation should exist between financial depth (MSYR) and per capita real income (PCY).

The coverage of the study is 15 ECOWAS countries over a 13 year period, involving panel data, also sometimes called times series of cross sections. The model may then be re-estimated as follows:

Consider a panel of *i* countries, observed over *t* periods of time as to the evolution of their per capita GDP, *PCYit (i=1,2…….Z; t=1,2,……....T)* . Therefore, following Baltagi et al (2007), specify a basic model for the empirical analysis of the determinants of economic growth. In particular, the study specifies the following functions in log form:

$$ln\ PCY_{it} = \beta_1 ln\ POPGR_{it} + \beta_2 ln\ INV_{it} + \beta_3 In\ HK_{it} + \beta_4 GEXP_{it} + \beta_5 ln\ MS_{it} + \beta 6\ ln\ XP_{it}$$

$$+ \beta_7 ln\ FDIAS_{it} + \beta_8 ln\ FDIMS_{it} + \beta_9 ln\ FDISS_{it} + \varepsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

Where:

ln stands for logarithms;

i is the country index;

t stands for time in years;

all the other variables are as already defined; and

$\varepsilon_{it} = U_i + V_t + W_{it}$.

4.2 Estimation methodology

It can be seen that equation 4 tracks the "Error Components Model": first introduced by Balestra and Nerlove (1966), expanded by Swamy and Arora (1972), and Wallace and Hussain (1990), and popularized by Baltagi (1995) and others. This phrasing derives from the fact that there are 3 error components, viz.,

a spatial (country) component (U_i), a time component (V_t), and a random component (W_{it}). The time component allows the impact of foreign direct investment to vary over time in each country while the country component permits the impact of foreign direct investment to vary across the countries in the sample.

4.2.1 Formal presentation of the ERROR COMPONENTS MODEL

Let y_{it} be an observation on a dependent variable for the *ith* cross sectional unit for the *tth* time period, and let x_{jit} be an observation on the *jth* nonstochastic regressor for the *ith* cross sectional unit for the *tth* time period. Then the model may be written as:

$$y_{it} = \alpha + \sum \beta_j x_{jit} + \varepsilon_{it} \quad \ldots\ldots (5)$$

Where:

$$\varepsilon_{it} = U_i + V_t + W_{it} \quad \ldots\ldots (6)$$

The U_i, V_t, and W_{it}, components of the random error ε_{it} are all random, have zero means, are independent of each other, and have variances σ^2_U, σ^2_V, and σ^2_W. It is further assumed that:

$EU_i U_{i'} = 0$ for $i \neq i'$; $EV_t V_{t'}' = 0$ $t \neq t'$, and $EW_{it}W_{i't}' = EW_{it}'W_{it} = EW_{i't}'W_{it} = 0$ for $i \neq i'$ and $t \neq t'$.

In this study, three methods of estimation will be utilized. First, two increasingly popular panel data estimators, the Fixed Effects model and the Random Effects model. For more on the Fixed Effects and Random Effects estimating techniques, see Wooldridge (2010, p. 257). Finally, the dynamic panel data estimator will also be used in order to obviate the perennial issue of endogeneity. See Arellano and Bond (1991).

4.3 Data Sources

Data for the macroeconomic variables for all 15 ECOWAS countries for 2001-2013 were obtained from the World Development Indicators 2015 by the World Bank. It was difficult obtaining data on FDI flows that are disaggregated by destination sectors. It was therefore decided that the needed data be generated by using sectoral output shares in combination with aggregate historical FDI data. The sectoral FDI flows (destined for the primary or natural resource sector designated as FDIAS, those destined for the manufacturing sector designated as FDIMS, and those destined for services sector, designated as FDISS) for each country, were

therefore generated using a computer algorithm specially designed for the purpose. Data on total and sectorally disaggregated FDI flows for all ECOWAS countries will be made available to readers on request.

5.0 Econometric Results

The paper presents in what follows, the econometric results obtained by using the Fixed Effects model, the Random effects model and the dynamic panel data or Generalized Method of Moments System (GMM SYS) estimator. Recall that all the variables in the regression equations are in logarithms. Therefore the estimated regression coefficients should be interpreted as elasticities. Also note that 3 stars (***) indicates that a regression coefficient is significantly different from zero at the 1% level; 2 stars (**) indicates that a regression coefficient is significantly different from zero at the 5% level; and 1 star (*) indicates that an estimated regression coefficient is significantly different from zero at the 10% level. The total absence of stars indicates that the regression coefficient is not significantly different from zero even at the 10% level.

5.1 Results of the Growth Equation, LnPCY using the Fixed Effects Model

We now present the fixed effects model results for equation (4).

Model 1: Fixed-effects, using 195 observations
Included 15 cross-sectional units
Time-series length = 13
Dependent variable: lnPCY

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	-3.63384	0.532819	-6.8200	<0.00001	***
lnINV	0.103454	0.0311733	3.3187	0.00111	***
lnHK	0.435966	0.075486	5.7755	<0.00001	***
lnMS	-0.203439	0.0471755	-4.3124	0.00003	***
lnGEXP	0.237915	0.0346947	6.8574	<0.00001	***
lnPOPGR	-0.189533	0.0412706	-4.5924	<0.00001	***
lnFDIAS	-0.225063	0.0461948	-4.8720	<0.00001	***
lnFDIMS	0.00137237	0.052373	0.0262	0.97913	
lnFDISS	0.228294	0.0579403	3.9401	0.00012	***
lnXP	0.134436	0.029686	4.5286	0.00001	***

Mean dependent var	6.360214	S.D. dependent var	0.690523
Sum squared resid	2.723447	S.E. of regression	0.126201
R-squared	0.970558	Adjusted R-squared	0.966598
F(23, 171)	245.0920	P-value(F)	2.9e-118

Log-likelihood	139.7394	Akaike criterion	-231.4787
Schwarz criterion	-152.9267	Hannan-Quinn	-199.6740
rho	0.501714	Durbin-Watson	0.840986

Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(14, 171) = 57.466
with p-value = P(F(14, 171) > 57.466) = 4.83135e-057

The results of the statistical test for differing group (country) intercepts are reported above. It can be confirmed that the null hypothesis of common intercept is rejected. The F-statistics of 46.4 easily passes the significance test at the 1 percent confidence level. Therefore, the use of the Fixed Effects model is justified.

Note: The value of the constant term reported in the equation above, -3.63, is the average for all 15 ECOWAS countries. The individual or country-specific constant terms are reported below. They are seen to range between -5.05 (for Nigeria) and 4.10 (for Guinea Bissau).

Estimated Country-Specific Intercepts

Country Code	Country Name	Country Intercept
1	Benin	-4.09
2	Burkina Faso	-4.39
3	Cape Verde	-3.61
4	Cote d'Ivoire	-4.28
5	The Gambia	-3.46
6	Ghana	-4.70
7	Guinea	-4.42
8	Guinea Bissau	4.10
9	Liberia	-4.03
10	Mali	-4.21
11	Niger	-4.33
12	Nigeria	-5.05
13	Senegal	-4.26
14	Sierra Leone	-3.95
15	Togo	-4.20

The overall fit is very good with an R^2 of 0.97 and an R-bar-squared of 0.966. This means that approximately 97 percent of the systematic variation in per capita real income in ECOWAS countries is explained by the variables used as regressors

in the equation. This level of fit is quite impressive taking into consideration the fact that the study uses panel data. The F-statistic of 245 is highly significant, easily passing the significance test at the 1 percent confidence level. Consequently, the hypothesis of a log-linear relationship between per capita real income and the regressors cannot be rejected at the 1 percent level of significance. It is easily confirmed that the main (positive) drivers of economic growth in ECOWAS countries are: FDI flows into the service sector, exports, aggregate investment, human capital and government expenditures.

5.2 Results of the Random Effects Model

Model 2: Random-effects (GLS), using 195 observations
Included 15 cross-sectional units
Time-series length = 13
Dependent variable: lnPCY

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	2.11824	0.366337	5.7822	<0.00001	***
lnINV	-0.00873071	0.041091	-0.2125	0.83197	
lnHK	0.885472	0.077109	11.4834	<0.00001	***
lnMS	-0.119378	0.0628956	-1.8980	0.05925	*
lnGEXP	0.0914522	0.0440776	2.0748	0.03939	**
lnPOPGR	-0.179958	0.0547646	-3.2860	0.00122	***
lnFDIAS	-0.453879	0.0518976	-8.7457	<0.00001	***
lnFDIMS	-0.121646	0.0633397	-1.9205	0.05633	*
lnFDISS	0.612263	0.0631501	9.6954	<0.00001	***
lnXP	-0.0219916	0.034988	-0.6285	0.53042	

Mean dependent var	6.360214	S.D. dependent var	0.690523
Sum squared resid	38.86822	S.E. of regression	0.457131
Log-likelihood	-119.4428	Akaike criterion	258.8856
Schwarz criterion	291.6156	Hannan-Quinn	272.1376

'Within' variance = 0.0159266
'Between' variance = 0.0465951
theta used for quasi-demeaning = 0.837849

Breusch-Pagan test -
Null hypothesis: Variance of the unit-specific error = 0
Asymptotic test statistic: Chi-square(1) = 154.221
with p-value = 2.07222e-035

Hausman test - Null hypothesis: GLS estimates are consistent

Asymptotic test statistic: Chi-square(9) = 196.45
with p-value = 1.83675e-037

The econometric results of this model show that the main (positive) drivers of economic growth in ECOWAS countries are: FDI flows into the service sector, human capital and government expenditures.

5.3 Results of the Dynamic Panel Data estimator (GMM SYS estimator)

The dynamic panel data estimator has been advanced as an effective method of addressing the problems of endogeneity and orthogonality between the error term and the regressors. The dynamic panel data estimator used in this paper is equivalent to the Generalized Method of Moments system (GMM SYS) technique and hence possesses the properties of consistency and asymptotic efficiency (Arellano and Bond, 1991).

Model 3: 1-step dynamic panel, using 180 observations
Included 15 cross-sectional units
Including equations in levels
H-matrix as per Ox/DPD
Dependent variable: lnPCY
Asymptotic standard errors

	Coefficient	*Std. Error*	*z*	*p-value*	
lnPCY(-1)	0.747979	0.0354201	21.1174	<0.00001	***
Const	1.3383	0.16287	8.2170	<0.00001	***
lnINV	0.00256529	0.0169409	0.1514	0.87964	
lnHK	0.163619	0.0275646	5.9358	<0.00001	***
lnMS	-0.0970452	0.0242893	-3.9954	0.00006	***
lnGEXP	0.0306733	0.0181083	1.6939	0.09029	*
lnPOPGR	-0.0688309	0.0194261	-3.5432	0.00040	***
lnFDIAS	-0.133101	0.0220229	-6.0437	<0.00001	***
lnFDIMS	0.0296963	0.0148764	1.9962	0.04591	**
lnFDISS	0.143278	0.0314451	4.5565	<0.00001	***
lnXP	-0.0328774	0.0109609	-2.9995	0.00270	***

Sum squared resid 2.728197 S.E. of regression 0.127056

Number of instruments = 87
Test for AR(1) errors: z = -15.9902 [0.0000]
Test for AR(2) errors: z = -0.967428 [0.3333]
Sargan over-identification test: Chi-square(76) = 186.545 [0.0000]
Wald (joint) test: Chi-square(10) = 10030.9 [0.0000]

NOTE: Model 3 is equivalent to the GMM-SYS estimator. (For more on this, see Ahn et al, 1999)

The econometric results show that the three components of FDI are significant determinants of growth. However, while FDI into the natural resources sector is negatively signed, the FDI flows into the manufacturing and service sectors are positively signed. The coefficient of FDIMS is significantly different from zero at the 5 percent level while the coefficient of FDISS is significantly different from zero at the 1 percent confidence level. In addition this coefficient has a fairly high elasticity (of approximately 0.15). Thus, FDI flows into the service sector are strong drivers of economic growth in ECOWAS countries. The coefficient of human capital is positive and significantly different from zero at the 1 percent level. However, while the coefficient of government spending is positive, it is only significant at the 10 percent level. The coefficient of aggregate investment is positive but not significantly different from zero. As hypothesized, the coefficient of population growth is negative and it passes the significance test at the 1 percent level. Money supply and exports are perversely signed. As expected, the one period lagged value of per capita real income has a positive sign and is highly significant, easily passing the significance test at the 1 percent confidence level. In summary, we may conclude that the main drivers of economic growth in ECOWAS countries are: the lagged value of growth, human capital. FDI flows into the service sector, FDI flows into the manufacturing sector and government expenditures.

Finally, it is worthy of mention that in all the different estimation techniques employed in this study, the coefficients of FDI flows to the service sector, human capital and government expenditures were consistently and positively related to economic growth; while population had a significant relationship with growth as postulated by theory.

6.0 Conclusion and Policy Implication

The main objective of this paper is to study the impact of foreign direct investment on economic growth in countries of the Economic Community of West African States, and determine which sectors attract more FDI inflows and which sector-specific FDI flows contribute most to economic growth. Data used for the study was from 2001 - 2013 for all 15 ECOWAS member countries. Economic growth was measured by the logarithm of per capita real income and the explanatory variables included population growth rate, investment-income ratio, human capital, the ratio of government expenditure to GDP, exports, financial deepening measured by the ratio of broad money stock to GDP, and FDI flows to

the three major sectors of the economies (primary or natural resources, manufacturing and services). FDI flows into the services and manufacturing sectors were found to have significant positive relationship with economic growth, while FDI flows to the primary sector had a negative relationship to economic growth but it was very significant. Other key variables that had a positive and significant impact on economic growth were human capital, government expenditures and the lagged value of growth. From the econometric results, it can be concluded that in addition to FDI directed to the services and manufacturing sectors, human capital and government expenditures are the principal drivers of economic growth in ECOWAS member countries.

In order to encourage massive inflows of FDI that will contribute to sustainable development, the countries of ECOWAS should liberalize their FDI regimes, put in place policies that will boost the manufacturing and services sectors, such as; improvement in the quality of the policy environment, ensure fair administration of justice, respect for property rights, minimal political intrusion in private business, enhance transparency and accountability, as well as, provide incentives that would attract investments into the production chain of the primary sector by setting up industries that would process raw materials for exports. Even so, considering the constraint in data and limitations to techniques used for the study, these results are tentative. However, they are not such as to nullify the conclusions reached, considering the robustness of the goodness-of-fit statistics.

References

Adamu, Patricia A. and Dickson E. Oriakhi. (2013a), "The Impact of Foreign Direct Investment in the Economic Community of West African States", *African Journal of Economic Policy*, vol. 20, no. 2, December.

Adamu, P.A. and D.E. Oriakhi. (2013b), "Foreign direct investment and economic growth: Evidence from the Economic Community of West African States". WIP, submitted to the *African Economic Research Consortium (AERC),* Nairobi, Kenya.

Adamu, P.A., C.A. Ighodaro and M.A. Iyoha. (2012), "Trade, foreign direct investment and economic growth: Evidence from the countries of the West African Monetary Zone". *West African Economic Review*. Vol 1, No. 2, pp 9-32.

Ahn, S. C. and P. Schmidt. (1999), "Estimation of linear panel data models using GMM" In L. M´aty´as (Ed.), *Generalized Method of Moments Estimation*, Chapter 8, pp. 211–247. Cambridge, UK: Cambridge University Press.

Aiyar, S., R. Duval, D. Puy, Y. Wu and L. Zhang (2013), "Growth Slowdowns and the Middle-Income Trap". *IMF Working Paper* WP/13/71. Washington, D.C., March

Ajayi, S. Ibi. (2006), "The Determinants of FDI in Africa: A Survey of the Evidence" in Ajayi, S. Ibi (ed.) "Foreign direct investment in sub-Saharan Africa: Origins, targets, impact and potential" African Economic Research Consortium (AERC). 2006.

Ajayi, S. Ibi. (2003), "Globalization and Africa". *Journal of African Economies,* 12(Sup. 1): 120–50.

Ajayi, S. Ibi. (2000), "What Africa needs to do to benefit from globalization". *Finance and Development,* 38(4): 6–8.

Ajayi, S. Ibi. (1999), *The Challenges of Financing Development in Africa.* UNECA Discussion Paper No. ESPD/DPS/99/2. United Nations Economic Commission for Africa, Addis Ababa.

Alfaro, Laura, Areedam Chanda, Sebnem Kalemli-Ozcan and Selin Sayek. (2001), "FDI and economic growth: The role of financial markets". Working Paper 01-083. Harvard Business School.

Arellano, M. and S. Bond (1991), "Some tests of specification for Panel data: Monte Carlo evidence and an application to employment equations". *Review of Economic Studies,* 58, 277-297.

Asheghian, P. (2004), "Determinants of economic growth in the United States: The role of foreign direct investment". *The International Trade Journal* 18(1): 63-83

Balasubramanyam, V. N., M. A. Salisu, and D. Sapsford. (1996), "Foreign direct investment and in growth in EP and countries" *Economics Journal* 106: 92–105

Balestra, P. and M. Nerlove, (1966), "Pooling cross-section and time-series data in the estimation of a dynamic model: The demand for natural gas", *Econometrica*, 34, 585-612.

Baliamount-Lutz, M. N. (2004), "Does FDI contribute to economic growth?" *Business Economics 39*(2): 49–56.

Baltagi, B., (1995), *Econometric Analysis of Panel Data*, New York: Wiley & Sons.

Bengoa, M., and Sanchez-Robles, (2003), "FDI, Economic Freedom, and Growth: New Evidence from Latin America," *European Journal of Political Economy* 19, 529-545.

Blomstrom, M., R. E. Lipsey, and M. Zejan. (1992), What explains developing country growth? Working paper 4132, National Bureau of Economic Research, Cambridge, MA. August.

Blonigen, B.A. and M. Wang. (2005), 'Inappropriate Pooling of Wealthy and Poor Countries in Empirical FDI Studies', Chapter 9 in: T. Moran, E. Graham and M. Blomström (eds.), *Does Foreign Direct Investment Promote Development?* Institute for International Economics, Washington D.C.

Borensztein, E. J. De Gregorio, and J.W Lee. (1998), "How does foreign direct investment affect economic growth?" *Journal of International Economics* 45 (1998) 115–135

Castejón, C. F. and J. Wörz (2006), 'Good or Bad? The Influence of FDI on Output Growth: An industry-level analysis', wiiw Working Papers, No. 38, Vienna.

De Mello, L. (1999), "Foreign direct investment-led growth: Evidence from time series and panel data. *Oxford Economic Papers* 51 (1): 133-151

De Mello Jr., L. R. (1997), 'Foreign direct investment in developing countries and growth: A selective survey', *Journal of Development Studies*, 34: 115-135

Easterly, W., and R. Levine. (2001) "Africa's Growth Tragedy: Politics and Ethnic Divisions". *Quarterly Journal of Economics* 112, 1203 – 1250

Ekpo, A.H. (1997), "Foreign direct investment in Nigeria: Evidence from time series data". C.B.N. *Economic and Financial Review*, vol. 35, no. 1, March

Fedderke, J. W. and A. T. Romm. (2004), "Growth Impact and Determinants of FDI into South Africa, 1956 – 2003".*EconomicModelling,* vol. 23, no. 6, pp. 738 – 60.

Fisher, S. (1991), "Macroeconomic development and growth". NBER Macroeconomic annual. 329-364

Gretl (Gnu Regression, Econometrics and Time-series Library). http://gretl.sourceforge.net/

Grilli, V., and G.M. Milesi-Ferretti (1995), "Economic effects and structural determinants of capital controls". .*IMF Staff Papers* 42: 517-551

Haddad, M., and A. Harrison. (1993), "Are there positive spillovers from direct foreign investment? Evidence from panel data for Morocco. *Journal of Development Economics* 42: 51-75

Hunya, G. (2006), "How to assess the impact of foreign direct investment on an economy". In Ajayi (ed.) *Foreign direct investment in sub-Saharan Africa: origins, targets, impact and potential*. African Economic Research Consortium (AERC), 2006

Iyoha, M. A. (2009), "Foreign Direct Investment, Macroeconomic Policy Environment and Economic Growth: The African Experience". *African Notes*, Cornell University, Ithaca, New York, USA. Spring

Iyoha, M. A. (2008), "The Effect of Policy Environment on Foreign Direct Investment and Economic Growth in Africa". .*Journal of Arts and Social Sciences,* vol. 1, no. 1. September.

Iyoha, M. A. (2007), "Policy Environment, Direct Foreign Investment and Economic Growth in sub-Saharan Africa". .*Finance and Banking Review*, vol. 1, no 1, July-December.

Khan, S.S. and L.T. Bamou. (2006), "An analysis of foreign direct flows in Cameroon. In Ajayi, S. Ibi (ed.) *Foreign direct investment in sub-Saharan Africa: Origins, targets, impact and potential*. AERC.

King, R.G. and R.E. Levine. (1993), "Finance and growth: Schumpeter might be right". *Quarterly Journal of Economics*, vol. 108, August, 717-737

Kraay, A. (2004), "When is Growth Pro-Poor? Cross-Country Evidence". *IMF Working Paper* 04/47

Lim, Ewe-Ghee. (2001), "Determinants of, and the relation between FDI and growth: A summary of the recent literature. *IMF working paper*, WP/01/175.

Mankiw, N.G., D. Romer and D. Weil. (1992), "A Contribution to the Empirics of Economic Growth". *Quarterly Journal of Economics,* CVIII, 407 – 438

Markusen, J. and T. Rutherford. (2004), 'Learning on the Quick and Cheap: Gains from Trade through Imported Expertise', *CEPR Discussion Paper* No. 4504.

Mencinger, J. (2003), "Does foreign direct investment always enhance economic growth?" *Kyklos* 56(4): 491-508.

Moran. T., E. Graham, and M. Blomstrom. (2005), "Does foreign direct investment promote development?" Washinton D.C.*: Institute for international Economics, Centre for Global Development.*

Nkurunziza, J.D. (2003), "War, inflation tax and policy in Burundi". RWIP, AERC

Ologu, Emmanuel Dele. (2003), *A test of the Neoclassical theory of economic growth using cointegration and error-correction modeling: the Nigerian case*. Unpublished Ph. D Dissertation, University of Benin.

Oxelheim, L., and P. Ghauri. (2004), *European Union and the race for foreign direct investment in Europe*. Amsterdam: Elseviier

Rodrik, D. (1998), "Who needs capital account convertibility?" In essays in *international Finance,* no. 207: *Should the IMF pursue capital account convertibility?* Ed. P. Kenen*, 55-65.* Princeton. NJ: Princeton University Press

Romer, P. (1993), "Idea gaps and object gaps in economic development". *Journal of monetary economics*, 32

Schmidt, R. (2008), "Enough FDI quickens economic growth everywhere", The North-South Institute, Ottawa, Ontario, Canada, October.

Siphambe, H.K. (2006), "Foreign direct investment in Africa: Botswana case study". In Ajayi, S. Ibi (ed.) *Foreign direct investment in sub-Saharan Africa: Origins, targets, impact and potential*. AERC.

Solow, R.M. (1957), "Technical Change and Aggregate Production Function," *Review of Economics and Statistics* 39, August, 312-320

Swamy, P.A.V.B. and S.S. Arora. (1972), 'The Exact Finite Sample Properties of the Estimators of Coefficients in the Error Components Regression Models', *Econometrica*, March 1972.

Tsai, P.L. (1994), "Determinants of foreign direct investment and its impact on economic growth". *Journal of Economic Development,* 19: 137–63.

UNCTAD, (2011), "World Investment Report," New York & Geneva. United Nations.

UNCTAD (2000), *The World Investment Report 2000: Cross-border mergers and acquisitions and development*. New York: United Nations

Varamini, H. and S. Kalash. (2010), "Foreign direct investment inflows, economic growth, and trade balances: The experience of the new members of the European Union". *Journal of East-West Business, 16: 1, 4-23.*

Wallace, T.D. and A. Hussain. (1969), "The use of error components models in combining cross-section with time-series data". *.Econometrica,* Vol. 37, No. 1 January

Wang, Z.Q. and N.J. Swain, (1995), 'The Determinants of Foreign Direct Investment in Transforming Economies: Evidence from Hungary and China', *WeltwirtschaftslichesArchiv*, 131, pp. 359-82

.

Wooldridge, J. M. (2010), *Econometric Analysis of Cross Section and Panel Data*. Cambridge, Mass.: MIT Press.

World Bank. *World Development Indicators*. (2015), Washington, D.C.

Zhang, K., (2001), "How Does FDI Affect Economic Growth in China?" *Economics of Transition* 9(3), 679-693.

APPENDIX

Correlation coefficients, using the observations 1:01 - 15:13
5% critical value (two-tailed) = 0.1406 for n = 195

PCY	INV	HK	MS	GEXP	
1.0000	0.4295	0.6885	0.6719	0.4156	PCY
	1.0000	0.0644	-0.0922	0.9661	INV
		1.0000	0.8018	0.0496	HK
			1.0000	-0.0836	MS
				1.0000	GEXP

POPGR	FDIAS	FDIMS	FDISS	XP	
-0.6186	0.2501	0.4359	0.4247	0.4014	PCY
0.0095	0.6493	0.9454	0.9205	0.9258	INV
-0.5359	0.0485	0.1023	0.1178	0.0409	HK
-0.5096	-0.0872	-0.0933	-0.0741	-0.0975	MS
0.0101	0.7893	0.9356	0.9441	0.9617	GEXP
1.0000	0.0258	-0.0185	-0.0069	-0.0204	POPGR
	1.0000	0.7476	0.8395	0.8045	FDIAS
		1.0000	0.9801	0.9225	FDIMS
			1.0000	0.9323	FDISS
				1.0000	XP

Summary Statistics, using the observations 1:01 - 15:13
(Missing values were skipped)

Variable	Mean	Median	Minimum	Maximum
PCY	763.102	513.363	130.913	3801.45
INV	3.08320e+009	7.35288e+008	9.64569	7.55111e+010
HK	37.2545	35.4000	6.91140	92.7388
MS	31.2265	28.0765	8.99590	88.1194
GEXP	2.03362e+009	5.16731e+008	12.1200	4.21805e+010
POPGR	2.63935	2.66489	0.193729	4.77433
FDIAS	186.181	36.4274	0.151690	3204.67
FDIMS	35.1347	7.72541	0.0391599	640.861
FDISS	254.407	52.5184	0.186300	4715.91
XP	6.34708e+009	1.02168e+009	28.6057	1.45555e+011
Variable	Std. Dev.	C.V.	Skewness	Ex. kurtosis
PCY	722.511	0.946807	2.58460	6.77352
INV	9.86199e+009	3.19862	6.02864	37.1265
HK	17.0949	0.458868	0.950706	1.45881
MS	15.6258	0.500401	1.75540	3.42790
GEXP	5.84973e+009	2.87651	5.08506	26.7540
POPGR	0.761859	0.288654	-0.571381	1.39487
FDIAS	442.930	2.37904	4.06800	18.7579

FDIMS	83.6072	2.37962	4.85872	26.7987
FDISS	633.609	2.49053	4.47642	22.1668
XP	1.91166e+010	3.01187	4.99614	27.0590
Variable	5% Perc.	95% Perc.	IQ range	Missing obs.
PCY	220.282	2554.59	430.266	0.000000
INV	11.4470	1.11343e+010	1.74057e+009	0.000000
HK	11.5445	71.1280	18.0851	0.000000
MS	13.7578	75.6847	15.2270	0.000000
GEXP	12.6812	8.15470e+009	1.15582e+009	0.000000
POPGR	1.31505	3.81363	0.825193	0.000000
FDIAS	2.38983	1028.18	86.9417	0.000000
FDIMS	0.372882	188.941	33.8299	0.000000
FDISS	2.34209	1590.43	157.964	0.000000
XP	32.4972	2.86420e+010	2.53763e+009	0.000000

THE IMPACT OF THE CENTRAL BANK OF NIGERIA'S MONETARY TIGHTENING MEASURES ON CREDIT AVAILABILITY TO SELECTED SECTORS OF THE ECONOMY

M. K. Tule[5], E. N. Egbuna[6], O. L. Akinboyo[7], U. J. Afangideh[8], and S. Oladunni[9]

Abstract

The adoption of tight monetary policy by the Central Bank of Nigeria since 2009 has been to address inflationary threats, which became elevated due to liquidity surfeit that exerted tremendous pressure on foreign exchange and external reserves. The liquidity condition reflected the impact of huge fiscal injections and quantitative easing implemented to address the challenges of the global financial crisis. This paper adopts an aggregated modified theoretical model for the Nigerian economy, in which aggregate credit supply is specified as a function of monetary policy innovations. Short term interest rates are used as proxy for MPR to capture the combined effects of monetary policy innovations and CBN interventions in the money market. Using monthly time series data from October, 2010 to December, 2013, the study identifies agriculture, manufacturing, real estate and construction as well as transportation and communication sub-sectors for analysis. The impact on the sectors, through the volume of credit, was observed to be marginal. Also, based on ordinary least squares (OLS) estimation techniques in the short run, the results indicates that measures such as cash reserve ratio and various proxies for monetary policy rate in the review period, did not produce the expected outcome on the selected sectors of the economy except on total credit to the private sector. Accordingly, in addition to ensuring price and monetary stability, complementary policies that will expand credit to the selected sectors are required to stimulate growth in the real sector of the economy.

Keywords: Tight Monetary Policy, Monetary Policy Instruments, Cointegration, Error Correction Model.

JEL Classifications: E51, E52, E58

1.0 INTRODUCTION

The Central Bank of Nigeria (CBN) has the mandate to formulate and implement monetary policy, with the primary objective of maintaining stable prices conducive to sustainable economic growth. It also aims to promote and preserve monetary and exchange rate stability as well as ensure a stable and sound financial system. The control of money supply is a critical aspect of central bank's monetary policy in delivering price stability mandate. In the control

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of money supply, the Bank must regulate the level of lending rates in the economy. Interest rates and other prices are central to financial intermediation in a market-based economy. In particular, interest rates represent the cost of borrowing for those who need financial resources and returns for those who are in surplus. High interest rates tend to restrict the growth in credit, making it more expensive for businesses to get finance, thus inhibiting growth in investment.

The interaction between monetary policy and credit flow is expected to stabilize prices as well as promote economic growth. The need to achieve this balance has prompted most countries to recognize the attainment of non-inflationary growth as a key macroeconomic objective. Thus, in addition to stabilizing prices, the Bank is expected to promote increased flow of credit for financing investments in the real sector that would in turn translate into economic growth and employment creation.

While the overall economic objective of government is to ensure macroeconomic stability, tight monetary policy is meant to dampen inflationary expectation to achieve price and exchange rate stability as well as manage vulnerabilities associated with capital flow reversal. Developments in the real sector reveal weak capacity utilization which could be traced to rising cost of inputs and credit. The CBN embarked on a number of interventions following the global financial crisis to ease access to credit, improve liquidity of the banking system and stabilize the financial system.

The Nigerian credit market has two (2) main characterizations, namely: the interbank market and the retail credit market. At the interbank market, wholesale lending and borrowing among money market players such as deposit money banks (DMBs), merchant banks and discount houses is conducted to take care of their short-term liquidity shortages; whereas, at the retail market, deposit money banks provide credit facilities to their customers on retail basis. The monetary policy rate (MPR) is used to anchor interest rates in these two (2) markets, such that adjustments to the MPR should signal the stance of policy with other rates adjusting accordingly. Also, complementary tools such as the Cash Reserve Requirements (CRR) and Liquidity Ratio (LR) have been used to influence interest rates and credit conditions in the economy.

The monetary tightening policy of the Central Bank of Nigeria was conceived to address inflationary threats which became elevated due to the incidence of liquidity surfeit that exerted tremendous pressure on the foreign exchange and external reserves position. The resurgence of liquidity surfeit in the economy was traceable to the impact of huge fiscal injections and quantitative easing

measures implemented to address the challenges of the global financial crisis on Nigeria.

This paper, therefore, examines the impact of lending on the selected subsectors (agriculture, manufacturing, real estate and construction as well as transportation and communication) of the real sector of the economy since the inception of the CBN tightening measures. These subsectors are chosen from the real sector for this study because they are seen as the ones that have the potential to generate substantial growth for employment creation; and are also curiously referred to as the preferred sectors of the economy. Additionally, they are the subsectors from which data could be accessed for the empirical aspect of the study.

Following this introduction is a review of theoretical and empirical literature in part two. Part Three focuses on Monetary Policy Instruments used for tightening by the Bank since 2010 and sectoral analysis of the impact of tightening and the extent and trends of lending. Part Four presents methodology which comprises model specification, analysis of empirical results while the paper is concluded in part five.

2.0 REVIEW OF THEORETICAL AND EMPIRICAL LITERATURE

2.1 The Theoretical Framework

The theoretical framework developed by Ehrmann et al (2003) and adapted by Takeda et al (2005) for analyzing the reaction of bank lending to monetary policy is adopted for this study. The main adaptation to the bank lending model of Ehrmann et al (2003) by Takeda et al (2005) is the accommodation of multiple monetary policy instruments. In the model, bank deposit represents an equilibrium relationship, with deposits *(D)* equal to money *(M)*, and both serving as functions of the interest rate *i* set by the central bank, thus:

$$M = D = -\psi i + \chi, \quad \text{..... (1)}$$

where χ is a constant parameter

The Bank i is faced with a demand for loan (L_i^d) that depends on economic activity (y), inflation $(\inf)$ and loan nominal interest rate (i_L):

$$L_i^d = \phi_1 y + \phi_2 \inf - \phi_3 i_L \text{ ..... (2)}$$

The a priori expectation is that loan demand has a positive relationship with economic activity but negative relationship with loan nominal interest rate.

However, no a priori sign for inflation parameter as theoretical literature suggests that any sign is possible. For instance, Cukierman and Hercowitz (1989) posit that high inflation dis-incentivizes money holding by firms and makes bank loan more attractive. On the other hand, De Gregorio and Sturzenegger (1997) develop a model in which firms'demand for bank credit decreases with inflation due to, as stated in their model, the fact that high inflation relates to low productivity levels, and this also decreases labour demand. Also, according to Huybens and Smith (1999) and depending on the nature of the steady state obtainable in the economy, both outcomes are possible.

The bank $i\,(L_i^s)$ supply of loan depends on available amount of money (or deposits), monetary policy instrument(s) (z*)*, and loan nominal interest rate, where instrument can either be represented by the Monetary Policy Rate (MPR) or the reserve requirements rate (CRR) on deposits (σ) or both. According to Takeda et al (2005) "the direct impact of the policy interest rate represents the opportunity costs for banks when they make use of the interbank market as a source of liquidity". Thus, loan supply is given by:

$$L_i^s = \mu_i D_i + \phi_4 i_L - \phi_5 z \quad \text{..... (3)}$$

The assumption is that all banks are not equally dependent on deposits; thus, the characteristics of individual banks and their reaction(s) to deposit changes are reflected as follows:

$$\mu_i = \mu_0 - \mu_1 x_i \quad \text{..... (4)}$$

The lending market equilibrium condition, added to equations (1) and (4) yields the reduced form model below:

$$L_i = (\phi_1\phi_4 y + \phi_2\phi_4 \inf - (\phi_5 + \mu_0\psi)\phi_3 z + \mu_1\psi\phi_3 z x_i + \mu_0\phi_3\chi - \mu_1\phi_3\chi x_i) \div (\phi_3 + \phi_4)$$
.. (5)

Where equation (5) may be expressed as:

$$L_i = ay + b\inf - c_0 z + c_1 z x_i - dx_i + \text{ constant} \quad \text{..... (6)}$$

The coefficient $c_1 = \dfrac{\mu_1\psi\phi_3}{\phi_3 + \phi_4}$ relates bank *i*'s loans reaction to the monetary policy interaction with its characteristic. Given the assumptions of the model, if coefficient c_1 is significant, then monetary policy affects loans supply. A well

known underlying assumption posits that demand elasticity for interest rate loan does not depend on the characteristic of the bank (x_i), i.e. that the coefficient ϕ_3 is same for all banks.

Homogenous reaction assumption of loan demand is fundamental in identifying the effects of monetary policy on the supply of loan. The assumption of a homogenous reaction of the loan demand is crucial for the identification of the monetary policy effects on loan supply. The assumption downplays a situation of differential sensitivity (diverse reaction) to interest rate changes. This assumption is not out of place in the case of Nigeria where the pattern of interest rates sensitivity that borrowers exhibit cut across all banks. For example, all banks in Nigeria have prime customers who possess higher bargaining power for interest rates applicable on their loans. In addition, bank loan is recognized as the major source of finance for firms as alternative financing windows are limited.

The literature on monetary policy and bank lending revolves around some categories of borrowers depending on the bank for their financing decision and how monetary policy constrains bank lending. Economic models of asymmetric information based on credit market imperfections provide the basis of some borrowers depending on banks for their financing decisions. According to Diamond (1984) and Fama (1985), the fundamental notion is that credit costs for obtaining information about a firm's condition, and costs of bankruptcy, are differentially greater for smaller firms. In the circumstance, it is more costly and difficult for smaller firms to obtain credit. It is also the case that banks have relative advantage over other intermediaries in gathering, processing and screening information that enables them to lend at lower cost to smaller firms (see Thakor, 1995; Swank, 1996; and Neuberger, 1998). These theories give backing to the observed differences in financing small and large firms. Generally, more array of financing options are at the disposal of large firms such as equity, short-term debt, long-term debt, apart from internal cash flow and bank loans. On the other hand, much less access to capital markets is available to small firms and they depend more on internal funds, bank loans and trade credit for financing (see Mash, 1982; and Abor, 2004). Thus, small firms dependence on financing by banks gives the impression that they are prone to disturbances in credit accessibility.

2.2 Empirical Literature

Evidence abounds in extant literature where imperfections in credit market could, in periods of tight credit, explain the differences in small and large firms' behavior. According to Gertler and Gilchrist (1994), greater proportion of the decline in manufacturing activity, along with a decline in inventory demand that is

traceable to monetary policy tightening, is associated with small firms. Also, Oliner and Rudebusch, (1994) opine that "small firms appear to have less access to bank and non-bank external finance in periods of monetary tightening." This analysis is in tandem with the view that macroeconomic consequences follows restrictive bank credit through spending decisions and investment of bank-dependent borrowers.

Numerous empirical studies have established a strong positive relationship between bank lending and investment as well as increased output (Chironko, 1989; Dornbush, 1990; Easterly, 1989; Stigliz, 1989). A greater number of these studies focus on the relationship between financial development and the efficiency of investment. Others such as Stigliz (1989) stressed the influence of financial liberalization on savings and investments and by implication, on long term growth. It was also noted that the impact of bank lending varies between economies depending on investment opportunities and the level of development of the economy. However, the studies generally assumed that increased volume of credit granted by banks would translate into automatic output growth.

This thinking flows from endogenous growth models canvassed by Greenwood and Javanovic (1990) which posits that the marginal product of capital was assumed to be positive. In this respect, banks in developed markets have been credited for the significant role which they play in influencing output growth particularly, in the manufacturing sector in developed and emerging market economies.

Various studies in this and related areas have been done in Nigeria. Nnanna (2001) and Soyibo (1997) indicate strong link between financial development and economic growth. In his studies on bank behaviour and economic growth, Nnanna (2001), reported a significant relationship between lending behaviour and output growth. His findings suggested that in the medium term, the decline in output was associated with reduction in banks' credit to the private sector. However, he noted that positive interest rate regime and expansionary monetary policy induced greater bank credit to the private sector in both the short and the medium terms. In the same study, the impact of policy distortions and inappropriate interest rate regime were found to have significant negative impact on credit expansion in the medium term.

In the study of the effect of banking sector reforms in Africa on Savings, Investment and Financial development, Soyibo (1997) reports that domestic investment declines rather than increase even with the reforms. The low investment rate manifested vividly in low economic growth which declined from

10.7 percent in 1985 to 0.3 percent in 1994. He attribute the contraction in credit delivery to lack of incentives and existence of unacceptably high non-performing assets. He notes that excessive regulation of the banking system could be associated with banks undertaking of unnecessary risky portfolio investments.

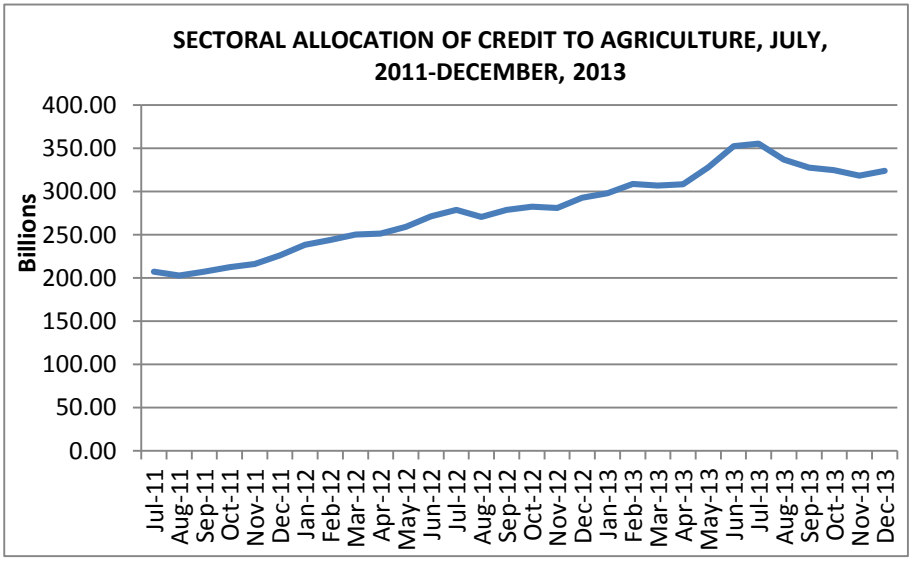
Aderibigbe (2001) opines that banks' lending to small and medium scale businesses does not address the needs of the poor people in the rural areas. This he said is due to the fact that the small scale enterprises' owners could not afford the traditional collaterals and the preference by banks to give large amount of loans to reduce administrative cost on a large number of small loans. He adds that the financial institutions need to fill the gap although they are constrained by policy inconsistency, socio-political factors, and weak regulatory framework.

3.0 SECTORAL ANALYSIS OF IMPACT OF TIGHTENING AND MEASURES TAKEN BY CBN TO ENHANCE CREDIT GROWTH TO THE ECONOMY

3.1 Sectoral Analysis of Lending since Tightening

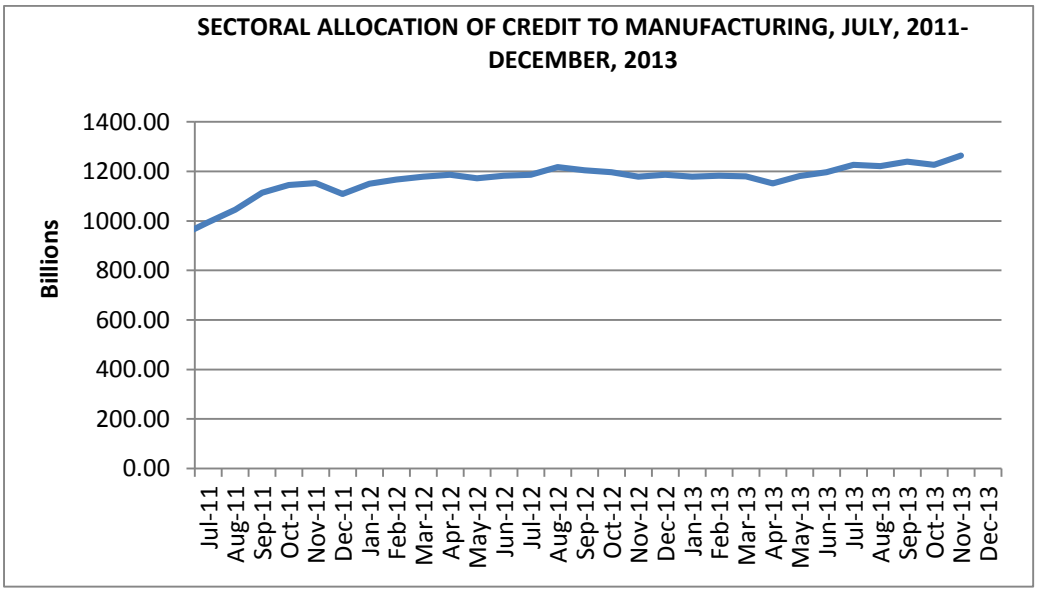
In terms of sectoral impact, a look is taken at the volume of credit to agricultural, manufacturing, real estate and construction as well as transportation and communication. Following the various policies adopted by the bank such as 12 per cent MPR, increase in CRR for public sector funds to 50 per cent in July 2013, etc , the credit to various sectors have marginally increased as shown in charts 4, 5, 6 and 7.

Chart 4: Credit to Agricultural Sector



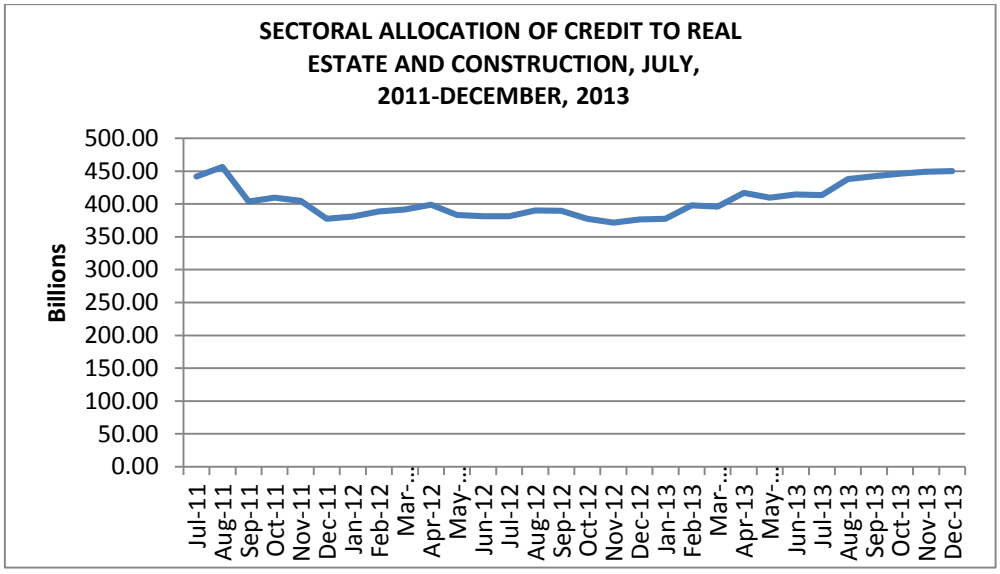
Generally, in terms of trend and extent, credit allocation to agriculture for the period under review grew by 56.31 per cent from N207.4billion in July, 2011 to N324.2billion in December, 2013. After initial fall from July, 2011 to August, 2011, Chart 4 has shown a sustained rise in credit allocated to agriculture. The peak was observed in July, 2013 after which it decelerated till November, 2013. Thereafter, it trended upward in December, 2013. The various initiatives undertaken by the Bank to bring about this rise have included the Nigeria Incentive-based Risk Sharing System for Agricultural Lending (NIRSAL), established in 2010. with a guarantee of N12.217billion till date. There was also the Commercial Agriculture Credit Guarantee Scheme (CACS) established in 2009 and the sum of N225.739billion has been released to 304 projects through 19 Deposit Money Banks (DMBs).

Chart 5: Credit to Manufacturing Sector



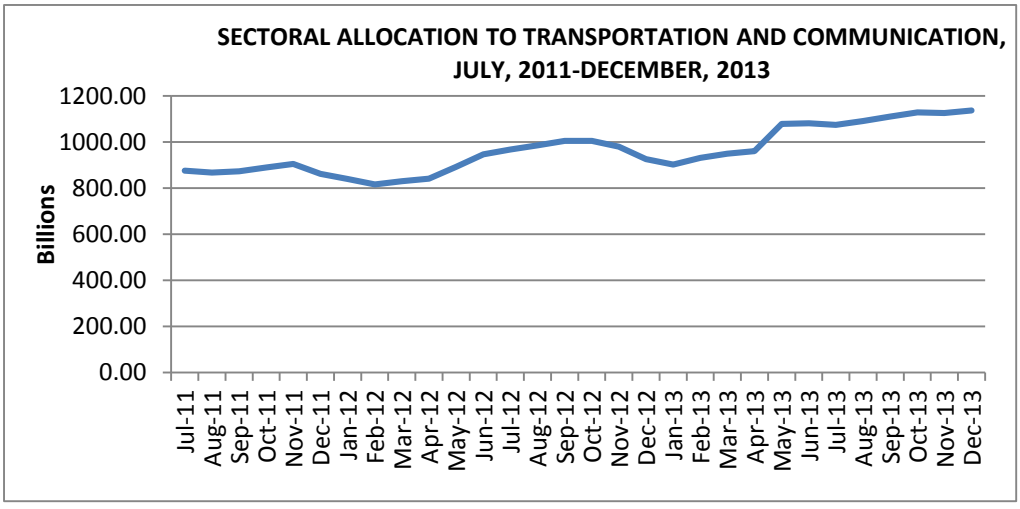
In the same period, July, 2011 to December, 2013, credit to manufacturing increased by 30.14 per cent from N 995.4 billion to N1295.4 billion. As shown in chart 5, there was initial rise from July to November, 2011. Subsequently, a gradual but sustained rise was observed upto December, 2013. This overall upward trend of credit to Manufacturing for the period was aided by some of the Banks' intervention measures such Small and Medium Enterprise Credit Guarantee Scheme (SMECGS) which guaranteed 65 projects valued at N3.084billion.

Chart 6: Credit to Real Estate and Construction



Given the important role of real estate sector in the provision of affordable accommodation and employment for the people, it is imperative to review the level of credit that was allocated to the sector for the period under review. From N441.9 billion in July, 2011, credit to the real sector rose to N450.1 billion, representing a paltry 1.86 percent. As depicted in chart 6, there was initial rise in July, 2011 with a downward movement thereafter till December, 2011. Subsequent movement in credit features a stagnating trend untill January, 2013 when a gradual upward movement began to emerge. This trend remained till December, 2013.

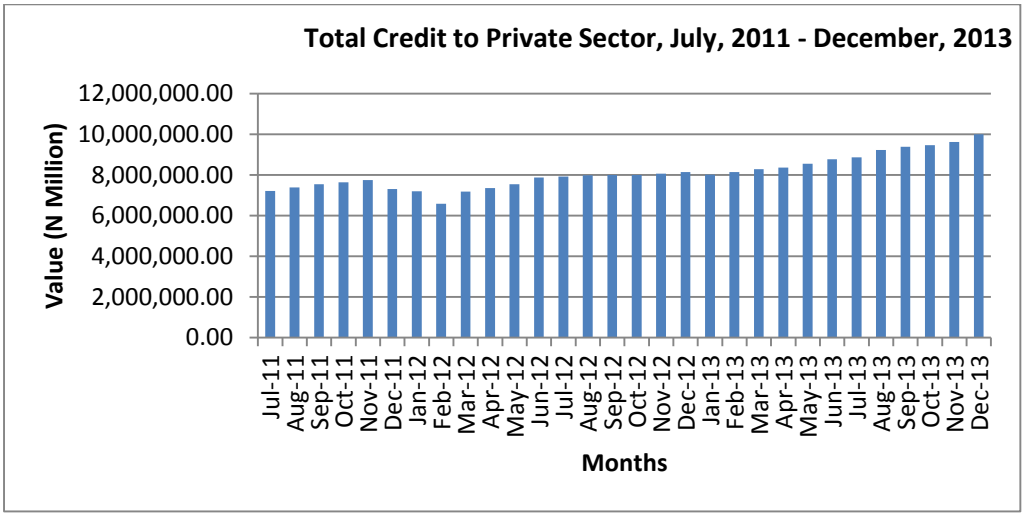
Chart 7: Credit to Transportation and Communication



The general trend of credit allocation to transportation and communication shows an upward rise from N876.1 billion in July, 2011 to N1137.01 billion in December, 2013, representing 29.78 per cent. The Credit allocation indicated an initial lull from July to November, 2011 before decelerating to February, 2012. Thereafter, it picked up to October, 2012 and subsequently fell again. However, from February, 2013, it started rising on a sustanable level till December, 2013.

The growth of total credit to the private sector for the period was 21.82 percent from N8,213,362.00 million in September 2010 to N10,005,594.30 million in December 2013.

Chart 8: Trend of Total Credit to the Private Sector



3.2 Measures taken by CBN to enhance Credit Growth in the Economy

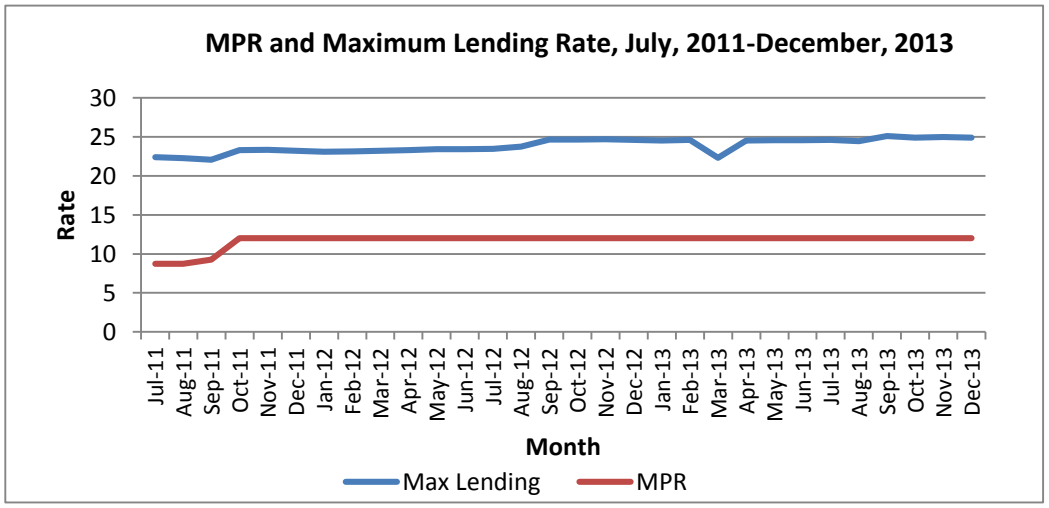
The CBN had taken several policy measures to enhance the growth of credit since 2009. In July 2009, Expanded Discount Window (DW) facility was replaced with a CBN Guarantee of interbank transactions. By this policy, the CBN observed that the increasing costs of obtaining funds from the interbank market and confidence among banks was decreasing. Thus, the Bank in July 2009 decided to intervene in the market by guaranteeing all interbank placements and placements with banks by Pension Fund Administrators maturing on or before 31st December 2010. The guarantee was later extended to all foreign credit lines to banks and the expiry date extended to June 30, 2011 and later to 30th September 2011. This was aimed at deepening interbank transactions and enhancing the growth of credit. The Bank also reduced Net Open Position (NOP) limit of DMBs from 20.00 to 10.00, 5.00 and 1.00 per cent and the injection of N620 billion as tier 2 capital to the banking sector as long term loans.

Other interventions embarked on by the Bank which made credit more available included among others the following

- the Nigeria Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL), established in 2010 had guaranteed N14.272 billion till date;
- power and airline intervention fund (PAIF) initiative introduced in September, 2010 to promote private sector involvement in the power and aviation sectors: N235.653 billion has been released since inception;
- small and medium enterprises credit guarantee scheme (SMECGS) (guaranteed 65 projects valued N3.084 billion to date);
- restructuring and refinancing facility (RRF) of N200 billion, introduced in 2010 (released N263.975 billion to 574 projects since inception).
- commercial agriculture credit guarantee scheme (CACS) established in 2009 (released the sum of N225.738 billion to 304 projects through 19 Deposit Money Banks (DMBs).

All these measures have increased lending to all the sectors of the economy and the impact has resulted in credit growth.

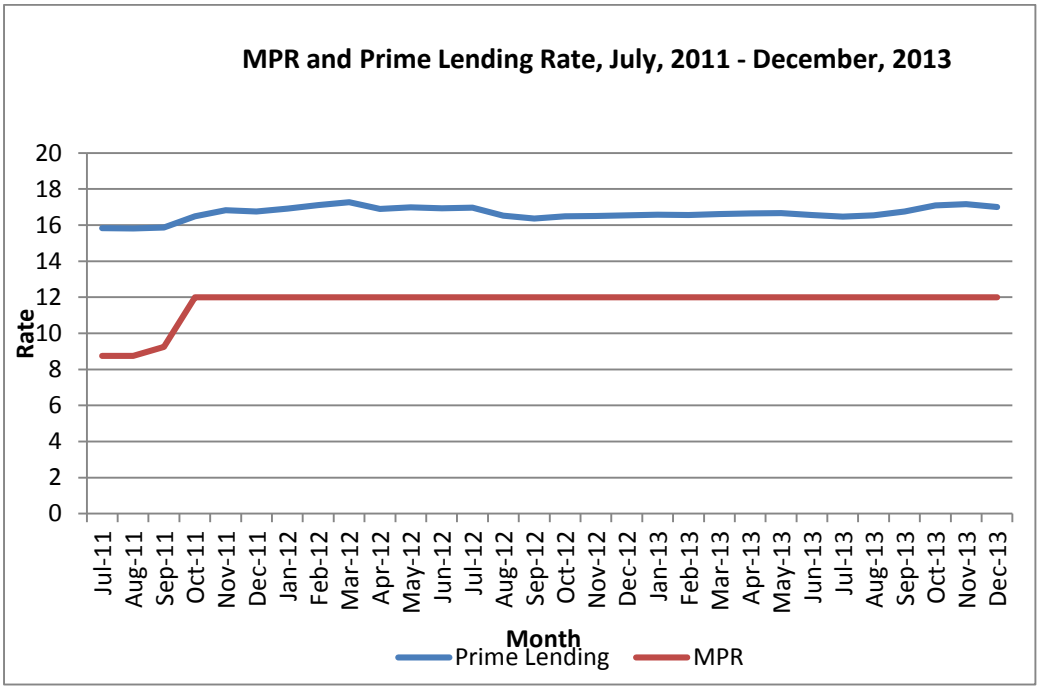
Chart 1: Trend of Monetary Policy Rate and Maximum Lending Rate



As shown in chart 1, the maximum lending rate charged by Deposit Money Banks was consistently higher than the MPR for the period under study. The trend from July, 2011 to August 2012 indicates that the movement of MPR had influence on

the maximum lending rate as the two variables moved in the same direction, but the trend became widened as from September, 2012 till December, 2013 except in March 2013 when it dropped sharply as a result of changes in other variables that usually affect lending rate such as administrative costs, increase in liquidity position of DMBs, etc.

Chart 2: Trend of Monetary Policy Rate and Prime Lending Rate



In chart 2, the same trend was also observed as in chart 1 above except that the premium between MPR and prime lending rate was reduced during the period and again the sharp decline in maximum lending rate for March 2013 in chart 1 was not reflected in prime lending rate. MPR was consistently at 12 per cent as from October 2011.

Chart 3: Trend of Prime and Maximum Lending Rate.

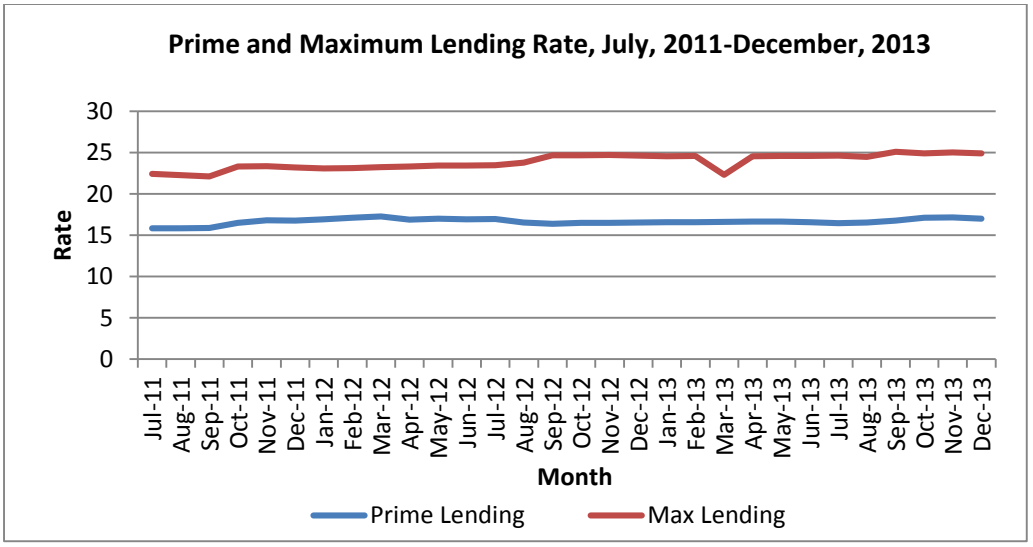


Chart 3 above, indicates that Maximum lending rate was consistently higher than prime lending rate.

4.0 METHODOLOGY AND RESULTS ANALYSIS

The relevant assumptions underpinning the empirical application of the theoretical framework described above using Nigeria data are summarized as follows:

- The individual characteristics of banks in terms of capital, assets and liquidity are not considered. The study adopts an aggregated approach in which aggregate credit supply is modelled as a function of the monetary policy innovations.
- There is homogenous loan demand reaction which in turn allows monetary policy effects on loan supply to be identified.
- The short-term interest rate may be used to proxy the MPR. It tends to capture the combined effects of monetary policy innovations and CBN interventions in the money market.

4.1 Data

The paper uses monthly time series data from July, 2011 to December, 2013. The source of data is the Banking Supervision Department and Statistics Department of the Central Bank of Nigeria.

4.2 Model Specification

The empirical test for this study follows that of Ehrmann et al. (2003) model in which more than one policy instrument was adopted. The bank deposits market is described by an equilibrium relationship. In this relationship, deposits (D) are taken to be equal to money supply (M), and both of them are functions of the interest rate i which is set by the monetary authority. This is modified and adapted for this study in which the focus is on sectoral credit allocation in a period of contractionary monetary policy by the monetary authority.

For the study, each sector of the economy faces a credit allocation function that is dependent on economic activity, rate of inflation and particularly, the short-run monetary policy instruments (based on recent tight monetary policy measures). The a priori expectations are as indicated below each of the variables in the model. The study has identified four sectors based on their relevance in the real sector and the availability of data for analysis. These sectors are agriculture, manufacturing, real estate and construction and transportation and communication. The various equations that make up the model are as follows:

$$MAN_t = a_0+a_1CRR_t+a_2PLR_t+a_3CPI_t+a_4MAN(-1))_t +\varepsilon_{1t} \quad \text{(1)}$$
$$\qquad\qquad (-) \quad (-) \quad (\pm) \quad (+)$$

$$AGR_t = \beta_0+\beta_1CRR_t+\beta_2TBR_t+\beta_3RGDP_t+\beta_4M2_t+\beta_5CPI_t +\varepsilon_{2t} \quad \text{(2)}$$
$$\qquad\qquad (-) \quad (-) \quad (+) \quad (+) \quad (\pm)$$

$$REC_t = \pi_0+ \pi_1CRR_t+\pi_2TBR_t+ \pi_3RGDP_t+ \pi_4MAN_t +\varepsilon_{3t} \quad \text{(3)}$$
$$\qquad\qquad (-) \quad (-) \quad (+) \quad (+)$$

$$TRC_t = \lambda_0+ \lambda_1CRR_t+ \lambda_2PLR_t+ \lambda_3RGDP_t+ \lambda_4 MLR_t + \lambda_5 MAN_t +\varepsilon_{4t} \quad \text{(4)}$$
$$\qquad\qquad (-) \quad (-) \quad (+) \quad (-) \quad (+)$$

$$TCPS_t = \mu_0 + \mu_1PLR_t+ \mu_2MLR_t+ \mu_3RGDP_t+ \mu_4M2_t+ \mu_5MAN_t+ \mu_5AGR_t+\varepsilon_{5t} \quad \text{(5)}$$
$$\qquad\qquad (-) \quad (-) \quad (+) \quad (+) \quad (+) \quad (+)$$

Where *rgdp* is real gross domestic product. Other real sector variables are *agr*, which is credit to agricultural sector; *man* is credit to the manufacturing sector; *rec* is credit to real estate and construction; *trc* is credit to transportation and communication. Other monetary variables which are also used in the paper are *cpi* which is inflation rate, *crr* is cash reserve requirement for private sector deposit, *m2* is broad money supply, *plr* is prime lending rate and *mlr* is maximum lending rate.

The ordinary least squares (OLS) estimation technique is adopted to run equations (1)-(4) to address the impact(s) of tight monetary policy on the different sectors of the economy while the same technique is utilized for equation (5) to examine the impact on the total credit to all the sectors of the economy in general. The a priori expectations are as indicated under each of the variables under consideration in each equation.

4.3 Estimation of Empirical Results

The estimation of empirical results begins by carrying out descriptive analysis of the basic characteristics of the data and also provide simple summaries about the sample. Also, correlation matrix check is done to test the collinearity of the variables used in the estimation at the same time. Further empirical analyses utilize cointegration tests of the variables in the equations to validate the existence or otherwise of long run relationship amongst them. This is done using both Engle-Granger two-step procedure and Johansen methodology. Thereafter, error correction modeling is carried out to combine the long run with short run dynamics to complete the analysis.

Table 1: Descriptive Statistics

	LAGR	LCRR	LMLR	LRGDP	LM2	LCPI	LMAN	LTRC	LREC	LPLR	LTCPS
Mean	12.44	1.84	3.15	11.21	16.41	4.79	13.89	27.56	26.81	2.80	15.89
Median	12.55	2.08	3.15	11.24	16.41	4.79	13.90	27.54	26.74	2.81	15.89
Maximum	12.86	2.48	3.22	11.47	16.57	4.95	14.08	27.76	27.67	2.85	16.12
Minimum	11.76	0.00	3.08	10.92	16.23	4.57	13.76	27.25	26.64	2.76	15.70
Std. Dev.	0.33	0.85	0.05	0.16	0.11	0.11	0.06	0.12	0.23	0.03	0.10
Skewness	-0.79	-1.13	-0.09	-0.09	-0.09	-0.11	0.37	-0.02	2.61	-0.32	0.58
Kurtosis	2.32	2.87	1.49	1.81	1.71	1.93	5.44	2.69	9.67	1.86	2.64
Jarque-Bera	4.82	8.39	3.75	2.34	2.76	1.94	10.61	0.15	116.68	2.74	2.40
Probability	0.09	0.02	0.15	0.31	0.25	0.38	0.00	0.93	0.00	0.25	0.30
Sum	485.19	71.76	122.98	437.01	639.91	186.68	541.73	1074.81	1045.77	109.25	619.83
Sum Sq. Dev.	4.06	27.63	0.09	0.96	0.46	0.42	0.13	0.52	1.98	0.03	0.36
Observations	39	39	39	39	39	39	39	39	39	39	39

Table 2: Correlation Matrix

	LAGR	LCRR	LMLR	LRGDP	LM2	LCPI	LMAN	LTRC	LREC	LPLR	LTCPS
LAGR	1.00	0.94	0.87	0.48	0.92	0.92	0.12	0.66	-0.62	0.77	0.50
LCRR	0.94	1.00	0.85	0.41	0.87	0.89	0.16	0.53	-0.78	0.75	0.32
LMLR	0.87	0.85	1.00	0.58	0.85	0.91	0.18	0.71	-0.52	0.67	0.59
LRGDP	0.48	0.41	0.58	1.00	0.31	0.48	0.38	0.71	-0.04	0.29	0.67
LM2	0.92	0.87	0.85	0.31	1.00	0.94	0.09	0.61	-0.58	0.62	0.50
LCPI	0.92	0.89	0.91	0.48	0.94	1.00	0.17	0.73	-0.57	0.66	0.63
LMAN	0.12	0.16	0.18	0.38	0.09	0.17	1.00	0.41	0.16	0.17	0.39
LTRC	0.66	0.53	0.71	0.71	0.61	0.73	0.41	1.00	0.00	0.44	0.90
LREC	-0.62	-0.78	-0.52	-0.04	-0.58	-0.57	0.16	0.00	1.00	-0.46	0.22
LPLR	0.77	0.75	0.67	0.29	0.62	0.66	0.17	0.44	-0.46	1.00	0.31
LTCPS	0.50	0.32	0.59	0.67	0.50	0.63	0.39	0.90	0.22	0.31	1.00

Table 3: Unit Root Tests Results

Variable		Unit Root Tests		Conclusion
		ADF	PP	
Lagr	Level	-0.9365	-1.2571	
	1st Diff	-8.9158***	-8.9158	I(1)
LCPI	Level	-1.6834	-1.5687	
	1st Diff	-8.1138***	-8.1805***	I(1)
LCRR	Level	-1.4277	-1.5633	I(1)
	1st Diff	-6.5204***	-6.6034***	
LM2	Level	-1.3337	-1.3357	I(1)
	1st Diff	-5.2387***	-5.1796***	
LMLR	Level	-1.160445	-1.4521	I(1)
	1st Difff	-9.325813***	-17.5102***	
LPLR	Level	-1.0356	-1.1939	I(1)
	1st Diff	-4.6911***	-4.6491***	
LMAN	Level	-1.8152	-1.8152	I(1)
	1st Diff	-7.7096***	-7.9326***	
LRGDP	Level	0.5138	-1.9083	I(1)
	1st Diff	-4.3279***	-3.1680**	
LREC	Level	-4.6187***	-8.8455***	I(0)
LTRC	Level	-1.534688	-1.3202	I(1)
	1st Diff	-8.7370***	-8.7390***	
LTCPS	Level	-0.6948	-0.5335	I(1)
	1st Diff	-7.6764***	-7.4519	

Computed by the Authors.

4.4 Cointegration Tests

The cointegration tests for the five equations using Engle-Granger two-step procedure confirm the existence of cointegration as the residual of each of the equations in the long run equations, was found to be stationary at levels. Using Johansen methodology, the cointegration tests also confirm the existence of long run relationship among the variables in the five equations. Although some of the variables indicated more than one cointegrating equations based on trace test statistic, the Max-eigen value statistic however, indicated one cointegrating equation for all of them (see Appendix tables 1-5 in the appendix).

Having confirmed the existence of long run equilibrium (cointegration) relationship among the variables in each of the equations, the study proceeds to estimate the short run error correction model (ECM) in order to draw policy implications for the study. This is based on Henry's general to specific modeling algorithm where the parsimonious model is derived from the 'over parameterized' iteration. The results of the short run error correction model for the five equations are presented and discussed in the next section.

4.5 Short run Error Correction Models

In order to complete the analysis and ensure that policy implication for management is drawn from the study, error correction procedure is carried out for the five equations after the Engle-Granger two-step procedure and Johansen Maximum Likelihood tests have confirmed the existence of long run relationships among the variables in the study.

4.5.1: Credit to Agricultural Sub-Sector Equation:

$$\Delta AGR_t = 0.002 + 0.127\Delta CRR(-1)_t - 0.342\Delta CPI_t - 0.270\Delta CPI(-4)_t + 1.473\Delta M2_t - 0.403ECM_t$$
$$(0.147) \quad (2.202) \quad (2.682) \quad (1.992) \quad (3.087) \quad (2.603)$$

R^2=0.552; AdjR^2 =0.472; F-statistic=6.903; DW=2.094

The results indicate that the previous month's cash reserve ratio had a positive and significant relationship with credit to agricultural sub-sector while the contemporaneous and fourth lag rate of inflation, though significant, impacted negatively on credit to agriculture. The current stock of money in the economy had a positive and significant relationship with credit to agricultural sub-sector. The ECM coefficient satisfies the a priori expectation of having negative magnitude as well as being statistically significant. The speed of adjustment of 40 per cent is the disequilibrium that is corrected in a month.

4.5.2: Credit to Manufacturing Sub-Sector Equation:

$$\Delta LMAN_t = -0.002 + 0.176\Delta LCRR_t - 0.174\Delta LCRR(-1)_t - 1.978\Delta LPLR_t + 2.781\Delta LPLR(-1)_t - 0.398ECM_t$$
$$(0.142)\quad (3.078)\quad (3.101)\quad (2.002)\quad (2.812)\quad (2.828)$$

R2=0.560; AdjR2 =0.489; F-statistic=7.88; DW=2.453

The contemporaneous cash reserve ratio is positively and significantly related to credit to the manufacturing sub-sector but its first lag which is also significant, is negatively related and satisfies the a priori expectation. The current lending rate satisfies the a priori expectation of being negatively related to credit to manufacturing sub-sector and its first lag is counter-intuitive though significantly related. The ECM coefficient is negatively signed and significant as expected, implying that about 39 per cent of disequilibrium is corrected in a month. Thus, the impact of tight monetary policy for the period under investigation was mixed.

4.5.3: Credit to Real Estate and Construction Sub-Sector Equation:

$$\Delta LREC_t = -0.031 + 0.063\Delta LCRR(-1)_t - 0.099\Delta LCPI(-1)_t + 0.282\Delta LMAN_t + 0.166\Delta LRGDP_t - 0.361ECM_t$$
$$(2.524)\quad (0.990)\quad (0.681)\quad (1.909)\quad (1.143)\quad (4.862)$$

R2=0.503; AdjR2 =0.423; F-statistic=6.273; DW=0.879

The first lag of cash reserve ratio has a positive (against a priori expectation) and insignificant relationship with credit to real estate and construction sub-sector. Other determinants like first lag inflation and contemporaneous manufacture and real gross domestic product satisfied the a priori expectation of being negatively and positively related to real estate and construction. The error correction coefficient was negative and significant with a speed of adjustment of 36 per cent. It is obvious from the analysis that tight monetary policy had insignificant impact on the real estate and construction sub-sector of the economy.

4.5.4: Credit to Transport and Communication Sub-Sector Equation:

$$\Delta LREC_t = 0.002 + 0.056\Delta LCRR(-1)_t - 0.137\Delta LCPI(-1)_t + 0.684\Delta LMAN_t + 0.540\Delta LMAN(-1)_t$$
(0.140) (1.557) (2.754) (6.414) (3.466)

$$+0.246\Delta LMAN(-2) - 0.207ECM_t$$
(2.501) (1.762)

R2=0.658; AdjR2 =0.572; F-statistic=7.687; DW=1.993

As in the real estate and construction sub-sector above, the first lag of cash reserve ratio does not satisfy the a priori expectation and is also statistically insignificant. However, other variables like first lag inflation, manufacturing and its lags (one and two) met a priori expectations and were statistically significant. The error correction coefficient was negative and statistically significant at 10 per cent level. Again, the impact of monetary tightening on transport and communication sub-sector is not significant.

4.5.5: Total Credit to Private Sector Equation:

$$\Delta LTCPS_t = - 0.013 - 0.072\Delta LCRR_t - 0.523\Delta LM2_t + 1.925\Delta LCPI_t + 0.322\Delta LMAN(-1)_t +$$
(1.114) (2.088) (2.087) (1.899) (3.771)

$$0.301\Delta LAGR - 0.278ECM_t$$
(4.389) (2.342)

R2=0.555; AdjR2 =0.468; F-statistic=6.434; DW=1.924

The contemporaneous cash reserve ratio is negatively and significantly related to total credit to the private sector. This satisfies the a priori expectation and is an indication that cash reserve ratio has a significant impact on total credit to private sector of the economy. Although the current stock of money and inflation were statistically significant, they did not satisfy the a priori expectation. However, both the first lag of manufacturing and current agricultural credit met a priori expectation in addition to being statistically significant in impacting total credit to the private sector. The ECM coefficient is significant and met a priori expectation with a speed of adjustment of about 28 per cent.

5.0 POLICY IMPLICATIONS AND CONCLUSION

5.1 Policy Implications

The analysis of the results has clearly shown that the various tight monetary policy measures adopted by the Bank, such as cash reserve requirement and monetary policy rate, do not have a significant impact on the identified sectors adopted

for this study. For instance, cash reserve ratio apart from being significant for agriculture and manufacture, has consistently not satisfied a priori expectation for the four sub-sectors except on the total credit to private sector. Also, the maximum lending rate and prime lending rate which were used as proxies for the Bank rate had no impact in the short run equations for the various sub-sectors except in the manufacturing sub-sector where the prime lending rate had a negative and significant relationship.

Accordingly, it is necessary for the Bank to reassess and maybe review the tight monetary policy adopted in the past couple of years, with a view to increasing credit allocation to the various sectors to stimulate investment and ultimately growth in the economy.

Also, the real sector is expected to lead in the drive for job creation. However, it is obvious from the results that the present tight monetary policy is not providing the needed incentive by way of encouraging credit allocation to the real sector to stimulate economic activities for employment generation. It is important for policies of the Bank to be seen to provide the environment for these sectors to thrive and flourish in their activities especially the availability of credit to stimulate economic activities.

Although the focus of the Bank is to ensure the achievement of its mandate of price and monetary stability, it is equally important to articulate complementary policies that would ensure price and monetary stability as well as keeping other economic fundamentals at the right direction through credit expansion to the various sectors for the overall macroeconomic stability.

5.2 Conclusion

The outlook of monetary policy over the short and medium term depends on developments in both the external and domestic environments. There have been concerns especially from the private sector for the CBN to embark on expansionary policy measure so as to speed up the growth of credit. It should be noted that monetary policy in Nigeria alone cannot achieve the desired growth. It must be complemented by fiscal policy, sound macro-prudential policies and most importantly an enabling environment.

However, in the light of the result of this study, it is pertinent for the Bank to take a critical look at the impact of the tight monetary policy measures it has adopted the past few years on the selected sectors of the economy. This is with a view to assessing its impact and contribution of credits to the real sector which has the potential of addressing macroeconomic challenges such as high lending rates, declining growth and unemployment in the country.

References

Abor, J. (2004), 'Internationalisation and Financing Options of Ghanaian SMEs', *ACTA Commercii*, Volume 4, 60-72.

Aderibigbe J.O. (2001), "The Role of the financial Sector In Poverty Reduction", *CBN Economic and Financial Review*. December 2001, Vol. 39 no 4

Central Bank of Nigeria (2009), *50 Years of Central Banking in Nigeria, 1958-2008*

Central Bank of Nigeria (2011), "Liquidity Management in Nigeria", *Understanding Monetary Policy Series*, No 4.

Central Bank of Nigeria (2013), *Communique No. 92 of the Monetary Policy Committee Meeting of Monday 18 and Tuesday 19 November, 2013*.

Chirinko, R.S, (1993), "Business Fixed Investment Spending: A Critical Survey of Modelling Strategies, Empirical Results, and Policy Implications", Federal Reserve Bank of Kansas City, *Research Working Paper*, 93-11.

Cukierman, A. & Hercowitz, Z. (1989), "Oligopolistic financial intermediation, inflation and the interest rate spread", Foerder Institute for Economic Research, Tel-Aviv University, *Working Paper* n. 17-89.

De Gregorio, J. and Sturzenegger, F. (1997), 'Financial Markets and Inflation Under Imperfect".

Diamond, D. (1984), "Financial Intermediation and Delegated Monitoring", *Review of Economic Studies* 51, 393-414. Information'. *Journal of Development Economics*, 54(1): 149-168.

Dornbush R, (1990), "Policies to move from stabilisation to Growth", *Proceedings of the World Bank Annual Conference on Development economics*, pp 10-48.

Easterly W R and D Wetzel, (1989), "Policy Determinants of Growth: Survey of Theory and Evidence", *PFR Working Paper*, no 343, pp 1-35.

Ehrmann, M., Gambacorta, L., Mart´ınez-Pag´es, J., Sevestre, P., & Worms, A. (2003), "Financial systems and the role of bank in monetary transmission in the Euro area", In Angeloni, I., Kashyap, A., & Mojon, B., editors, Monetary

Trans-mission in the Euro Area: *A Study by the Eurosystem Monetary Transmission Network*, pages 235–269. Cambridge University Press, Cambridge.

Fama, E.F. (1985), "What's Different About Banks?", *Journal of Monetary Economics* 15, 29-39.

Gertler, M., and Gilchrist, S. (1994), "Monetary Policy, Business Cycles, and the Behaviour of Small Manufacturing Firms", *Quarterly Journal of Economics*, May, pp. 309-40.

Greenwood, Javanovic B, (1990), "Financial Development Growth and the Distribution of Income", *Journal of Political Economy,* Vol 98,pp 1076-1108.

Huybens, E. and Smith, B. D. (1999), "Inflation, financial markets and long-run real activity", *Journal of Monetary Economics*, 43(2):283–315.

King Darryl (2011), "The Supply and Demand of Structural Liquidity and the Impact of Recent Decisions of the Monetary Policy Committee", *Policy Paper Presented to the MPIC Meeting*, Central Bank of Nigeria, August 2011.

Marsh, P. (1982), 'The Choice Between Equity and Debt: An Empirical Study', *The Journal of Finance*, Vol. 37, No. 1 pp. 121-44.

Nnanna, O J , (2001),"Bank Lending Behaviour and Economic Growth: An Empirical Analysis with Implication for Monetary Policy Formulation in Nigeria", *CBN Economic and Financial Review*, Vol 40, No. 3.

Oliner, S. and Rudebusch, G.D. (1994), "Is There a Broad Credit Channel for Monetary Policy?", Board of Governors of the Federal Reserve System, *Research Working Paper*, January.

Soyibo, A. (1997), "Banking Sector Reforms in Africa: The Effects of Savings, Investment, and Financial Development", *African Development Review* 9: 52-76.

Stiglz, J. E. (1989), "Financial Markets and Development", *Oxford Review of Economic Policy* 5(1) 55-68.

Takeda, T., Rocha, F. & Nakane, M. I. (2005), "The Reaction of Bank Lending to Monetary Policy in Brazil", *RBE Rio de Janeiro* 59(1): 107 – 126 Jan/Mar 2005.

EXTERNAL RESERVES AND ECONOMIC GROWTH IN NIGERIA: AN EMPIRICAL INVESTIGATION.

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Abstract

The paper examines the nexus between Nigeria's foreign reserves and economic growth. Analysis of the data from 2000:Q1 - 2013:Q2, using the modified Wald statistic of Toda and Yamamoto (1995) confirms a unidirectional causality running from external reserves to economic growth. The Gregory and Hansen cointegration test also confirms the existence of a long run relationship between the variables, but with a structural break in 2009Q4. The study finds that external reserves drives economic growth in Nigeria, both in the short and long term horizons. Results also show that a one per cent increase in external reserves leads to 0.15 per cent increase in economic growth. Since general macroeconomic stability has growth enhancing effects, the paper endorses the CBN routine interventions in the foreign exchange market aimed at ensuring stability of the exchange rate.

JEL Classification: F31, F43, O47

Keywords: Exchange Reserves, Co-integration, Structural Break, Economic Growth, Causality

1.0 INTRODUCTION

The debate on the rationale for maintaining high external reserves amidst rising government debt profile, persistent high unemployment, sluggish industrial sector growth, huge infrastructure gap and the urgent need to diversify from oil (for oil producing countries) has been a recurring one among economists, development planners and policy makers in oil producing countries. Meanwhile, there is no consensus in extant literature regarding the exact impact of external reserves accumulation on output performance.

Some studies have shown that reserves accumulation has both economic and social costs, including opportunity cost arising from low returns on reserve assets, losses due to reserve currency depreciation, and forgone gains from investment and social expenditures that could be financed by these reserves. The costs may be so significant that they undermine economic output in which the reserves accumulation becomes inimical to overall growth (Rodrik, 2006; Adam and Léonce, 2007). Other studies have argued that external reserves accumulation

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has been instrumental to growth performance of nations as such reserves are used to finance transaction needs, intervene in foreign exchange markets, enhance credit worthiness, promote wealth accumulation, create buffer against external shocks and entrench the credibility of monetary policy (Yeyati, 2006; Cave and Jones, 1973; Obaseki and Bello, 1996; Ogwumike, 2001; and Abeng, 2007).

For most natural resource endowed emerging economies, a recurrent macroeconomic policy question relates to the extent to which their external reserves management strategies should aim to promote growth or enhance welfare. Thus, researchers in these countries have attempted to examine the causal relationship between external reserves and economic growth as well as quantify the output cost of holding excess reserves. In Nigeria, the literature is still sparse with the few available ones failing to agree on the existence and direction of causality between external reserves and economic growth (Usman and Ibrahim, 2010; Irefin and Yaaba, 2012).

The broad objective of this study is therefore to empirically examine the nexus between external reserves and economic growth in Nigeria while leveraging on recent advances in econometric methodologies and data set (2000:Q1 to 2013:Q2). Specifically, the paper expects to confirm the existence of long-run relationship between external reserves and output performance in Nigeria and, thereafter, examine the direction of causality between the two variables. This paper is different from earlier related works in a number of ways. First, it considers the possibility of structural breaks in the modelling approach. Second, a causality test that is robust to non-stationary VARs has been used. Lastly, in order to reduce the sensitivity of the model results to the inclusion/exclusion of other covariates, the analysis was restricted by investigating the relationship between external reserves and output performance using a bivariate approach.

The study is divided into six sections. Following this introduction, a review of empirical literature has been undertaken in section two. Section three presents stylized facts on external reserves management in Nigeria. Section four discusses data and methodology while the results of the study are discussed in section five. Section six concludes the paper with some policy implications.

2.0 REVIEW OF EMPIRICAL LITERATURE

The literature is replete with studies conducted to investigate the determinants of external reserves and the growth implications of external reserves accumulation. For instance, Adam and Léonce (2007), in their study, using panel data from 21 African countries, examine the sources, motivation and economic implications of

reserve accumulation with a focus on the impact on exchange rate, inflation, and public and private investment. They argue that countries generally maintain reserves in order to effectively manage their exchange rate and reduce adjustment costs associated with fluctuations in international payments but advised that in any credible reserves management strategy, the benefits of external reserve accumulation should be carefully weighed against its potentially high economic and social costs. Their results showed that excessive accumulation of external reserves resulted in exchange rate appreciation while it yields little benefits in terms of public and private investment. They conclude that African countries, especially those endowed with natural resources; need to adopt a more pro-growth approach to reserve management.

In an analysis of the benefits of reserves accumulation, Adam and Léone (2007) opine that the costs of maintaining reserves comprise the opportunity cost of foregone domestic consumption and investment as well as financial costs and the strain on monetary policy arising from efforts to sterilize the effects of excessive monetary expansion through higher domestic interest rates. This, according to the duo, can increase fiscal pressure (control of government spending and deficits) and make reserve accumulation inconsistent with fiscal policy objectives.

Aizenman and Lee (2005) compare the relative importance of precautionary and mercantilist motives in explaining the hoarding of international reserves by developing countries. Their empirical results suggest that precautionary motives have played a more prominent role in reserve accumulation. Meanwhile, a study by Rodrik (2006) reveals that reasonable spreads between the yield on reserve assets and the cost of foreign borrowing led to an income loss of nearly one per cent of GDP in developing countries that have rapidly increased foreign exchange reserves. In contrast, Yeyati (2006) points out that the costs of foreign exchange reserves may have been considerably overstated in previous studies. He argues that, to the extent that reserves lower the probability of a run-induced default, they reduce the spread paid on the stock of sovereign debt.

IMF (2003) applies a simple empirical model on a large panel that covers 122 emerging-market economies with annual data from 1980 to 1996 to investigate the determinants of reserve holdings. In the study, real GDP per capita, the population level, the ratio of imports to GDP, and the volatility of the exchange rate are found to be statistically significant determinants of real reserves. Predicted values from the model reveal that international reserves in Latin America are not excessive, while those in emerging Asia have increased more than warranted since 2001.

Aizenman and Marion (2002, 2004) investigate the reasons for the relatively high demand for reserves by countries in emerging Asia and the relatively low demand by some other developing countries (e.g., Latin America). In addition to share of imports/exports to output, ratio of capital flows or broad money to GDP, short term external debt, exchange rate and interest rates differential; they examine the role of political uncertainty and corruption as determinants of reserve holdings. Using a theoretical model, they show that sovereign risk, costly tax collection to cover fiscal liabilities, and loss aversion (defined as the tendency of agents in an economy to be more sensitive to reductions in consumption than to increases) lead to a relatively large precautionary demand for international reserves. They further conclude that the recent large build-up of international reserves in emerging Asia is motivated by the experience of the Asian crisis.

Osabuohien and Egwakhe (2008) seek to evaluate the role of external reserve in the Nigerian economy. Their model is structured to determine the relationships between external reserves and three covariates; namely, gross domestic product (GDP), exports and imports. It assumes that external reserves are held with a view to making the economy more attractive to foreign investment, which would, in turn, improve the economic performance of the nation. Their results, however, show that large foreign reserves cannot propel economic growth in Nigeria.

In a more recent paper, Usman and Ibrahim (2010) specify a simple long run external reserves demand equation for the period 1986-2006. Using an error correction model, they find that demand for external reserves in Nigeria is driven mainly by current account variability, real exchange rate and opportunity cost of holding reserves. Two of these variables (current account variability and real exchange rate) have positive and statistically significant coefficients, while the opportunity cost of holding reserves has a negative coefficient. However, GDP is found to be insignificant. Meanwhile, Obaseki and Bello (1996) argue that external reserves accumulated either through a phenomenal rise in oil price or exchange rate promotes Nigeria's domestic output.

Ogwumike (2001) is of the view that reserves are necessary impetus for investors to invest in the critical sectors of an economy - such as agricultural, manufacturing, mining and quarrying, building, and construction and crude petroleum sectors- which will bring about significant growth to the economy. Reserves could also serve as collateral for capital importation which in effect will enhance growth in output.

Fapolusi (2006), avers that external reserves, if appropriately managed are expected to enhance economic growth and very essential for the prosperity of a nation and this is why it is a major macroeconomic goal. Even though economic

growth is not a sufficient condition for poverty alleviation/elimination it is indeed a necessary condition for the reduction and sustained economic growth in an atmosphere of equitable distribution of income and wealth paves the way for the reduction or elimination of absolute poverty and underdevelopment.

Heller (1966) concludes that emerging market economies hold reserves as a buffer stock to smooth unexpected and temporary imbalances in international payments. This view is supported by Eichengreen (2006) who notes that demand for reserves is partially driven by demand for insurance against financial shocks. However, in determining the optimal level of reserves, the monetary authority needs to balance the macroeconomic adjustment costs incurred if reserves are exhausted (crisis prevention motive) with the opportunity cost of holding reserves. Thus in theory, a country can decide to accumulate foreign reserves to eliminate some of its volatility. Evidence suggests that higher reserves reduce both the likelihood of a crisis and the depth of a crisis, should one occur (IMF 2003).

Jeanne and Ranciere (2006) argue that holding reserves is costly, but without reserves, a sudden stop in capital flows would lead to sharp falls in consumption and output. Osabuohien and Egwakhe (2008) maintain that "the opportunity cost of stock-pilling Nigeria's external reserve in order to cushion financial crisis vulnerability appears as a risk-aversion strategy. Nevertheless, this strategy undermines the marginal benefit if the reserve is pumped into investment to stimulate economic productivity". Alternatively, the duo assert further that "the elasticity of reserve accumulation to the degree of unlikely financial shocks affects the foregone utilisation-benefits. Nda (2006) notes that, the Nigerian reserve is to some degree exclusively held in government bonds. Hence, yielding low returns, and provide security and liquidity that are highly priced by reserves managers. As a result, the cost-benefit analysis between security and liquidity vis-à-vis the return constitutes a bitter pill for the acceptance by the general public (Osabuohien and Egwakhe, 2008).

In a more analytical paper, Gosselin and Parent (2005) argue that the model estimated by IMF (2003) could be liable to misspecification error, due to issues of structural break. Their argument is based on the fact that the Asian crisis could have led to significant changes in the relationship between the variables. However, after conducting various robustness tests using the IMF's data set; they are unable to find any statistical evidence of a break in the patterns of the correlations among the variables. This, they conclude, could reflect the fact that the IMF's data set covers a wide array of monetary regimes for which the average coefficients are stable. While also, considering the possibility of structural breaks in external reserves models, Lizondo and Mathieson (1987) find that the debt crisis

of the early 1980s in Latin America produced a structural break in the country's demand for reserves.

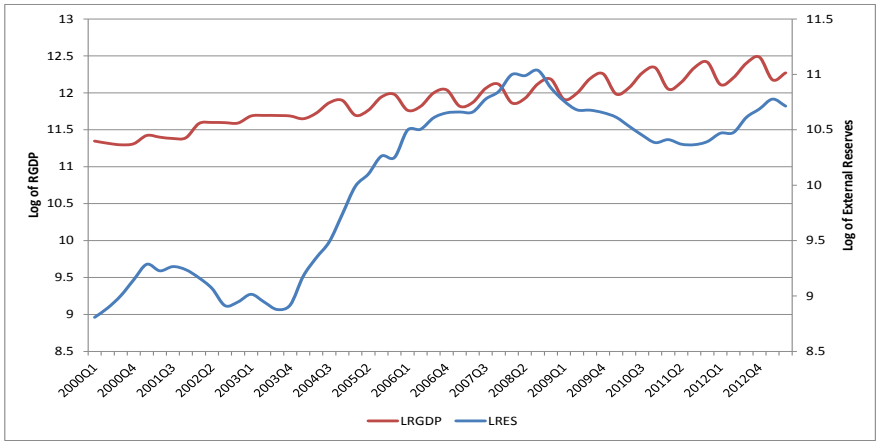
The studies reviewed above indicate that the literature is not unanimous on the exact relationship between external reserves and growth, even though some studies (such as IMF, 2003) have highlighted the possibility of threshold effect. Only very few studies accommodate structural break in their modelling approach. Failure to account for structural breaks when they do occur leads to biased parameter estimates.

3.0 DATA AND METHODOLOGY

3.1 Data Source and Description

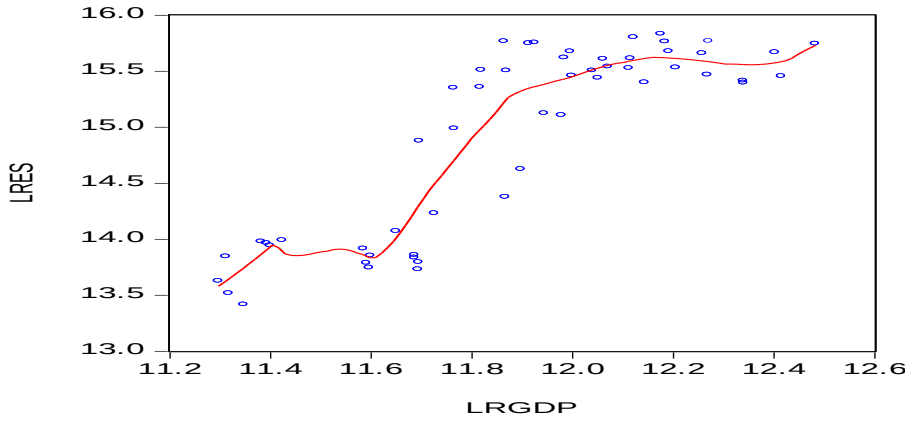
This study uses quarterly data on real gross domestic product (RGDP) and external reserves (RES) covering the period 2000Q1 to 2013Q2. The choice of estimation period is based on data availability and the need to cover current economic developments in the country, especially in the aftermath of the 2008/09 global financial crisis. Time series data on the variables are sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin. In order to take care of the possibility of exponential growth trend in the series and curtail the effect of outliers, the variables are transformed into logarithmic form. The double log transformation enables us to estimate a linear relationship between the two variables with the obtained coefficients interpreted as elasticities.

Chart 1: Plot of Log-transformed RGDP and External Reserves, 2000Q1 – 2013Q2



Furthermore, a scatter plot of the series presented in Chart 2 seems to broadly suggest a positive relationship between the two variables, a relationship that is more pronounced between 2004 and 2007.

Chart 2: Scatter Plot of LRGDP and LRES, 2000Q1 – 2013Q2



However, as shown by the polynomial kernel fit of the scatter plot, the relationship seems to be flat during 2007 – 2012 and there are also pockets of short term negative relationships during the entire sample period, (for instance during 2000 and 2002).Overall, Chart 2 seems to suggest that the exact pattern of relationship between real gross domestic product and external reserves requires further investigation. The observed behaviours in the two charts above are informative and provide a guide in the choice of estimation procedures to be adopted to provide answers to the research questions posed by the study.

3.2 Methodology

3.2.1 Unit Root

A critical step in any time series analysis is the identification of the order of integration for the variables. This is to avoid the spurious regression problem. The Augmented Dickey-Fuller (ADF) unit root test which includes intercept as well as intercept and trend in the test regression, is employed. Also used is the Zivot and Andrews (1992) unit root test, which is robust to the presence of structural breaks in the data. The null hypothesis in this case is the presence of unit root with drift that excludes any structural break in the series while the alternative is a trend stationary series process that allows for a one-time break in the trend function (Zivot and Andrews, 1992). Thus, given a time series Y_t, the regression equations specified by Zivot and Andrews to test for unit root under the assumptions of structural break in levels, trend and both trend and intercept are respectively as follows:

$$y_t = \hat{\mu}^A + \hat{\theta}^A DU_t(\hat{\lambda}) + \hat{\beta}^A t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^A \Delta y_{t-j} + \hat{e}_t, \qquad (2)$$

$$y_t = \hat{\mu}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_t^*(\hat{\lambda}) + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^B \Delta y_{t-\mathrm{j}} + \hat{e}_t \,, \qquad (3)$$

$$y_t = \hat{\mu}^C + \hat{\theta}^C DU_t(\hat{\lambda}) + \hat{\beta}^C t + \hat{\gamma}^C DT_t^*(\hat{\lambda}) + \hat{\alpha}^C y_{t-1} + \sum_{j=1}^{k} \hat{C}_j^C \Delta y_{t-\mathrm{j}} + \hat{e}_t \qquad (4)$$

where $DU_t(\lambda) = 1\ if\ t > T\lambda, 0\ otherwise;\ DT_t^*(\lambda) = t - T\lambda$ if $t > T\lambda, 0\ otherwise$. λ in the three equations corresponds to estimated values of the break fraction, $\theta\ and\ \gamma$ are parameter estimates that endogenously account for the structural break at levels and trend respectively. Δ is first difference operator. The asymptotic distribution of the test statistic is given as $inf_{\lambda\in\Lambda} t_{\hat{\alpha}^i}(\lambda),\ i = A, B, C\ (for\ the\ models\ corresponding\ to\ equations\ 2-4)$ with the size a left-tail critical value from the asymptotic distribution being $k_{inf,\alpha}^i$. Thus, the null hypothesis of a unit root is rejected if:

$\inf_{\lambda\in\Lambda} t_{\hat{\alpha}^i}(\lambda) < k_{inf,\alpha}^i\ \ i = A, B, C\ (for\ the\ models\ corresponding\ to\ equations\ 2-4)$

The overall essence of this step is to ensure that the proper order of integration of the series is identified with a view to ensuring that the included variables enter the model in a non-explosive form.

3.2.2 Causality Test

The idea of causality was formally developed by Granger (1969) who argues that a variable X_t causes another variable Y_t if the former helps to improve the forecast of the latter and if otherwise, X_t is said to be Granger-noncausal for Y_t. Granger's test for causality is based on zero restrictions on the coefficients of a subset of lagged variables included in an estimated simple Vector Autoregression. In line with Granger's suggestion, the paper tests for the absence of Granger causality between LRGDP and LRES by estimating the following bivariate VAR:

$$LRGDP_t = \propto + \sum_{i=1}^{m} \gamma_i LRGDP_{t-i} + \sum_{j=1}^{n} \delta_j LRES_{t-j} + \mu_{yt} \qquad (5)$$

$$LRES_t = \propto + \sum_{i=1}^{m} \theta_i LRES_{t-i} + \sum_{j=1}^{n} \varphi_j LRGDP_{t-j} + \mu_{xt} \qquad (6)$$

where LRGDP and LRES are real gross domestic product and external reserves in their logarithmic form, m and n are the optimal lag orders selected via information

criteria, μ_{yt} and μ_{xt} are the uncorrelated white-noise error terms of the respective equations, γ_i, δ_j, θ_i and φ_j are the coefficients in the VAR.

The investigation of causality between LRGDP and LRES involves investigating the joint significance of the coefficients for the lagged LRES and lagged LRGDP terms (δ_j and φ_j) in equations (5) and (6), respectively. This is based on the calculated *F* statistic for the Wald test on coefficient restrictions. However, the Wald test statistic used in a VAR-based Granger causality test as outlined above has been criticized as following a nonstandard asymptotic distribution and depending on nuisance parameters if the VAR process is non-stationary (Sims et al., 1990; Toda and Phillips, 1993; Toda and Yamamoto, 1995). The consensus in literature is that the results of the simple Granger causality test, as outlined above, are meaningless, even asymptotically when the variables in the model are I(1). The shortcomings of the simple Granger causality test are documented in Shirazi and AbdulManap (2005).

To overcome these shortcomings, Toda and Yamamoto (1995), hereafter referred to as T-Y procedure, propose a causality test procedure that involves the estimation of levels VAR with augmented lags and the usual restrictions on the parameter matrices irrespective of the order of integration or cointegration of the process. Thus, the T-Y procedure modifies the Wald statistic for testing the significance of the relevant coefficient by estimating a VAR ($m+h_{max}$) instead of a *VAR (m)* model (where *m* is the optimal lag length for the system selected on the basis of an appropriate selection criterion and h_{max} is the maximal order of integration in the process). Thus, the inclusion of an additional lag in the VAR allows the testing of non-causality hypothesis by a conventional Wald statistic since the standard asymptotic inference holds. He further showed that that the estimated parameters under this framework have a limiting normal distribution. Consequently, we employed the T-Y procedure to investigate the direction of causality between the two variables of interest, namely *LRGDP* and *LRES*.

3.2.3 Cointegration Test

It has been argued in literature that the Engle and Granger (1987) approach to testing for cointegration tends to under-reject the null of no cointegration if there is a cointegration relationship that has changed at some (unknown) time during the sample period (Harris and Sollis, 2003). This implies that the Engle-Granger procedure has low power in the presence of structural breaks. In view of the possibility of structural breaks in the cointegrating relationship between the variables (see Gosselin and Parent, 2005 and Lizondo and Mathieson 1987), the paper employs a residual based cointegration tests proposed by Gregory and Hansen (1996) to investigate whether LRGDP and LRES share similar stochastic

trends in the long run relationship, which may have changed as certain period. This is an extension of the Engle and Granger (1987) approach and it involves testing the null hypothesis of no cointegration against an alternative of cointegration with a single break in an unknown date based on extensions of the traditional *ADF-, Z_α* and Z_t – test types. Thus, this test is robust to the presence of structural breaks in the cointegrating relationship amongst the variables in the model. Being residual based, it involves testing for unit roots in the residuals from the cointegrating regression. If the null hypothesis is rejected, it implies that the linear combination of the variables exhibits stable properties in the long run, albeit with the presence of structural break. This concept is of importance to this study because it helps define the existence of a long-run equilibrium to which the two variables converge over time.

Gregory and Hansen develope three different models to test for cointegration based on different assumptions about the form of the structural beaks in the cointegrating relationship. These are models that assume a level shift in the cointegrating relationship (C), a level shift with time trend (C/T) and a regime shift (C/S). The third assumption allows the cointegrating relationship not only to shift in a parallel fashion but to also rotate. Thus, given a bivariate model involving Y_t and X_t (which are I(1) variables) and *I(0)* residuals, the specifications for models C, C/T and C/S are respectively given as:

$$y_t = \alpha_1 + \alpha_2 D_t + \delta X_t + \mu_t, \qquad t = 1, 2, \ldots\ldots, T. \tag{7}$$

$$y_t = \alpha_1 + \alpha_2 D_t + \varphi t + \delta X_t + \mu_t, \qquad t = 1, 2, \ldots\ldots, T. \tag{8}$$

$$y_t = \alpha_1 + \alpha_2 D_t + \delta_1 X_t + \delta_2 X_t D_t + \mu_t, \qquad t = 1, 2, \ldots\ldots, T. \tag{9}$$

Where y_t is the dependent variable, x_t is a vector of covariates, t is a time trend, parameters α_1 and $\alpha_2$are the respective intercept terms before and after the break, φ is the coefficient for time trend, δ_1 and δ_2 are the respective coefficients of the independent variable before and after the structural break and υ_t is the disturbance term. D_t is a dummy variable that takes the form:

$$D_t = \begin{cases} 0, if\ t \leq [T\tau] \\ 1, if\ t > [T\tau] \end{cases} \tag{10}$$

where the unknown parameter $\tau \in (0, 1)$ denotes the relative timing of the break and [ ] denotes the integer part operator. Since the change point or its date are unknown, the test for cointegration within this framework involves computing the usual statistics for all possible break points $\tau \in J$ and then selecting the smallest

value obtained, since it will potentially present greater evidence against the null hypothesis of no cointegration. Assuming LRES causes LRGDP, the implied Gregory and Hansen (1996) cointegrating equations for our variables are as follows:

$$LRGDP_t = \alpha_1 + \alpha_2 D_t + \delta LRES_t + \mu_t, \quad t = 1, 2, \ldots\ldots, T. \tag{11}$$

$$LRGDP_t = \alpha_1 + \alpha_2 D_t + \varphi t + \delta RES_t + \mu_t, \quad t = 1, 2, \ldots\ldots, T. \tag{12}$$

$$LRGDP_t = \alpha_1 + \alpha_2 D_t + \delta_1 RES_t + \delta_2 RES_t D_t + \mu_t, \quad t = 1, 2, \ldots\ldots, T. \tag{13}$$

where LRGDP and LRES are as earlier defined and ε_t is the random error. The parameters of equations (11) – (13) are estimated via OLS and the residuals from the selected model are tested for stationarity. If the residuals are found stationary, it implies that the linear combination of LRGDP and LRES is stable and the variables are cointegrated.

3.2.4 Error Correction Model

The study employs the Engle and Granger (1987) two- stage procedure to examine the short and long run dynamics of the relationship between the two variables. The Granger's representation theorem shows that if there exists cointegration amongst a group of variables, there must also exist an error correction representation. Thus, following the results of the tests for unit roots, structural breaks and cointegration, an error correction model is estimated and specified as:

$$\Delta LRGDP_t = \alpha_0 + \sum_{i=0}^{s} \beta_i \Delta LRES_{t-i} + \sum_{j=1}^{q} \gamma_j \Delta LRGDP_{t-j} + \rho \varepsilon_{t-1} + \mu_t \tag{14}$$

Where Δ denotes the first difference operator, ε_t is the estimated residual from the selected Gregory-Hansen equation, s and q are the number of lag lengths selected on the basis of information criterion. For a stable system, the coefficient ρ is negative and statistically significant. Moreover, the value of ρ measures the speed of adjustment of the LRGDP to the value implied by the long run equilibrium relationship.

4.0 RESULTS

4.1 Unit Root Test Results

The results of the Augmented Dickey-Fuller unit root test are reported in Table 1. At 5 per cent significance level, we cannot reject the null hypothesis of unit roots for the two variables in their levels. However, stationarity was attained after differencing each of the variables once. This implies that the variables are integrated of order one, I(1). The results of the Zivot-Andrews unit root test with endogenously determined structural breaks in the intercept, trend as well as intercept and trend are presented in Table 2.

Table 1: Augmented Dickey-Fuller Unit Root Test

Variable	Levels		First Difference		Integration Order
	ADF^{c}	ADF^{ct}	ADF^{c}	ADF^{ct}	
LRGDP	-2.7337*	-2.7944	-2.9838**	-3.6546**	I(1)
LRES	-1.3996	-1.8675	-2.6372*	-4.1201**	I(1)

ADF^{c} and ADF^{ct} represent unit root test with constant and constant and trend, respectively

*Lags are chosen based on Schwarz Information Criterion (SIC). ** and * indicate significance at 5% and 10% levels, respectively*

The timing of the structural break for each of the variables is determined based on the most significant t ratio for the respective parameter in equations (2) to (4). For instance, the model with break in trend shows that the two series are stationary at levels, albeit with structural breaks in 2003Q3 and 2008Q2 for LRGDP and LRES, respectively. The timing of the structural break for LRES coincides with the period of the global financial crisis. As shown in Chart 1, an era of substantial decumulation in Nigeria's external reserves began in 2008Q3, which lasted till about the second quarter of 2011.

Table 2: Zivot-Andrews Unit Root Test

Variable	**Break in Intercept**			**Break in Trend**			**Break in Intercept and Trend**		
	Test Statistic	Break Date	I(d)	Test Statistic	Break Date	I(d)	Test Statistic	Break Date	I(d)
LRGDP	-3.4211	2004Q2	I(1)	-11.0567***	2003Q3	I(0)	-4.6209	2003Q3	I(1)
LRES	-5.1982***	2004Q1	I(0)	-6.1722***	2008Q2	I(0)	-5.9595***	2007Q3	I(0)

***Critical values** - **Intercept break:** -5.43 (1%), -4.80 (5%); **trend break:** -4.93(1%), -4.42 (5%); **intercept and trend breaks:** -5.57 (1%), -5.08 (5%) (Zivot and Andrews, 1992). *** indicate significance at 1% level*

This development was not unconnected with pressures from the foreign exchange market as well as the effects of falling crude oil prices in the international market. This did not however translate to a decline in LRGD, at least not in a contemporaneous sense.

4.2 Lag Order Selection

In order to properly identify the underlying dynamics of the VAR model to be used for the causality test, we determine the optimal lag length using the Schwarz Information Criterion (SIC) and the results are presented in Table 3. The SIC criterion suggests a VAR of order six (6). The implication of this is that the dynamics of the interactions between external reserves and output performance in Nigeria persists up to six quarters and this knowledge is factored into our VAR specification.

Table 3: Optimal Lag Length Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-23.5953	NA	0.0116	1.2188	1.3016	1.2492
1	68.9111	171.7976	0.0002	-2.9958	-2.7475	-2.9048
2	74.3418	9.5683	0.0002	-3.0639	-2.6502	-2.9122
3	100.8493	44.1793	5.52e-05	-4.1357	-3.5565	-3.9234
4	144.0726	67.9224	8.58e-06	-6.0035	-5.2587	-5.7305
5	152.4473	12.3627	7.05e-06	-6.2118	-5.3016	-5.8782
6	162.3864	13.7254*	5.40e-06	-6.4946	-5.4189*	-6.1003
7	169.4265	9.0515	4.79e-06	-6.6394	-5.3982	-6.1844
8	175.1740	6.8423	4.55e-06	-6.7226	-5.3159	-6.2070
9	182.3354	7.8434	4.09e-06	-6.8731	-5.3009	-6.2968
10	183.9108	1.5754	4.85e-06	-6.7577	-5.0200	-6.1207
11	193.2935	8.4891	4.04e-06	-7.0140	-5.1108	-6.3164
12	201.2947	6.4771	3.66e-06*	-7.204510*	-5.1359	-6.4463*

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

4.3 Causality Test

As outlined in the previous section, both the simple pairwise Granger causality test and T-Y procedure are employed to test for causality between LRGDP and LRES based on the selected optimal lag. The result of the pairwise Granger causality test is presented in Table 4. At the 5 per cent significance level, the null hypothesis that LRES does not Granger Cause LRGDP cannot be rejected, except at the 10 per cent level. However, at all conventional levels of significance, there is no evidence to reject the null hypothesis that LRGDP does not Granger Cause LRES. Therefore, based on the pairwise Granger Causality test, we can conclude that

there is unidirectional causality running from and LRES to LRGDP at the 10 per cent significance level.

Table 4: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
LRES does not Granger Cause LRGDP	48	1.9588	0.0985
LRGDP does not Granger Cause LRES	48	1.9117	0.1064

In order to address the shortcomings of the pairwise Granger Causality test conducted above, the procedure developed by Toda and Yamamoto (1995) is also implemented. Since the optimal lag length selected criteria suggested a lag order of six (6), a VAR of order 7 (i.e. $m+h_{max}$) is estimated based on the results of the ADF unit root test. The results of the test are summarized in Table 5.

Table 5: Toda and Yamamoto No-causality Test Results

Null Hypothesis:	Optimal Lag (m)	Augmented Lag ($m+h_{max}$)	Modified Wald	P-values	Decision
LRES does not Granger Cause LRGDP	6	7	2.6331**	0.0344	Reject H_0
LRGDP does not Granger Cause LRES	6	7	1.7864	0.1335	Fail to Reject H_0

*Notes: ** indicates significance at 5% level. M+hmax refers to the order of the augmented lag VAR suggested by Toda and Yamamoto (1995). The optimal lag of 6 is as per the lag order selection procedure based on SIC*

The results, which are based on the modified Wald test, suggest that the null hypothesis of Granger no-causality from LRES to LRGDP is rejected at the 5 per cent significance level, affirming the results obtained from the pairwise Granger causality test. However, there is no evidence to reject the null hypothesis of Granger no-causality from LRGDP to LRES. This implies that there is no bidirectional causality between the two variables in Nigeria. These results suggest that movements in Nigeria's real gross domestic product can be explained by variations in the level of the country's external reserves. This may not be unconnected with the active role being played by the CBN (using its external reserves) to ensure exchange rate stability in the country. The result is also suggestive of the fact that foreign exchange supply by the CBN for valid transactions (especially of machineries and equipment) at its regular auctions may have been supportive of the enterprises or sectors that are critical to the output growth of the economy. These are in line with the findings of studies like Yeyati (2006), Cave and Jones (1973), Obaseki and Bello (1996), Ogwumike (2001) as well as Abeng (2007), which argued that robust external reserves are helpful in promoting growth performance of nations as such reserves could be used to

finance the country's transaction needs, intervene in foreign exchange markets, enhance credit worthiness, promote wealth accumulation, create buffer against external shocks and entrench the credibility of monetary policy.

4.4 Cointegration Test

The results of the Gregory Hansen residual-based integration test akin to the three test regressions specified in equations (11) - (13) are presented in Table 6. Based on the *ADF** test statistic, the study failed to establish cointegration between external reserves and growth during the estimation period, even though, break dates of 2002Q4 and 2009Q4 were identified. However, results based on the Z_t* statistic showed that cointegration exists between the two variables and identified two break points which occurred in 2002Q1 and 2009Q4. The Z_α* found a cointegrating relationship only for GH-2 and identified a break date of 2002Q1.

Table 6: Gregory-Hansen Cointegration Test with Structural Breaks

Model	ADF*	Break Date	Z_t*	Break Date	Z_α*	Break Date
GH-1(Level shift)	-3.7793	2009Q4	-5.2098	2009Q4	-38.2129	2009Q4
GH-2(Level shift with trend)	-4.9455	2002Q4	-7.4664	2002Q1	-55.6343	2002Q1
GH-3 (Regime shift)	-3.7212	2009Q4	-5.1494	2009Q4	-37.6961	2009Q4

The ADF and Z_t* 5 per cent critical values are -4.61, -4.99 and -4.95 for GH-1, GH-2 and GH-3 models, respectively (Gregory & Hansen, 1996)*

The Z_α 5 per cent critical values are -40.48, -47.96 and -47.04 for GH-1, GH-2 and GH-3 models, respectively (Gregory & Hansen, 1996)*

Based on the statistical significance of the coefficients in the estimated variants of the Gregory and Hansen cointegrating regressions, the study chooses GH-1 (akin to equation 11) as the static model from which the residuals used for the error correction model is obtained. Thus, based on the Z_t* statistic for GH-1, this study recognizes a break date of 2009Q4, which coincides with the period of the last global financial crisis.

4.5 Long Run Elasticity Estimates (With and without Structural Break)

Table 7 reports long run elasticities of the real gross domestic product to external reserves based on the model with and without structural break. Results of model 1a (OLS regression without structural break) reveal a statistically significant and positive relationship between external reserves and RGDP, implying that increasing external reserves was associated with increasing growth during the estimation period.

Table 7: Long Run Elasticity Estimates of RGDP to External Reserves

Dependent Variable: LRGDP

Variable	Model 1a (without break)		Model 1b (with break)	
	Coefficient	P-value	Coefficient	P-value
Intercept	8.4823	0.0000	8.8931	0.0000
Dum*Intercept			0.3035	0.0000
LRES	0.3387	0.0000	0.2928	0.0000
R-squared	0.6312		0.7476	
Adjusted R-squared	0.6241		0.7377	
SIC	-0.3147		-0.6200	
S.E. of regression	0.1956		0.1634	
Log likelihood	12.4871		22.7243	

Even after accounting for structural break, a positive relationship is found. The estimated coefficient of LRES in model 1a is 0.3387, implying that a one per cent increase in reserves leads to about 0.34 per cent increase in real output. However, the incorporation of a structural break dummy leads to lower output elasticity to external reserves (0.2928). Also, the interaction term for the shift in intercept is statistically significant, implying that the break date is correctly identified. Compared to the model without structural break, the model with structural break provided a better fit to the data as it yielded a higher adjusted R-squared is higher (0.7377) and lower Schwarz Information Criterion (-0.6200). Thus, the residuals from the cointegrating regression in Model 1b are used to set up an appropriate error correction model in the next step.

4.6 Error Correction Model

In order to understand the short and long run dynamics of the relationship between external reserves and growth, the study sets up two bivariate error correction models. The results of the models are presented in Table 8. Model 2a is based on the residuals obtained from the static model (model 1a) presented in Table 7 above while model 2b is set up based on the obtained residuals from the level shift model of Gregory-Hansen procedure (GH-1). Therefore, model 2b incorporates the identified structural break point while model 2a does not.

Table 8: Results of the Bivariate Error Correction Model

Dependent Variable: DLRGDP

Variable	Model 2a (without break)		Model 2b (with break)	
	Coefficient	P-value	Coefficient	P-value
C	0.0043	0.5295	0.0066	0.3650
DLRGDP(-1)	0.0843	0.0639		
DLRGDP(-4)	0.9509	0.0000	0.9236	0.0000
DLRGDP(-5)			0.0979	0.0645
DLRES(-2)	0.1672	0.0142	0.1523	0.0355
DLRES(-4)	-0.2635	0.0007	-0.2478	0.0012
ecm(-1)	-0.1188	0.0146	-0.1627	0.0153
R-squared	0.9381		0.9379	
Adjusted R-squared	0.9309		0.9305	
S.E. of regression	0.0390		0.0395	
Log likelihood	92.6102		90.2147	
Durbin-Watson Stat	1.8549		1.8324	

The LRGDP has strong autoregressive dynamics as its fourth lag confers huge and statistically significant impact on itself. A one per cent increase in RGDP four quarters ago leads to about 0.95 per cent increase in RGDP in the current period (Model 2a). However, after accounting for structural break, the impact wanes to about 0.92 per cent (Model 2b).

In terms of the impact of external reserves on growth, a positive impact is conferred at the second lag. Based on the results of model 2a, a one per cent increase in external reserves two quarters ago, propels output growth by about 0.17 per cent in the current quarter. Similar to the results of the obtained long run elasticities, accounting for structural break in the cointegrating regression leads to a lower external reserves elasticity of output. Thus, model 2b shows that the elasticity of output to a percentage change in external reserves is 0.15 per cent during the estimation period. It is revealing to observe that the sign of the coefficient for DLRES (-2) in models 2a and 2b remains positive. On the other hand, a negative relationship is found between output and the fourth lag of external reserves. A percentage increase in external reserves four quarters ago leads to a 0.26 per cent decline in output in the current quarter (model 2a) while the model with structural break (model 2b) reveals an impact of about 0.25 per cent.

As stated in the previous section, the coefficient of the error term measures the speed of adjustment to long run equilibrium. For a stable system, the coefficient is expected to be negative and statistically significant. The results presented in Table 8 reveal that the two models are stable as the error correction coefficients in the two models are negative and statistically significant. The model without break (model 2a) indicates that 11.8 per cent of the disequilibrium error is

corrected within the quarter. However, after accounting for structural break, a faster speed of adjustment is realized. The statistical significance of the error correction coefficient, at the 5 per cent significance level, further provides evidence of a long-run cointegrating relationship among the variables.

Based on the argument in literature on the need to avoid parameter bias by incorporating the effects of structural breaks in modelling economic relationships, model 2b is selected as the preferred model. In view of the mixed results obtained in terms of the sign of the LRES coefficient in model 2b, the impact of external reserves on economic growth remains inconclusive. At 93.1 per cent, the adjusted R^2 obtained is satisfactorily high, implying that 93.1 per cent of the variation in the response variable is explained by the model.

In Table 9, the results of the tests for serial correlation, heteroscedasticity and stability in the residuals of the selected error correction model 2b are presented. It shows that the model is quite adequate for inference purposes. For instance, the Breusch-Godfrey test for serial correlation failed to reject the null hypothesis of no autocorrelation in the errors while the white test for heteroscedasticity also failed to reject the null hypothesis of homoscedasticity in the errors. Furthermore, a test for specification error conducted based on Ramsey reset procedure reveals that the model is correctly specified as the associated p-value is 0.1941.

Table 9: Model Diagnostics

Test	F-statistic	P-value
Breusch-Godfrey (Serial Correlation)	2.0514	0.1419
White Test (Heteroskedasticity)	0.7864	0.3799
Ramsey RESET (Stability)	1.7425	0.1941

6.0 CONCLUSION AND POLICY IMPLICATIONS

The paper examines the relationship between external reserves and economic growth in Nigeria. While growing reserves seem to have been used to achieve exchange rate stability in Nigeria, the exact relationship between external reserves and economic growth remains largely unexplored. This study attempts to bridge this gap using time series econometrics and quarterly data spanning 2000:Q1 to 2013:Q2.

The result of the pairwise Granger causality test shows that there is unidirectional causality running from reserves to output at 10 per cent significance level. The results of the modified Wald test of Toda and Yamamoto (1995) suggest that the null hypothesis of Granger no-causality from LRES to LRGDP is rejected at the 5 per

cent significance level, affirming the results obtained from the pairwise Granger causality test. Thus, the study concludes that reserve accumulation causes growth and not vice versa.

The existence of a long-run relationship between external reserves and economic growth in Nigeria was investigated. Based on the Gregory Hansen residual-based cointegration test, the study finds a cointegrating relationship albeit with a structural break date of 2009Q4, which coincides with the period of the last global financial crisis. Thus, there is a long run relationship between the two variables. Results of the long run static models with and without structural break reveal a statistically significant and positive relationship between external reserves and RGDP, implying that increasing external reserves was associated with increasing growth during the estimation period. After accounting for structural break (2009Q4), the external reserves coefficient remained positive but became lower. The results of the bivariate error correction models also show that a one per cent increase in external reserves leads to 0.15 per cent increase in output growth. As in the long run model, lower external reserves elasticity of output is realized when structural breaks are accounted for.

While the investigation of the channel of transmission is beyond the scope of this study, it is important to note that the macroeconomic stabilization effects of reserves accumulation (especially in terms of exchange rate stability) may have been positive on growth. Therefore, this study endorses the routine interventions of the CBN in the foreign exchange market with a view to ensuring stability in the exchange rate.

REFERENCES

Abeng, M. O. (2007), "Foreign Exchange Reserve Accumulation: Implication for the Nigerian Economy", *CBN Bullion Publication*, 31(3), 32–50.

Acharya, S. (2002), "India's Foreign Exchange Reserves: When is enough-Enough?" New Delhi: *Panel Discussion*

Adam, E. and Leonce, N. (2007), "Reserves Accumulation in African Countries: Sources, Motivations and Effects", Department of Economics, University of Massachusetts' *Working Paper* 2007-12.

Ajakaye, O. (1997), "The Structural Adjustment Programme and Changes in the Structure of Production in Nigeria (1986-1994)", *NCEMA monograph series* no 9 Ibadan NCEMA.

Akinlo, A. E. (2004), "Foreign Direct Investment and Growth in Nigeria. An Empirical Investigation", *Journal of Policy Modeling*, 26: 627-39.

Amadi, S. N. (2002), "The impact of Macroeconomics Environment on Foreign Direct Investment in Nigeria", *International Journal of Development.*

Anyanwu, J. C. (1998), "An Econometrics Investigation of Determination of Foreign Direct Investment in Nigeria in investment on the growth process", *Proceedings of the Nigerian Economic Society Conference 1998*, pp 219-40 Ibadan, Nigeria.

Asiedu, E. (2001), "On the Determinants of Foreign Direct Investments in Developing Countries: Is Africa Different?", *World Development*, 30 (1): 107-19

Asiedu, E. (2003), "Capital Controls and Foreign Direct Investment", *World Development*, 32(3): 479-490

Ayanwale, A.B (2007), "Foreign Direct Investment and Economic Growth: Evidence from Nigeria", *African Economic Research Consortium Research Paper* 165, Nairobi, Kenya.

Baumol, W.J. (1952), "The transactions demand for cash: an inventory theoretic approach", *Quart. J. Econ*. 66 (November), 545–556.

Blomstrom, M., Konan, D. and Lipsey, R.E. (2000), "FDI in the Restructuring of the Japanese Economy", *The European Institute of Japanese Studies, Working Paper* No. 91. Stockholm.

Borensztain, E., De Gregoria, J. and Lee, J. (1998), "How does Foreign Investment affect Economic Growth?", *Journal of International Economics,* 45 (1): 115-35.

Central Bank of Nigeria (various years), *Central Bank of Nigeria Statistical Bulletin*, Abuja Nigeria

Central Bank of Nigeria's *Annual Report and Statement of Accounts,* Abuja, Nigeria. Several Issues

Chenery, H.B. and Stout, A. (1966), "Foreign Assistance and Economic Development", *American Economic Review*, Vol. 55

Chenery, H.B., Robinson, S.and Syrguin, M. (1986), *Industrialization and Growth: A Comparative Study*, Washington D.C. The World Bank.

Cobham, A. (2001), "Capital account liberalization and Impact on the Poor", Paper produced for Oxfam and Brettonwoods Project.

Damodar, N. G. and Porter, D.C. (2009), *Basic Econometrics 5th edition*, McGraw Hill International Edition.

De Mello, L.R. (1997), "Foreign Direct Investment in Developing Countries and Growth: A Selective Survey" *Journal of Development Studies,* 134 (1): 1-34

Dees, S. (1998), "Foreign Direct Investment on China: Determinant and Effects", *Economics of Planning*, 31:175-94

Driffield, N. (2001), "The Impact of Domestic Productivity of Inward Investment in the UK", *the Manchester School,* 69:103-19

Drucker, P. F. (1974), "Multinationals and Developing Countries, Myths and Realities", *Foreign Affairs,* No. 53

Dunning, J. H. (1977), "Trade Location and Economic Activity and MNE. A search for an Eclectic Approach", The International Allocation of Economic Activity. Macmillan London.

Eichengreen, B. (2006), "Insurance underwriter or financial development fund: what role for reserve pooling in Latin America?", *NBER Working Paper* No. 12451.

Eke, N. A. (2003), "FDI and Economic Growth in Nigeria a Causality Test", *Journal of Economic and Social Studies,* vol 3.

Ekpo, A. H. (1995), "FDI in Nigeria: Evidence from Time Series Data", *CBN Economic and Financial Review,* 35(1):59-78

Engle, R. and Granger, C. (1987), "Co-Integration and Error-Correction: Representation, Estimation and Testing", Econometrica 55: 251-76

Findlay R. (1978), "Relative Backwardness, Direct Foreign Investment and the Transfer of Technology. A Simple Dynamic Model", *Quarterly Journal of Economic*, 92:1-16

Flood, R. and Marion, N. (2002), "Holding international reserves in an era of high capital mobility", In: Collins, S.M., Rodrik, D. (Eds.), *Brookings Trade Forum* 2001. Brookings Institution Press, Washington, DC, pp. 1–68.

Frenkel, J. A. (1974), "The Demand for International Reserves by Developed and Less-Developed Countries", *Economica* 41 (February), 14–24.

Glass, A.J. and Saggi, K. (1998), "FDI Policies under Share Markets" *Journal of International Economics*, 49 307-32

Cheng, G. (2012), "A Growth Perspective of Foreign Reserve Accummulation", *JEL*. F41. F43

Granger, C. W. J. (1969), "Investigating Causal Relations by Econometric Models and Cross-spectral Methods", *Econometrica* 37 (3): 424–438

Gregory, A. and Hansen, B. (1996), "Residual-based Tests for Cointegration in Models with Regime Shifts", *Journal of Econometrics* 10: 321 – 335.

Hadiji, M. M., Ghura, T., Muhleisen, D., Nord, M. and Ucer, R. (1995), "Sub Saharan African Growth, Savings and Investment 1986-1993", *IMF working paper*.

Harris, R. and Sollis, R. (2003), "Applied Time Series Modelling and Forecasting", Wiley Applications

Heller, H.R. (June 1966), "Optimal International Reserves", Econ. J. 76, 296–311.

Hussain, I. (2002), "Why Foreign Exchange Reserves: Ideas and Identities of India – Pakistan", http//www.chowk.com

Irefin, D. and Yaaba, B. N. (2012), "Determinants of Foreign Reserves in Nigeria: An Autoregressive Distributed Lag Approach", *CBN Journal of Applied Statistics* Vol. 2 No.2

IMF (2003), World Economic Outlook 2003. IMF. Washington, D.C. USA

Jeanne, O. and. Ranciere, R. (2006), "The optimal Level of International Reserves for Emerging Market Economies: Formulas and Applications", *IMF Working Paper*, WP/06/229

Johnson, H. G. (1962), "A quantity theorist's monetary history of the United States", *Economic Journal* 75 (June) 388-96

Jhingan M.L. (2002), "The Economics of Development and Planning", Vrinda Educational; Books 34th Revised Edition.

Koutsoyiannis, A. (2001), *Theory of Econometrics; An Introductory Exposition of Econometrics Methods, Second Edition* Palgrave Publishers Ltd.

Lim, E. (2001), "Determinants of and Relationship between FDI and Growth: A Summary of Recent Literature", *IMF working paper,* No 175. International Monetary Fund Washington D.C

Markussen, J.R. and Vernable, A.J. (1998), "Multinational Firms and New Trade Theory", *Journal of International Economics* 46: 183-203

Nwakwo, G.O. (1998), "Foreign Private Capital Flow to Nigeria 1970-1983", Economics and Financial Review volume 28, March

O' Hearn, D. (1990), "TNCs, Intervening Mechanizing and Economic Growth in Ireland: A Longitudinal Test and Extension of Bomschier Model", World Development, March.

Obaseki, P. J. (2007), "Sources, Currency Composition and uses of External Reserves", *CBN Bullion*. Vol. 32 (2).

Obaseki, P.J. (2007), "Foreign Exchange Management in Nigeria. Past, Present and Future", *CBN Economic and Financial Review*, Vol. 29, No. 1.

Obwona, M.B. (2001), "Determinants of Foreign Direct Investment and their Impact on Economic Growth in Uganda", *Africa Development Review*, Blackwell Publishers, Oxford, United Kingdom.

Obwona, M.B. (2004), "Foreign Direct Investment in Africa in Financing Pro-poor Growth", AERC Senior policy Seminar VI, Kampala, Uganda, *Seminar Papers*, Nairobi: African Economics Research Consortium

Ogwumike, F.O. (2001), "Appraisal of Poverty and Poverty Reduction Strategies in Nigeria", *CBN Economic and Financial Review*. Vol. 39.No. 4:45-71

Ojukwu, P. (2007), "Nigeria External Reserves and Issues in Economic Development Strategies", : *The Guardian*, Wed. 9, p. 27.

Olivera, J.H.G. (1969), "A note on the optimal role of growth of international reserves", J. *Polit. Econ*. 77 (2), 245–248.

Oyinlola, O. (1995), "External Capital and Economic Development in Nigeria (1970-1991)", *The Nigeria Journal of Economic and Social Studies*, (37(2&3): 2005-22.

Pesaran M., Yongcheol, S. H. and Richard, J. S. (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics*. J. Appl. Econ. 16: 289-326 (2001)

Polterovich, V. and Popov, V. (2002), "Accumulation of Foreign Exchange Reserves and Long-Term Growth. Framework for the New Economic School Research Programme", (www.nes.ru./english/about/10th-Anniversary/papers-pdf/Popov-Polterovich)

Rodrik, D.(2006), "The Social Cost of Foreign Exchange Reserves", *National Bureau of Economic Research, Working Paper Series*, w11952

Romer, P. (1990). "Endogenous Technological Change", *Journal of Political Economy*, 98:s71-103.

Root, G.R. (1984), *International Trade and Investment*. 5th Edition South Western Publication Company, Cincinnati Ohio.

Shirazi, N. S. and AbdulManap, T. A. (2005), "Export-Led Growth Hypothesis: Further Econometric Evidence from South Asia", *The Developing Economies* 43, No. 4, pp. 472–488

Sjoholm, F. (1999), "Technology Gap, Competition and Spillovers from Foreign Direct Investment Evidence from Established Data", *Journal of Development Studies*.

Smarzynska, B.K.(2002), "Does FDI Increase the Productivity of Domestic Firms? In Search of Spill overs through Backward Linkages", *Policy Research Working Paper* No 29 the World Bank, Washington D.C

Soderstain, B.O. (1970), *International Economics* Second Edition. USA Macmillan Publisher

Tang, S., Selvanathan, E.A. and Selvanathan, S. (2008), "FDI Domestic Investment and Economic Growth in China", *UNU-WIDER Research Paper*, No 2008/19

Toda, H.Y. and Yamamoto (1995), "Statistical inference in Vector Autoregressions with possibly integrated processes", *Journal of Econometrics*, 66, 225-250.

Todaro, M.P. (1999), *Economic Development,* 5th Edition Addison Webley Longman Inc. Reading Massachusetts.

Todaro, M.P. and. Smith, S. C. (2003), *Economic Development*, ISBN-10: 0273655493 | ISBN-13: 9780273655497

Triffin, R. (1947), "National central banking and the international economy", In: Allen, W., Allen, C.L. (Eds.), *Essays in International Economic Equilibrium and Adjustment*. MacMillan, New York.

UNCTAD (2000), *Capital Flows and Growth in African*, New York, United Nation

Vojtisek, P. (2002), "The Measurement of External Debt and External Reserves: The Case of the Czech Republic", Statistics Department, Czech National Bank.

World Bank (1996), *World Debt Tables: External Finance for Developing Countries*, Volume1 (Analysis and Summary Tables) Washington D.C. The World Bank.

Zivot, E. and Andrews, D. W. K. (1992), "Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis", *Journal of Business & Economic Statistics*, Vol. 10, No. 3, pp. 251-270

TRADE OPENNESS, INVESTMENT AND ECONOMIC GROWTH: EVIDENCE FROM ECOWAS COUNTRIES

By Hassan O. Ozekhome[11]

Abstract

This paper investigates the impact of trade openness and investment on economic growth in the Economic Community of West African States (ECOWAS) region, using dynamic panel data methodology in the period 2000-2013. In order to overcome the problem of unobserved period and country specific effects (economic peculiarities) and joint endogeneity of most of the explanatory variables with economic growth, and, thus to control for the biases resulting from simultaneous or reverse causation, the Generalized Method of Moments (GMM) Estimator is used. GMM was developed for dynamic models of panel data that were introduced by Holtz- Eakin, Newey and Rosen (1988), Arellano and Bond (1991), and Arellano and Bover (1995). Such models will control for country specific effects and joint endogeneity in data. Country and time fixed effects are used to control for country heterogeneity and the effects of common growth shocks across countries. The empirical results reveal that trade openness; foreign direct investment, real gross domestic capital formation, human capital and lagged real GDP (a measure of previous market size) are the principal drivers of economic growth in ECOWAS countries. Inflation is found to have a destabilizing effect on the economic growth of ECOWAS countries. Industrial output on the other hand is found to be positively related to growth in ECOWAS countries but its effect is rather weak, perceivably due to the low of industrialization in the region. The study recommends amongst others, open trade and investment policies, sound complementary macroeconomic policies , institutional structures, and policy coordination and harmonization with respect to trade, investment and finance among member countries in order to fast-track their rapid economic growth.

***Keywords**: Trade openness, Investment, Foreign direct investment, Economic growth, ECOWAS, Generalized Method of Moments (GMM)*

JEL classification: F13, O24, F43, F24, Q27

1. INTRODUCTION

Over the last decade, there has been increased theoretical and empirical research on the relationship between trade openness, investment and economic growth. Ever since Adam Smith and David Ricardo, economists have recognized the positive effects of openness to trade on economic development. Not only can trade increase per capita income directly via absolute and/or comparative advantage, it can also boost efficiency

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indirectly via other channels such as technology transfer, increasing scale economies and the competitive influence of interaction with foreign firms in markets at home and abroad. It is a truism that opening up to external markets would ensure better and efficient allocation of resources and promote the orientation of investments towards exporting sectors. The exporting sectors were seen to have been held back by trade restrictive policies which caused considerable distortions in optimal resource allocation. Trade liberalization would therefore correct these distortions and promote optimal allocation of resources and investment (Hammouda and Jallab, 2005). The liberalization of trade has led to a massive expansion in the growth of world trade relative to world output. While world output (or GDP) has expanded fivefold, the volume of world trade has grown 16 times at average compound rate of just over 7% per annum. In fact, it is difficult, if not impossible, to understand the growth and development process of countries without reference to their trading and investment performance. (Thirlwall, 2000).

In fact, rapid expansion in trade and investment will not materialize until key barriers to trade are removed (Pack and Page, 1994). It is generally believed that trade expansion and increased investment induce high levels of economic growth. The success of the high-performing Asian economies (Hong Kong, Korea, Singapore and Taiwan) in the past three decades provides a strong argument for export-led growth. The spectacular growth rates enjoyed by these economies improved their standards of living, comparable with those of the rich industrialized countries. There appears to be a consensus that the success achieved by these economies is largely due to their unusual export performance, especially manufactured exports. For example, Pack and Page (1994) show that high investment ratios and initial levels of education of the high-performing Asian economies cannot totally explain the spectacular growth performance of these economies. Spectacular export performance not only allowed the high-performing Asian economies to reap economies of scale from expanding market size, it also gave them an ability to move to a new, higher production possibility frontier typical of OECD countries. The seven channels identified by Pack and Page through which the high-performing Asian economies achieved best practice include (1) new equipment, (2) direct foreign investment, (3) technology licensing, (4) transfer of non-proprietary technology, (5) information provided by purchasers, (6) returning nationals and (7) research and development. However, not everyone agrees that openness to trade is of paramount importance for growth. Many studies show that empirical evidence supporting openness to trade as a significant determinant of growth is at best controversial.

Those who reject openness to trade as the main source of growth are not advocates of trade restrictions, but rather are advocates of the relative importance of other deep determinants of growth, especially institutions (Block and Tang, 2004). Recently, studies by Alcala and Ciccone (2002), and Dollar and Kraay (2003) seek to address the question of the relative importance of trade and institutions in accounting for growth. Alcala and Ciccone report that both trade and institutions are equally significant in accounting for growth. Dollar and Kraay, on the other hand, find that trade has a larger effect on growth than that of institutions over the short run, but in the long run trade and institutions are both equally important for growth. The role of investment in economic growth as well as the importance of economic and institutional developments in facilitating investment and trade have received considerable attention in extant literature.

Overall economic performance, as reflected in annual growth rates of per capita income, has on the average been rather weak in ECOWAS countries during the past decades. The lacklustre growth performance may have reflected the low volume of trade and extremely low level of investment, particularly foreign direct investment inflows into ECOWAS countries. The low level of and rate of growth in trade among West African countries is a reflection of the failure to realize the objectives and dreams of the founding fathers of the Economic Community of West African States (ECOWAS). After nearly four decades of existence, ECOWAS has not fully achieved a functioning customs union. Available evidence points to the fact that the low volume of trade and FDI flows into ECOWAS countries contrasts sharply with the heavy volume going to Asian countries (Adamu, Ighodaro and Iyoha, 2012). Given the strong impact of increased trade and investment in enhancing economic growth in West African countries, particularly in their quest to achieve full-fledged custom union, there is need to empirically re-examine the relationship between them. This is the focus of this study.

2.0 LITERATURE REVIEW

2.1. Trade, Investment and Economic Growth- The Theoretical Nexus

Theoretically, there exists a strong positive relationship between trade, investment and economic growth. This nexus is referred to as the trinity of trade, investment and growth in development literature. Openness facilitates increased trade and foreign direct investment. Expansion in trade and increased foreign direct investment in turn stimulates economic growth. Foreign direct investment is positively correlated with growth through its role as a conduit for advanced technology transfer, innovative capacity, managerial expertise from advanced countries to developing countries (Makis et al, 2004; Baliamount-Lutz, 2004;

Aseghian, 2004, Lim, 2001; cited in Adamu et al 2012). Reflecting recent developments in growth theory, improvements in technology, efficiency, capital accumulation and openness-induced productivity and foreign direct investment have the capacity to stimulate growth. The theoretical contention is based on the notion that FDI increases the rate of technical progress in the host country through a contagion (externalities or spillovers) effect from advanced technology and managerial expertise used by foreign firms. This contagion or knowledge diffusion, according to theory, can result in improved production and efficiency of domestic firms in various forms through the ''virtuous circle of trade and investment'' viz: imitation and internalization of new technology, as well as learning-by doing, and hence, improved productivity and growth. These spillover effects can be achieved through the linkages between multinational corporations (MNCs) or their affiliates (Adamu, et al 2012)

From a growth perspective, the fundamental objective of trade reforms is to transform international trade into ''engine of growth''. In fact, newly developed models of endogenous growth have stressed the role of openness in facilitating increased trade and foreign direct investment in the growth process. Romer (1989) through endogenous growth model has demonstrated that increased trade openness induces marginal returns to capital investments, with positive spill-overs, permitting increasing returns to scale in aggregate production, and investments through technological diffusion, which in turn, enhances growth. Accordingly, through international trade and investment, there will be increasing returns in production through externalities and spillovers. The, endogenous growth models accord FDI an important source of human capital and technological diffusion which stimulates long-run growth. Romer (1989) develops a model where by taking advantage of larger markets-an open economy can specialize in the production of relatively large number of intermediate goods and thus grow faster. Other pundits have recently concentrated on the relationship among openness, technological progress, and productivity growth. Grossman and Helpman (1991) and Edwards (1992), for example, have argued that openness affects the speed and efficiency with which small countries can absorb technological innovations developed by industrial countries. This idea, based on an insight first proposed by John Stuart Mill, implies that countries with a lower level of trade distortions will experience faster growth in total factor productivity, and given other good macroeconomic policies and institutional framework, will grow faster than countries that inhibit international competition (Dornbusch and Edwards, 2004).

A number of researchers such as Tybout (1992), Edward (1992) and De Gregorio (1992) have tried to test the general implications of these theories for growth using cross-country data sets by using empirical models to examine the relationship

between trade orientation, investment and growth of total factor productivity. Although different empirical models have yielded different results, the general orientation is that indeed countries with less distorted external sectors appear to grow faster. According to Dornbusch (1991), openness affects growth not only through one channel, but through a combination of channels, including the introduction of new goods, the adoption of new methods of production, the new organization of industries, the expansion in the number of intermediate goods available and the conquest of new markets that permit the expansion of exports and investment. Finch and Michalopolous (1988), cited in Iyoha (2004) posit that effective participation in international trade permits economies of scale not open to small protected economies. By introducing greater market competition, it encourages a more efficient utilization of resources and greater growth in productivity in the whole economy. Moreover, open trade policies permit quicker adaptation to new technologies and greater flexibility in responding to international developments. This view is supported by Haberler (1988) who argues that development policies that give attention to foreign trade, private enterprise and direct foreign investment have been found to yield sustained and efficient industrialization and growth.

2.2. Review of Empirical Studies

A number of empirical cross-country studies and country-case studies have examined the relationship between trade openness, investment and economic growth with a view to providing empirical insights into the importance of trade openness and investment for long-run growth. These studies are briefly reviewed.

Frankel and Romer (1999) exploit the causal link between growth and the geographical deep determinant of trade (specifically, countries that are landlocked and/or remote tend to trade less than those that are not). Edward (1998), Barro and Sala-i-Martin (1995), Sachs and Warner (1995b), Greenaway and Morgan (1998), and Vamvakidis (1998) are some examples of studies that use cross-country regressions and find that trade distortions caused by government intervention lead to slow growth rates. Balasubramanyam et al. (1996) find evidence that the positive effect of foreign direct investment on growth is stronger in countries with an export orientation than in countries with an import-substitution orientation. Harrison (1996) shows that estimate of a variety of openness measures are more significant in panel-data regressions than in cross-country regressions. Lee (1996) studies industry-level data for Korea and finds that trade protection reduces both labour productivity and total factor productivity for the period 1963 to 1983.

Rodriguez and Rodrik (1999) demonstrate that the positive correlation between openness and growth found in Dollar (1992), Sachs and Warner (1995b), Ben-David (1993) and Edwards (1998) is not robust, as a result either of problems in the measures of openness or lack of appropriate control variables. Levine and Renelt (1992), show that the direct effect of openness on growth is not robust. Openness, they argue, only has an indirect effect on growth through higher investment. Using historical data from 1870 to the present, Vamvakidis (2002) finds no positive correlation between openness and growth before 1970, suggesting the positive correlation between openness and growth is only a recent phenomenon. Harrison and Hanson (1999) question whether there is a positive employment impact of liberalization and suggest that liberalization may raise wage inequality. Xu (2000) finds little evidence that technology transfer from US multinational enterprises has a positive effect on productivity growth of less developed countries.

Balasubramanyam, Salisu and Sapsford (1996) using the endogenous growth model in a cross-sectional analysis of 46 countries examine the relationship between trade openness, investment and economic growth. The results reveal that the growth-enhancing effects of FDI are stronger in countries that adopted export-oriented policies than those which followed an import substitution policy.

In a similar vein Borensztein et al (1998) examine the impact of FDI inflows on the growth pattern of 69 developing countries from 1970-1989, using an endogenous growth model. The empirical findings reveal that FDI facilitates technological transfer and, hence economic growth.

Cieslik and Tarsalewska (2008) using evidence from Central Eastern European (CEE) countries empirically examine the relationship between trade, FDI and economic growth and find that trade and FDI are positively related to economic growth in the countries studied. The findings reveal that openness, domestic investment and macroeconomic stability are critical growth-driving factors.

In an empirical study of 10 emerging countries in Europe before they joined the European Union, Varamini and Kalash (2010) provide mixed results on the causality relationship between FDI and economic growth. Their empirical findings reveal both unidirectional and bi-directional relationship between FDI and growth on the one hand and, openness and FDI on the other hand.

In a similar study in eight transition economies in Europe between 1994 and 2001, Mencinger (2003) finds a negative causal relationship between Openness, FDI

and economic growth. The conceivable explanations for these controversial results could be found influencing country specific effects (economic peculiarities) regarding stages of development, sample period, data and methodologies (Zhang and Song, 2001).

Jariyapan (2012) investigates the nexus between economic growth, trade openness and foreign direct investment by using the General Method of Moments and a sample of 16 industrialized countries from 2000 to 2008. From the results of this study, trade openness has a positive impact on FDI and growth.

A plethora of empirical evidence exists in the development literature concerning the positive externalities derived from outward-oriented trade policies (opening up to external markets and investment) in the form of technological transfer, improved balance of trade and knowledge spillovers. FDI enhances not only growth but also influence other critical variables that have positive impact on growth. These variables include investment climate, good macroeconomic policies, such as tax policy, financial incentives, trade policy (openness, export promotion, tariff reduction), and subsidies have impacted positively on FDI inflows (Moran. et al , 2005; Oxelheim et al, 2004; UNCTAD, 2000, cited in Adamu et al 2012). The importance of liberalized trade and investment climate cannot be overemphasized. Such liberal investment conditions would generate stronger externalities and attract more dynamic FDI flows that would demonstrate cutting edge technology and managerial acumen, and encourage the setting up of outward –oriented operations, which would promote trade (Lim, 2001). On the other hand, a restrictive investment climate with inhibitive conditions such as mandatory joint partnership, licensing or domestic content requirements is likely to encourage FDI that will exhibit slower rate of technology transfer, obsolete technology and less efficient management systems (Adamu et al, 2012).

On research studies that relate to Africa and Nigeria in particular, Sarkar (2007) examines the relationship between openness (trade-GDP ratio) and growth. The cross-country panel data analysis of a sample of 51 countries of the South during 1981-2002 shows that for only 11 rich and highly trade-dependent countries a higher real growth is associated with a higher trade share. Time series study of individual country experiences shows that the majority of the countries covered in the sample including the East Asian countries did not experience positive long-term relationship between openness and growth during 1961-2002. He finds that the experience of various regions and groups shows that only the middle income group exhibited a positive long-term relationship.

Baliamoune-Lutz and Ndikumana (2007) explore the argument that one of the causes of the limited growth effects of trade openness in Africa maybe the

weakness of institutions. They also control for several major factors and, in particular, for export diversification, using a newly developed data set on Africa. Results from Arellano-Bond GMM estimations on panel data from African countries show that institutions play an important role in enhancing the growth effects of trade. They find that the joint effect of institutions and trade has U-shape, suggesting that as openness to trade reaches high levels, institution play a critical role in harnessing the trade-led engine of growth. The results from this paper are informative about the missing link between trade liberalization and growth in the case of African countries.

Kandiero and Chitiga (2003) investigate the impact of openness to trade on the FDI inflow to Africa. Specifically, in addition to economy wide trade openness, they analyze the impact on FDI of openness and manufactured goods, primary commodities and services. The empirical work is conducted using cross-country data comprising of African countries observed over four periods: 1980-1985, 1985-1990, 1990-1995, and 1995-2001. The empirical results reveal that FDI to GDP ratio responds well to increased trade openness and that both stimulate higher economic growth rates.

Ogujiuba, Oji and Adenuga (2004) test the validity of trade openness for Nigeria's long-run growth using a co-integration approach. They prefer the VAR approach for some reasons and their econometric results show that there is no significant relationship between openness and economic growth, and that unbridled openness could have deleterious implications for growth of local industries, the real sector and government revenue.

Addison and Wodon (2007) study the macroeconomic volatility, private investment growth, and poverty in Nigeria. Using cross-sectional data for 87 countries, they show that real per-capita growth over the period 1980 -1994 is a function of productivity growth and investment rates, both of which were negatively affected by volatility (in terms of trade, real exchange rate, and public investments). When comparing Nigeria with high growth nations, they find that most of the growth differential can be attributed to Nigeria's higher macroeconomic volatility. Simulations suggest that if Nigeria had lower levels of volatility and better macro- economic policies, poverty would have been much lower than observed.

Nwafor (unpublished) examines the effects of reduction of import tariffs on poverty in Nigeria. Using information on Nigeria's past experience with trade liberalization, he examined the possible impacts on the economy. The empirical results reveal that trade restrictive policies adversely affect economic growth. He

thus recommends openness of the domestic economy to trade and investment in order to propel rapid economic growth.

3.0 EMPIRICAL METHODOLOGY AND MODEL SPCIFICATION

3.1 Theoretical Framework and Model Specification

This study is based on the endogenous growth model. The motivation for the use of endogenous growth model stems from the failure of the neoclassical theories to explain the intrinsic characteristics of economies that cause them to grow over extended period of time. The neoclassical theory focuses on the dynamic process through which capital–labour - ratios approach long run equilibrium. In the absence of external technological change, which is not clearly explained in the neoclassical model, all economies will converge to zero growth.

The neoclassical theory sees rising GDP as a temporary phenomenon resulting from technological change or a short term equilibrating process, in which an economy approaches its long -run equilibrium. The model credits the bulk of economic growth to a complete independent process of technological progress in which low capital-labour ratios will result in exceptionally high rates of investment. The most interesting aspect of endogenous growth models is that they help explain anomalous international flows of capital that exacerbate wealth disparities between developed and developing countries. The potentially high rates of return on investment offered by developing economies with low capital–labour- ratios are greatly eroded by lower levels of complementary investments in human capital (education), infrastructure, research, and development (R&D).

The general endogenous production function

$$GDP = AK;^{\propto_i} L^{1-\propto_i} K^{B} \quad (1)$$

Assume symmetry across industries for simplicity, so that each industry will use the same level of capital and labour. Then the aggregate production function is of the form:

$$GDP = AK^{\propto} L^{B} \quad (2)$$

Where;

GDP = GDP per capita at time (a measure of economic growth).

A = Total factor productivity

K = Capital stock

L = Labour.

The model in equations (1) and (2) is endogenous growth model, since the residual component, A, which is a measure of technological progress and human capital accumulation is endogenized. This means that technological knowledge and the accumulation of human capital are embodied not as exogenous growth- generating factors but as a process explaining the growth process itself (Udah, 2010). In empirical applications, the endogenous growth model takes account of the role of international capital flows (reflected in FDI) and investment in human and physical capital and other policy variables such as trade openness and inflation as critical ingredients of growth. Incorporating these relevant variables and adding industrial output to the augmented model, yields the following specification for the determinants of economic growth in the selected ECOWAS countries.

GRGDP=f(TOPN,FDI, INV, SCHL,INF, INDP).....(1)

Equation (1) shows that potentially, real GDP (RGDP) is determined by TOPN, FDI, INV, SCHL, INF and INDP, which form a plausible relationship in order to estimate the above equation (2).

Where:

GRGDP= real GDP rate or rate of growth of real GDP (a measure of economic growth in the countries)

TOPN= trade openness- measured: as sum of exports [(X) + imports (M)]/GDP

FDI= foreign direct investment

INV= real gross domestic capital formation

SCHL= enrolment in secondary institutions as a measure of human capital accumulation

INF= inflation rate- measured as the percentage change in the consumer price index

INDP= industrial production (output).

The empirical specification of the model to be estimated is therefore:

$GRGDP_{2i,t}=, a_0 + a_1TOPN_{i,t} + a_2FDI_{i,t} + a_3INV_{i,t} + a_4SCHL_{i,t} + a_5INF_{i,t} + a_6INDP_{i,t} + \varepsilon_{it}$.....(2)

Where *i* represents country (10 ECOWAS countries) and *t* time (2000-2013), and GRGDP, TOPN, FDI, INV, SCHL, INF and INDP are as earlier defined. The *a priori* expectations are (a_1, a_2 a_3, a_4 a_6) > 0, and (a_5) < 0.

a_0 – a_6 are parameters to be estimated, and ε_t is the error term.

In terms of apriori expectation, trade openness, foreign direct investment, real domestic capital formation, human capital and industrial production are expected to have positive impact on economic growth, while the coefficient of inflation is expected to have a negative relationship with economic growth. The expected signs are based on economic theory and/or intuitive reasoning. The higher degree of trade openness of a country, the higher will be the economic growth rate since trade openness facilitates greater integration into the global economy and stimulates growth through the channels of better resource allocation, greater competition, innovation, transfer of technology and access to foreign capital). Foreign direct investment stimulates growth by increasing the stock of capital, easing foreign exchange constraints to development, and facilitating the transfer of advanced technology and technical know-how from industrialized countries to host countries, thereby increasing productivity. The higher the level of domestic investment, the more rapid will be the rate of economic growth since investment increases the capital stock and stimulate aggregate demand. An improvement in human capital (reflected in human capital accumulation) enhances growth through increasing the productivity of the work force. Thus, the higher the quality of human capital, the higher the rate of economic growth. It is well established in the development literature that increase in industrial production (output) stimulates economic growth; hence, the higher the level of industrial production, the faster the rate of economic growth. Inflation is theoretically expected to have an inverse relationship with economic growth. Accelerating rates of inflation have a destabilizing effect on economic growth through its dampening impact on real savings and investment and its increasing uncertainty syndrome (Adamu et al, 2012).

3.2. Econometric Methodology.

The specification of the proposed model is the dynamic panel, using a panel data regression econometric methodology. In order to overcome the problem of unobserved period and country specific effects (economic peculiarities) and joint endogeneity of most of the explanatory variables with economic growth, and, thus to control for the biases resulting from simultaneous or reverse causation, the Generalized Method of Moments (GMM) Estimator is adopted. It was developed for dynamic models of panel data that were introduced by Holtz-Eakin, Newey and Rosen (1988), Arellano and Bond (1991), and Arellano and

Bover (1995) that will control for country specific effects and joint endogeneity in a dynamic model of panel data. Country and time fixed effects are used to control for country heterogeneity and the effects of common growth shocks across countries. In this, an advantage is taken of the data's panel nature where these estimators are based on, first, differencing regressions and/ or instruments to control for unobserved effects, and, second, using previous observations of explanatory and lagged dependent variables as instruments, called "internal" instruments. This approach accounts for time specific effects and the yield gap in the set of explanatory variables, in order to overcome the problem of biased estimates. Therefore, the proposed model above is re-expressed in the following form:

$$RGDP_{2i,\,t} = a_0 RGDP_{2i,\,t-1} + a_1 x_{i,t} + \mu_{,it} + \varepsilon_{i,t} \quad \ldots\ldots(3)$$

Where; *RGDP*$_2$ is the Real GDP (economic growth rate) of country *i* at time *t*; *a0* is the parameter to be estimated, *X* is the vector of core explanatory variables – trade openness *(TOPN)*, foreign direct investment (FDI), real gross domestic capital formation *(INV), years of* schooling (SCHL- as a measure of human capital), inflation (INF), and industrial production/output (INDP) ; μ is country specific effects; ε is the error term; and all variables are in log form. There seems to be problems in using panel ordinary least squares (OLS), with fixed and random effects, to estimate the above equation. For example, the term lagged real GDP gives rise to an autocorrelation problem. To solve it, Arellano and Bond (1991) used the general method of moments (GMM) approach to estimate the above equation by firstly differentiating the model. Consequently, the fixed country-specific effects are removed: $E(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ However, $(RGDP_{2i\ t} - RGDP_{2i,\ t-1})$ still depended on $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ .Therefore, a few more lags of the first-differentiated lagged dependent variable are instrumental in solving the problem.

3.3 Data Sources

This study employs a dynamic balanced panel data covering the relevant variables in the 15 ECOWAS countries over the period 2000-2013. The 15 countries are the six (6) West African Monetary Zone (WAMZ) and nine (9) other ECOWAS countries. The West African Monetary Zone is made up of six non-contiguous countries in West Africa; made up of Nigeria, Ghana, Sierra-Leone, The Gambia, Liberia and Guinea. These countries are members of the Economic Community of West African States (ECOWAS). ECOWAS is regional economic grouping of 15 countries formed in 1975 to accelerate the economic integration, industrialization and economic development of - participating member countries (Iyoha, 2004). The 15 countries are Nigeria, Ghana, Sierra-Leone, Gambia, Liberia, Guinea,

Guinea-Bissau, Benin, Senegal, Togo, Mali, Niger, Burkina Faso, Cape Verde and Cote D'Ivoire. The relevant data are obtained from the World Bank's World Development Indicators (WDI) and various publications by ECOWAS, and all data in this study are in log form.

4.0. EMPIRICAL RESULTS AND ANALYSIS

As mentioned earlier, given the nature of the study and the empirical tools employed the time series properties of the data to be used are examined to ensure stability and time invariance in the estimated relationships. The importance of stationarity of time series used in regression borders on 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 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 and inconsistent estimates (Engle and Granger, 1987). There is thus the need to investigate the stationarity of variables in the model.

4.1. Descriptive Statistics

Descriptive statistics show the summary of data and other basic characteristics within the cross-sectional series. The summary statistics for all the variables in the study are reported in Table 1 below.

Average real GDP for the sample of ECOWAS countries during the period is 65.3 which is relatively high considering the fact that this is a critical factor for sustainable long run growth in the member countries' economy and particularly in the drive towards greater economic integration as exemplified in the proposed currency union. The corresponding average values for trade openness, FDI, investment, human capital, inflation and industrial output are 42.8, 39.6, 38.2, 24.9, 10.3 and 41.4 respectively. In terms of the standard deviation, inflation has the highest value of 5.5 over the sample period-an indication of inflation variability in the sampled countries during the period of study. The maximum real GDP of 77.9 percent and the minimum value of 6.7 percent give clear indications that the rate of growth has moved rather diametrically among the sampled countries over the period of the study. This wide dispersion and differential growth rate is confirmed by the relatively high standard deviation for the variable and all other variables. Apparently, growth rates and other macroeconomic performance indices generally indicate economic performance in the ECOWAS countries over the period. The skewness value for the real GDP of 0.19 is low suggesting that the growth series were centred on the mean value; the kurtosis also confirms this

outcome. The Jarque Bera value of 14.92 is significant at the 1 percent level, indicating that the hypothesis of normality in the distribution cannot be accepted. This implies that the data series may have endogeneity issues. This therefore necessitates adoption of a dynamic GMM estimator which is capable of controlling the joint endogeneity effects of most of the explanatory variables with economic growth, and, thus to control for the biases resulting from simultaneous or reverse causation.

Table 1: Descriptive Statistics

	Mean	*Median*	*Max.*	*Min.*	*Std. Dev.*	*Skewness*	*Kurtosis*	*J-B*
GRGDP	65.3	22.67	77.9	6.7	3.82	0.19	6.01	14.82
TOPN	42.8	36.32	68.11	35.3	1.24	2.33	2.55	6.88
FDI	39.6	31.15	54.16	23.92	2.81	1.14	3.65	3.15
INV	38.2	18.1	42.11	33.1	1.30	3.8	0.02	5.4
SCHL	24.91	11.9	57.60	39.5	3.71	2.1	1.02	0.09
INF	10.30	9.61	15.11	7.50	4.50	-1.25	-1.62	4.13
INDP	41.4	45.1	48.15	53.20	4.25	2.41	3.5	4.21

4.2 Unit Root Analysis

The study starts by performing a panel unit root test. LLC, Fisher-PP and Fisher-ADF tests were conducted to find the level of all variables in order to check whether the variables in both panels are stationary or non-stationary. If all the variables are stationary at their level, they would enter the model in their level form. The result in Table 3 shows that all variables are overwhelmingly stationary at their level and consequently, enter the model directly.

Table: 2: Unit Root Test for Variables in Levels

Test	LnGRGDP	LnTOPN	LnFDI	LnINV	LnSCHL	LnINF	LnINDP
LLC	-2.7971***	-3.2066***	-6.3191***	-8.1141***	-1.9821**	-10.794**	-4.4992***
Fisher -PP	44.7712**	51.7918**	23.5972*	40.313*	39.2250*	55.50***	43.8160*
Fisher -ADF	49.8817**	43.4460**	38.69412**	51.665***	45.3158**	46.2871**	29.1797*

*** Statistical significance at the 1% level

** Statistical significance at the 5% level

* Statistical significance at the 10% level

4.3. Analysis of Generalized Method of Moments (GMM) results

Since all variables are stationary at their levels, the Arellano and Bond (1991) GMM estimator can be carried out to determine the impact of trade openness, investment, and other macroeconomic variables on economic growth in ECOWAS. An examination of the results reported in table 3 shows that all variables have the correct signs. Lagged growth rate of real GDP has the correct positive sign and is significant at the 10 percent level. This implies that previous economic growth constitutes a spring board for higher levels of growth in ECOWAS countries. Since all the data are in log form, the coefficients are elasticities. The coefficient of lagged growth rate of real GDP of 0.72 therefore implies that a 10 percent increase in previous economic growth will stimulate future economic in the succeeding year by 7 percent. The coefficient of trade openness of 0.18 and has the correct positive sign, and is significant at the 5 percent level. This undoubtedly shows that increased trade openness will invariably propel rapid economic growth in ECOWAS through greater integration into the global economy, better resource allocation, greater competition (Adamu et al 2012). This finding corroborates the result obtained by Balasubramanyam et al (1996) and Kandiero and Chitiga (2003). The coefficient of trade openness of 0.19 implies that the elasticity of real GDP (a measure of economic growth) with respect to trade openness is 0.19. Thus, a 10 percent increase in trade openness will directly stimulate economic growth by1.9 percent in ECOWAS countries. The coefficients of FDI and domestic investment (real gross domestic capital formation) of 0.16 and 0.28 both have the expected positive signs and are significant at the 1 percent level respectively. This implies that an increase in foreign direct investment and domestic investment (reflected in rising domestic gross capital formation) will invariably enhance economic growth in ECOWAS countries through the channels of innovation, transfer of advanced technology and know-how and domestic capital accumulation (Baliamount-Lutz, 2004). The elasticity of economic growth with respect to FDI and investment is 0.15 and 0.28. Thus, a 10 percent increase in FDI and investment (gross capital formation) will on the average trigger economic growth in ECOWAS countries by 1.5 percent and 2.8 respectively.

Human capital has the expected positive sign and passes the significance test at the 5 percent level. This implies that an increase in human capital will promote growth through increasing the productivity of the work force as exemplified in the endogenous growth model. Its coefficient of 0.083 implies that a 10 percent increase in human capital will on the average induce economic growth in ECOWAS by 8.3 percent. This high elasticity value is an indication of the high growth-yielding capacity of human capital. Inflation is significant at the 5 percent

level and has the expected negative sign. Thus, high inflation rates militate against rapid economic growth. Its elasticity coefficient of- 0.036 implies that a 10 percent accelerating rate of inflation will dampen economic growth in ECOWAS by 0.04. This destabilizing effect of inflation on growth is also buttressed by the findings of in Adamu et al (2012). The level of industrialization (as measured by industrial output) has the expected positive sign but is not statistically significant at the 5 percent level. This could be due to the low level of industrialization and industrial technology needed to propel rapid industrialization in the region. Since the t-value of its coefficient is greater than unity, we may infer that industrial output facilitates rapid economic growth but its effect is rather weak due to the low level of industrialization and technological know-how of ECOWAS countries. Its elasticity coefficient of 0.271 implies that 10 percent increase in industrial development will induce economic growth in the region by approximately 2.7 percent.

Table 3. Results from the Arellano and Bond (1991) (GMM) Estimator
Dependent Variable: RGDP

Variables	Estimated Coefficients	t-statistics
C	0.0617	1.1521
Lagged GRGDP	0.7251	1.9522*
LnTOPN	0.1914	2.2448**
LnFDI	0.1570	2.6213***
LnINV	0.2821	3.6860***
LnSCHL	0.0833	2.1924**
LnINF	-0.0377	-2.2168**
LnINDP	0.2705	1.4212

*** Statistical significance at the 1%leve
** Statistical significance at the 5 % level
* Statistical significance at the 10% level

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

This study assesses the impacts of trade openness and investment on economic growth in ECOWAS countries, using dynamic panel data for the period 2000-2013.The choice of the estimation period (2000-2013) was informed partly by data availability in the countries of the ECOWAS studied. In order to overcome the problem of unobserved period and country specific effects (economic peculiarities) and joint endogeneity of most of the explanatory variables with economic growth, and, thus to control for the biases resulting from simultaneous or reverse causation, we use the Generalized Method of Moments (GMM)

estimation method is used. GMM was developed for dynamic models of panel data by Arellano and Bond (1991), and Arellano and Bover (1995) that will control for country specific effects and joint endogeneity in a dynamic model of panel data. Country and time fixed effects are used to control for country heterogeneity and the effects of common growth shocks across countries. In this, due advantage is taken of the data's panel nature where these estimators are based on, first, differencing regressions and/ or instruments to control for unobserved effects, and, second, using previous observations of explanatory and lagged dependent variables as instruments, called "internal" instruments. This approach accounts for time specific effects and the yield gap in the set of explanatory variables in order to overcome the problem of biased estimates.

The empirical results reveal that trade openness; foreign direct investment, real gross domestic capital formation, human capital and lagged real GDP (a measure of previous market size) are the principal drivers of economic growth in ECOWAS countries. Inflation on the other hand is found to have a destabilizing effect on the economic growth of ECOWAS countries.

Given the diverse economic benefits realizable from increased trade and investment in terms of rapid economic growth, increased output and employment generation and the move towards greater economic integration, the following policy recommendations are suggested:

(i) adoption of outward-oriented international economic policies;

(ii) adoption of economic , trade and investment policies that encourage capital inflowsand foreign direct investment;

(iii) implementation of stable macroeconomic policies, particularly with respect to output growth, low level of inflation, minimum fiscal deficits to GDP ratio, sound exchange rate and interest rates that are not subject to provocative vacillations (volatility). This is because sound macroeconomic performances reflected in these aspects are desideratum for the success of a greater economic integration, particularly in the push towards monetary integration in the WAMZ. The recent economic crisis in Greece- member of the EU has recently attenuated this;

(iv) increased investment in infrastructure, education and health in ECOWAS countries;

(v) establishment of sound institutional structures and other growth-enhancing mechanisms;

(vi) policy coordination and harmonization with respect to trade, investment and finance among member countries, as this will fast-track the push towards greater economic integration in the region and the drive towards monetary integration. Thus, while monetary

integration would contribute to economic integration, economic integration would certainly promote the effective implementation of a common monetary policy, which will eventually facilitate currency unification, particularly in the WAMZ.

REFERENCES

Adamu, P. A., Ighodaro, C.A. & Iyoha, M.A. (2012), "Trade, foreign direct investment and economic growth: Evidence from the countries of the West African Monetary Zone", *The West African Economic Review*, 1(2), 10-31.

Addison, S., & Woodon, P. (2007), "Private investment, macroeconomic volatility and economic growth. Across-sectional Analysis", *Journal of Economic Development*, 4(3), 21-40.

Alcala, F. and Ciccone, A. (2002), "Trade and productivity", Paper presented at the National Bureau of Economic Research Summer Institute. http://www.nber.org/ _ confer/2002/

Arellano, M., & Bond, S., (1991), "Some tests of specification for panel data: Monte Carlo Evidence and an application to employment equations", *Review of Economic Studies*, Wiley Blackwell, 58(2), 277-97, April.

Arellano, M., & Bover, S., (1995), "Dynamic panel data and simultaneous reverse causation bias", *Journal of Econometrics*, 23(6), 250-261.

Aseghian, P. (2004), "Determinants of economic growth in the United States: The role of foreign direct investment", *The International Trade Journal*, 18(1), 107-19.

Balasubramanyan, V. N, Salisu, M.A., & Sapsford, D. (1996), "Foreign direct investment and growth in EP and IS countries", *Economics Journal*, 106, 92-105.

Baliamoune – Lutz, M. and Ndikumana, L. (2007), "The growth effects of openness to trade and the role of institution: New evidence from African countries", *working paper* N0 2007-05. Department of economics, University of Massachusetts, Amherst, February.

Baliamount-Lutz, M. N. (2004), ''Does FDI contribute to economic growth?'', *Business Economics* 106, 407, 49-56.

Barro, R.J. and Sala-i-Martin, X. (1995), Economic growth. New York: McGraw-Hill.

Ben-David, D.(1993), "Equalizing exchange: trade policy and development", *The Quarterly Journal of Economics* 108(3), 653–79.

Bolch, H & Tang, H. K. (2004), "Deep determinants of economic growth: institutions, geography and openness to trade", *Progress in Development Studies, 4(3), 245-255.*

Borenstzein, E. J., De Gregorio, J., & Lee, J.W. (1998), How does foreign direct investment affect economic growth?", *Journal of International Economics*, 45(1998), 115-135.

Ciselik, A, & T arsalewska, M. (2008), "Trade, foreign direct investment and economic growth: Empirical evidence from CEE countries", *www.etsg.org/ETSG2008/Papers/Ciestlik*.

De Gregorio, J. (1992), "Economic growth in Latin America", *Journal of Development Economics,* 39(1), 59-84.

Dollar, D. and Kraay, A. (2003), "Institutions, trade and growth", *Journal of Monetary Economics* 50, 133–62.

Dornbusch, R. (1991), "Policies to move from stabilization to growth", In *Proceedings of the World Bank Annual Conference on Development Economics.* Washington DC: World Bank.

Dornbusch, R. & Edward S. (2004), "Transition from stabilization and adjustment to growth", *Proceedings of the World Bank Annual Conference on Development Economics*. Washington DC: World Bank.

Edwards, S. (1998), "Openness, productivity and growth: what do we really know?", *Economic Journal* 108, 383–98.

Edwards, S. (1992), "Trade orientation, distortions and growth in developing countries", *Journal of Development Economics*, 39(1),31-58.

European Journal of Economics, Finance and Administrative Sciences, Issue 18 (2010).

Finch, D, & Michalopolous, C. (1988), "Development, trade and international organizations", In A. O. Krueger (Ed). *Development with trade: LDCs and international economy*. San Francisco, California: ICEG.

Frankel, J.A. and Romer, D. (1999), "Does trade cause growth?", *American Economic Review* 89, 379–99.

Greenaway, D. and Morgan, C.W. (1998), Trade orientation and economic development: theory and evidence. In Sapsford, D. And Chen, J., editors, Development economics and policy. London: Macmillan, 111–32.

Grossman, G. & Helpman, E. (1991), Innovation and growth in the global economy: Cambridge: MIT Press.

Hammouda, H. B. & Jallab, M. S. (2005), "Trade liberalization and development: Lessons for Africa", *Journal of World Investment and Trade*, 2(6), 1-21.

Harrison, A. and Hanson, G. (1999), "Who gains from trade reform? Some remaining puzzles", *Journal of Development Economics,* 59, 125–54.

Herberler, G. (1988), *International Trade and economic development*. San Francisco, California: ICEG.

Holtz-Eakin,S., Newey & Rosen, P. (1988), "Generalized Method of Moments (GMM) estimator for dynamic models of panel data", *Quantitative and Empirical Economics Journal, 25(1),* 172-190.

Iyoha, M.A. (2004), Macroeconomics theory and policy, Revised Edition, Benin City, Mindex Publishing.

Jariyapan, P. (2012), "Determination of transport CO2 emission using the General Method of Moments: Empirical evidence from 16 countries", *The Empirical Econometrics and Quantitative Economics Letters, 1(2),* 1-12.

Kandiero, R., & Chitiga L. (2003), "Openness can be good for growth. The role of policy complementarities", Washington DC: World Bank.

Levine, R. and Renelt, D. (1992), "A sensitivity analysis of cross-country growth regression", *American Economic Review,* 82(4), 942–63.

Lim, E, G. (2001), "Determinants of, and the relation between FDI and growth: A summary of the recent literature", *IMF Working Paper*, WP/01/175.

Makis, S. & Samworu, A. (2004), "Impact of foreign direct investment and trade on economic growth. American", *Journal of Agricultural Economics*, 86(3), 795-801.

Mencinger, J. (2003), "Does foreign direct investment always enhance economic growth?", *KYKLOS*,56(4), 491-508.

Moran, T., Graham, E. & Blomstrom, M. (2005), "Does foreign direct investment promote development?", Washington DC: *Institute for International Economics, Centre for Global Development.*

Ogujiuba, K, Oji, S. & Adenuga, K. (2004), "Openness and economic growth in Nigeria: A VAR approach", *Journal of International Finance and Economics*, 6(9), 22-40.

Oxelheim, L. & Ghauri, P. (2004), European Union and the race for foreign direct investment in Europe. Amsterdam: Elseviier.

Pack, H. and Page, J.M. (1994), "Accumulation, exports, and growth in the high-performing Asian economics", Carnegie-Rochester Conference Series on Public Policy 40, 199–236.

Rodriguez, F. and Rodrik, D. (1999), "Trade policy and economic growth: a sceptic's guide to the cross-national evidence", *NBER Working Paper* 7081, Cambridge MA: National Bureau of Economic Research.

Romer, P. (1989), Capital accumulation in the theory of long-run growth. In Robert Barro ed., Modern business-cycle theory. Cambridge: Harvard University Press.

Sachs, J. & Warner, A. (1995b), "Economic reform and the process of global integration", *Brookings Papers on Economic Activity* 1, 1–118

Sarkar, P. (2007), "Trade openness and economic growth in Southern Economies", *Journal of Investment, Trade and Economic Growth,* 3(8), 51-69.

Thirlwall, A.P. (2000), *Trade, trade liberalization and economic growth: Theory and evidence*. Abidjan: Mustafa Printing Press.

Tybout, J. (1992), "Linking trade and productivity New research directions", *World Bank Economic Review*, 6(2), 189-211.

Udah, E. B., (2011), "Industrial development, electricity crisis and economic performance in Nigeria", European Journal of Economics, Finance and Administrative Sciences, Issue 18.

UNCTAD (2000), "The World Investment Report: Cross-border mergers and acquisitions and development", New York: United Nations.

Vamvakidis, A. (1998), "Regional integration and economic growth", *The World Bank Economic Review 12(2), 251–70.*

Vamvakidis, G. (2002), "How robust is the growth-openness connection? Historical evidence", *Journal of Economic Growth* 7, 57–80.

Varamini, H. & Kalash, S. (2010), "Foreign direct investment inflows, economic growth, and trade balances: The experience of new members of the European Union", *Journal of East- West Business*, 16(1), 4-23.

Xu, B. (2000), "Multinational enterprises, technology diffusion, and host country productivity growth". *Journal of Development Economics* 62, 477–93.

Zhang, K. H. & Song, S. (2001), "Promoting exports: The role of inward FDI in China", *Economic Review* 11(4), 385-396.

POVERTY AND SOCIO-ECONOMIC PROFILE OF SOME SELECTED COMMUNITIES IN NIGERIA: THE USE OF INNOVATIVE INSTRUMENTS

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Abstract

Worsening socio-economic conditions and living standards of people in most developing countries is one reason which underlined the focus on a global partnership to reduce extreme poverty in line with one of the Eight Millennium Development Goals (MDGs) by 2015. Among recent systems innovation instruments used in analyzing poverty issues are the Lorenz curves (graphical representation of the degree of income inequality) and Gini coefficients. These are used to measure the degree of inequality in income distribution among the 9 Local Government Areas of the Zone in the period June to August, 2014. From the findings among others, it was observed female-headed households tend to earn less income, compared to male-headed households; implying that female-headed households are more likely to be in poverty, compared to male-headed households in the district. The poor reside more in rural agrarian areas. It is recommended that other than the Lorenz and Gini coefficients, geospatial technology tools used to analyze, manage, store, or retrieve and present visualize spatial data even in a disaggregated format as a technological innovation in the formulation of policies to eradicate poverty should be deployed in identifying, measuring incidence, depth and severity of poverty.

JEL classification: 043, F46, A13

1. INTRODUCTION

The focus on a global partnership to reduce extreme poverty is one of the Eight Millennium Development Goals (MDGs) pledged to in 2000 by all 191 nations to be accomplished by the year 2015. Specifically, halving the proportion of people living in absolute poverty from 48 percent in 1990 to 24 percent by 2015 was a laudable target set for the African continent. Developing countries and development partners- local and international have since then engaged in a number of initiatives aimed at achieving one or more of the eight goals. However, given the low implementation as at the second quarter of the target year, the goals will hardly be met in sub-Saharan Africa within the remaining three-quarter of 2015. Although the United Nations (2007) update recorded some notable gains that were made in Africa, extreme poverty particularly at the community level is still rampant in the continent. Available data indicate that only the North African countries of Algeria, Egypt, Libya, Morocco

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and Tunisia as well as Mauritius would have met the poverty halving target of 24 percent (Anyanwu, 2012).

Delta State, with a population of 4,098,291 (Males: 2674306 Females: 2024085; see Federal Republic of Nigeria, Official gazette, No. 24, vol. 94, 2007) is biodiversity-rich and oil producing in Nigeria; an example of one State thought to have made some positive progress toward meeting the MDGs, particularly in the areas of poverty reduction, education and nutrition going by the populous oriented policies of the State government. Progress on the health-related MDGs is also believed to be encouraging as the State operates free maternal and under-five free health care programme. Nevertheless, going by the current trends, the State could be counted as one of all the States in Nigeria that is off-track of halving extreme poverty to 24 percent. One means hypothesized in this paper of how Delta State and by extension Nigeria can achieve the poverty reduction target in Post-MDGs space is to ascertain and appreciate the incidence and causes of poverty, its severity and depth, and where it is more predominant. The underlying logic is that effective and appropriate programmes needed in tackling poverty necessitates identifying who the poor are, where they live and their characteristic profiles.

The rest of the paper is organized in six parts as follows: Following the introduction, section 2 briefly reviews the relevant literature on poverty and the use of Geospatial Technology while section 3 provides the methodological framework for the analysis. Section 4 presents empirically, the socio-economic profiles of the communities based on the findings while section 5 displays the geographic disaggregated poverty indicators. Section 6 concludes the paper.

2. REVIEW OF LITERATURE

2.1. Poverty and Measurements

In the literature, poverty has been regarded as multidimensional in nature and determinants. This strand of contention is influenced by the writings of Amartya Sen (1976) as echoed to by Chakravarty (1983), Foster, Greer and Thorbecke (1984), Atkinson (1987), Sen (1997), Zheng (1997), Foster (2006) and Alkire and Foster (2007). However, many pundits have also taken a uni-dimensional perspective to while at the concept (See for instance, Sen, 1992b; Alkire, 2002; Nussbaum, 2003; Alkire, 2007; McGillivray and Clarke, 2007. Despite this seeming absence of a universally agreed definition of poverty, a common working definition is inability to afford the minimum needs that are deemed reasonable by the standards of the society in question (Ravallion, 1992).

Poverty can also be seen from the point of view of deprivation, economic disenfranchisement, lack of rights and socio-economic restrictions which often include exclusion (willful or involuntary exclusion). The different ways of examining the different conceptualizations of poverty and how they are measured are depicted in Table 1.

Table 1: Summary of the Approaches to the Definition of Poverty

Definition of Poverty		Approach	Indicators
1.	Poverty as a consequence of deficiency in the provision of goods.	Absolute poverty approach	Income, Health care services, Shelter, Accommodation etc
2.	Poverty as an outcome of deprivation and lack of right	Relative poverty approach (earning capacity and entitlement perspective)	Income earned, Income from sale of assets, Income from productive activities , Control of resources
3.	Poverty as a result of inadequate capability	Capability approach	Market for goods, Market for labour, Benefits derived from Labour
4.	Poverty as an outcome of social and economic exclusion/disenfranchisement	Socio-economic exclusion derived from the vulnerability and short term shocks	Participation in political, economic and social processes; Net assets, Investment

Source: Adapted from Anyanwu (1997)

Poverty is dynamic and as such, it is not a static condition. Resources required to meet ones needs may increase and fall as needs do. Individuals can move in and out of poverty over time – so it may be temporary, recurrent or persistent over longer periods (Goulden and D'Achy, 2014). Some people and groups are far more vulnerable to poverty than others although the risk of experiencing poverty exists for many more than are in poverty. This underscores the focus on studies on poverty, identifying its variants for policy intervention and eventual poverty alleviation.

A second issue that is also of prominence concern to policy makers and researchers is how best to measure poverty from the many indicators: cost, availability and quality of goods and services, inequality among persons counted as multi-dimensionally poor among others. As such, in measuring poverty, setting relative international poverty lines has become visible parameter. In the 1990 World Development Report (WDR) on Poverty, the World Bank anchors international poverty lines along national poverty lines of "$1 a day" used in the

poorest countries. Since the 1990 poverty measurement benchmark set by the World Bank, series of multidimensional measurements and methods have emerged. The most widely used multidimensional poverty measures since the 1970s are the 'counting approaches' (See Alkire and Foster, 2011) reflecting their ability to handle categorical or ordinal variables in counting measures. Most applications of counting measures tend to report a headcount ratio. The headcount ratio is very easy to understand and communicate, although it cannot be broken down by dimension to show how people are poor. In overcoming this limitation, the Foster-Greer-Thorbecke (1984, FGT) methodology that is most widely used in class of income poverty measures was developed; although it belongs to the 'counting approaches', it has its own shortcomings.

A recent method in the literature is the Alkire-Foster (or 'AF') method which takes into cognizance, overlapping or simultaneous deprivations that a person or household experiences when using different indicators. In the 'AF' approach, people are identified as multi-dimensionally poor if the weighted sum of their deprivations is greater than or equal to a chosen poverty cut-off point (OPHI, 2014). The varied approaches and methods of poverty measurements are situated in the proposition that an understanding of the various dimensions and determinants of poverty is a requirement for effective pro-poor development strategies (Anyanwu, 2012).

2.2 Geospatial Technology

Geospatial technology is an amalgam of inter-related systems and tools used to analyze, manage, store, or retrieve and present visualize spatial data even in a disaggregated format. It is one of the innovation instruments in geospatial technology; the field is inter-disciplinary in nature and consists of three areas: (1) geographic information systems (GIS); (2) remote sensing; and (3) global positioning system (GPS). As further enunciated by Rogers (2013) GIS as a mapping and spatial analysis tool is widely used in education, government and industry to identify and solve spatial issues and problems. The application of GIS enhances the geographic disaggregation of information by plotting such information on maps. When applied to poverty mapping, GIS is able to display information on the spatial distribution of welfare and its determinants, measures the concentration and distribution of poverty using some measures as the headcount index poverty and be able to serve as an alternative poverty measure. Geographic disaggregated poverty indicators disclose information that compliments aggregate national level indicators. GIS presents Maps as powerful tools of complex information in a visual format that is easy to understand (Atubi, Efe and Akpokvwovwor, 2014). Series of papers have in recent times applied the integrated spatial statistics and GIS in poverty studies to assist policymakers to

employing more efficient use of scarce resources and develop greater accountability in measureable outcomes at all spatial levels (for instance, see Unwin and Unwin, 1998; Li, Henry, and Davis, 1999; Rogers, Emuanu and Robinson, 2006; Leigh and Lee, 2005; 2013; Atubi, Efe and Akpovwovwor, 2014). This is mostly lacking in Nigerian studies.

2.3 Lorenz curves and Gini coefficients.

Other recent innovation instruments which are systematic and used in analyzing poverty issues in recent times are the Lorenz curves and Gini coefficients. These instruments used in this study are discussed in details in the next section of study.

3. DATA AND METHOD OF ANALYSIS

The methodology adopted in this study is informed by the framework of elucidating the poverty profile and socioeconomic conditions of all the Local Governments in the North Senatorial District of Delta State, Nigeria. The procedures adopted allow us to describe, explain and then predict the distribution of poverty at the highest spatial resolution of the key predictor variables. Details of the materials and methods are presented below.

3.1 Sample Size

The sample size chosen for this analysis is 1,350 households (with 10 communities selected from each Local Government Area (LGA) and 15 households selected from each community). The heads of each household (male or female, married or unmarried) in either urban or rural areas were used as the major focus of the questionnaire administration. For effective coverage, the Zone was categorized into three sub-sample groups in line with the nine local government areas. A semi area-based quota random sampling process was used to select the households interviewed for the purpose of the study. The nine local government councils are reported in Table 2.

Table 2: Local Government Areas of Delta North Senatorial District

Delta North Senatorial District	Population
Aniocha North	104,711
Aniocha South	140,604
Ika North East	183,657
Ika South	162,594
Ndokwa East	103,171
Ndokwa West	149,325
Oshimili North	115,316
Oshimili South	149,306

Ukwuani	120,390
Total	**1,293,074**

Source: National Population Commission

3.2: Data Collection Process

The data used in the study is predominantly primary in nature and were elicited through an in-depth and on-the-spot interview of household to household heads using a structured questionnaire in the period June to August, 2014. The questionnaire was administered by fifty (18) trained research enumerators and two supervisors. Content validity of the questionnaire was evaluated before the pretesting, and where necessary modifications were made. Actual field administration took place after the pre-testing. Pidgin English language and the local dialects were adopted where necessary to ensure that the contents of the questionnaires were not misrepresented to the respondents.

3.3: Method of Data Analysis

The variables associated with poverty are numerous; some are social, others are economic and political. These factors were noted in the course of questionnaire design and consequent administration and collation of the data for analysis. The procedure adopted in the study follow the lead by Rogers, Emwanu and Robinson (2006:3) adapted from Ravallion (1996). In simplified terms poverty is defined and measured as a single monetary indicator of household welfare (y_i), e.g. total expenditure on consumption over a period of time. Poverty line (z_i) is measured as the cost to the *ith* household of escaping poverty implying that the lower the value of y_i/z_i, the poorer the household. Consequent upon this, some poverty indices that incorporate the measured *ys* and *zs* can be generated. Such indices belong to the Foster-Greer-Thorbeckeí (FGT) class of poverty indicators (Foster et al.1984; Foster and Shorrocks 1988). Upon retrieval of the questionnaires and preparation of the appropriate templates, the data were imputed into a spreadsheet using Excel. This was followed by data cleaning and coding using SPSS 22.0 and DAD 4.6. Both the SPSS and DAD software were used for the analysis of poverty and the socioeconomic profiles.

Different thresholds were chosen for the purpose of analyzing the typologies of poverty, based on the expenditure per capita approach. For the Core Poor, the adopted threshold was based on household expenditure less than 1/3 of the pre-determined expenditure value. For the Moderately Poor, the established threshold was set as expenditure value greater than 1/3 of the predetermined expenditure threshold, but less than 2/3 of the latter, while the Non-Poor computation is based on expenditure above the 2/3 of the predetermined

threshold, defined as the poverty line. Lorenz curves and Gini coefficients were computed in order to measure the degree of inequality in income distribution among the 9 LGAs in the Zone. Specifically, the poverty indicators to be computed include the Poverty Head Count Ratio/Poverty Incidence; the Disparity in Income Distribution Index; Measure of Relative Poverty, and the Dollar per Day Approach, respectively.

3.4 Welfare Indicators, Lorenz and Gini Coefficients

The Poverty Headcount Ratio is the simplest and most widely used poverty index. Applying the FGT index as a proxy, it is expressed as;

$$\frac{1}{N}\sum_{i=1}^{Q}(z_i - y_i)^{\beta} \quad (1)$$

where N = the total population, z_i is the poverty line for individual *i,* y_i is the welfare indicator for the same individual and Q is the total population below the poverty line. For the head count index $\beta = 0$; for the poverty gap index $\beta = 1$ and for the squared poverty gap index $\beta = 2$. Alternative measurement of the headcount ratio is defined as the fraction of the total population who are below the poverty line. It measures the percentage of the poor individuals (that are living below the poverty line) to the total number of people

$$H = \frac{Q}{N} = \frac{1}{N}\sum_{h=1}^{N} I(x_h \leq z) \quad (2)$$

Where:

$H = P_O$ is headcount, Q is the proportion of the population below the poverty line and N represents the total number of people in the population.

Among recent innovation instruments used in analyzing poverty issues are the Lorenz curves and Gini coefficients. The Lorenz curve is a graphical representation of the degree of income inequality. The curve plots the cumulative percentage of the index against the cumulative proportion of recipients, starting with the poorest individual or household. The closer the Lorenz curve is to the 45^0 line, the more dominant that income class becomes. On the other hand, the Gini coefficient measures income inequality as depicted by the Lorenz curve. It is calculated as;

$$G = \frac{Area\ between\ the\ Lorez\ and\ diagonal\ line}{Total\ area\ between\ the\ diagonal\ line\ and\ the\ horizontal\ axis} \quad (3)$$

Where $0 \leq G \leq 1$

A Gini index of zero represents perfect equality, while an index of 1 implies perfect inequality. A coefficient of zero indicates an equitable distribution of income

while a coefficient greater than zero is indicative of various degrees of income inequality.

4. SOCIO-ECONOMIC CHARACTERISTICS OF HOUSEHOLD

The socio-economic and livable conditions of the 1,250 households in the 9 Local Government Areas (LGAs) of the senatorial district surveyed for this study is relayed in this section. The household is defined as any group of person (who are related) living together, eating from the same cooking pot; who slept in the same house last night and are likely to sleep there today or this week.

Some major characteristics of the household and/or of the household heads are discussed below with a view to highlighting their common socio-economic distributions. These characteristics include; (a) gender of the household head, (b) household size, (c) Level of Education attained by household head, (d) income of household head, (e) marital status of household head, (f) access to credit facilities, and (g) access to sources of drinking water.

4.1 Gender of the Household Head and Size of the Household

The gender of the household head is a major socioeconomic characteristic that can affect the well-being of the household. A careful evaluation of the gender of the heads of the households selected in all the communities in the district reveals that most of the households (the largest proportion of the households) are male-headed households in all the LGAs. The dominance of men as household heads in this study is a clear indication that irrespective of the supposed modern civilization, marriages are still generally stable in the district. The plot of the gender distribution of households is as shown in Figure 1. The mean household size based on the sample data is 5. Figure 2 shows the distribution of the households according to the different sizes. One characteristic of households' structure is the large size.

4.2 Education Level of Household Heads

The stratification of household heads according to the level of education attained is presented in Figure 3. One observation is that most of the household heads have at least primary school education. The proportion of household heads with secondary school, adult, and B.Sc/HND qualifications is a little above average for the 9 local government areas. A large proportion of individuals had primary school qualifications.

4.3 Distributions of Household Heads by Income Earned and Access to Credit Facilities

Table 3 shows that of the total sample covered by the survey, only three (3) household heads in Oshimili South LGA earned above one hundred thousand naira income per month. The highest proportion of household heads in the senatorial district belongs to the 11,000 to 20,000 income category. Ndokwa East LGA records the highest number of households within the N1,000 – N10,000 monthly income bracket. Table 3 shows the distribution earned according to household for the 9 LGAs in the Zone for the income ranges, N11,000 – N20,000; N21,000 – N30,000; N31,000 – N40,000, and N41,000 – N50,000.

From the survey, it was found that household heads in Zone generally have access to the following sources of credit facilities: micro-finance banks, cooperative societies, informal lending, extended family lending, borrowing from friends, self-built financial pool (personal savings) and inherited funds. Of these sources of credit facilities, extended family borrowing and Informal borrowing (borrowing from friends) are the most commonly utilized sources of credit on the average in the District (see Figure 4). Access to credit through the micro-finance banks varies through the 9 LGAs.

4.4 Access to Public Schools and Public Health Facilities

The working definition of public schools in this study is primary and secondary schools owned and operated by the government. The issue here is to determine how long in terms of time, it takes a pupil or student to walk to the nearest public school in the district. From Figures 5, it takes average of 20 minutes to get to the nearest public schools which is commendable. As for public health facilities, it takes average of 30 minutes as shown in Figure 6. These may imply that basic human development facilities are relatively available in the district.

Table 3: Income of Households Heads

LGA	N10000	N11000 - N20000	N21000 - N30000	N31000 - N40000	N41000 - N50000	N51000 - N60000	N61000 - N70000	N71000- N80000	N81000 - N90000	N91000 - N100000	Above N100000	Total of House holds
Aniocha South	30	69	16	18	11	-	-	-	-	-	-	144
Aniocha North	29	72	17	17	10	-	-	-	-	-	-	145
Ika North East	28	67	17	21	10	-	-	-	-	-	-	143
Ika South	30	71	15	17	11	-	-	-	-	-	-	144
Ndokwa East	82	51	12	2	-	2	1	-	-	-	-	150
Ndokwa West	29	71	17	16	11	-	-	-	-	-	-	144
Oshimili North	26	64	15	16	9	-	-	-	-	-	-	130
Oshimili South	17	44	11	15	9	9	5	3	3	3	12	131
Ukwuani	27	63	15	15	9	-	-	-	-	-	-	129

4.5 Descriptive Statistics

The descriptive statistics of the key socio-economic data highlight the essential characteristics of the variables such as their maximum and minimum values as well as their standard deviations and means, as a prelude to the analysis of the determinants of poverty in the senatorial district using household heads monthly expenditure budget (in Naira). The monthly expenditure budget and the units of measurement applied are: household expenditure on food and household expenditure on education.

The expenditure pattern of households instead of household incomes is used in the analysis because at the pilot stage of the study, it was found that respondents had the tendency not to provide full information about their incomes. Where necessary for the purpose comparison, the mean expenditure for all items is compared with the mean income declared for each of the 9 LGAs. It is noted generally that larger household expenditures is a reflection of better living standards, as personal welfare is largely a function of what the household consumes. Tables 4 – 7 and Figures 7-9 summarize the expenditure on different household budget heads. The corresponding plots are also presented.

4.5.1. Household Expenditure on Food and Household Expenditure on Hospital Bills

The mean expenditure on food for the 9 LGAs ranges from ₦4,013 to ₦21,014. Based on the ranking of the mean in Table 4, Ika North East local government area recorded the highest mean monthly household expenditure on food of ₦21,013, while Oshimili South recorded the lowest mean monthly household expenditure on food of ₦4,013.

4.5.2. Household Expenditure on Education

Table 5 reports the mean monthly expenditure of households on education and the amount ranges from ₦2,375 to ₦23,123. Ika North Local Government Area recorded the highest average monthly education expenditure of N23,123. The lowest mean household expenditure per month is recorded in Oshimili South LGA (₦2,375). The wide gap in education expenditure among the Local Government Areas can be attributed to location as well as accessibility to educational facilities. The cost of education tends to be higher in private primary and secondary schools.

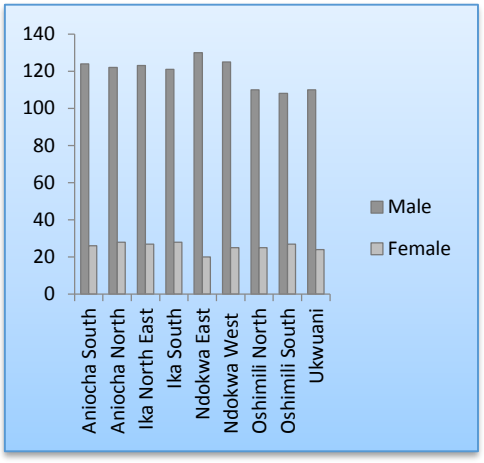

Figure 1: Distribution of Household by by Size

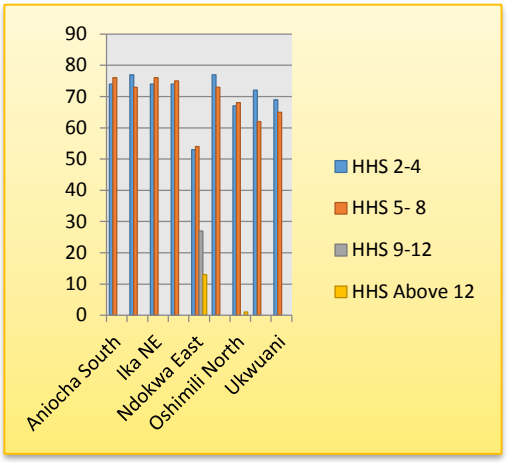

Figure 2: Distribution of Household Gender of Household Head

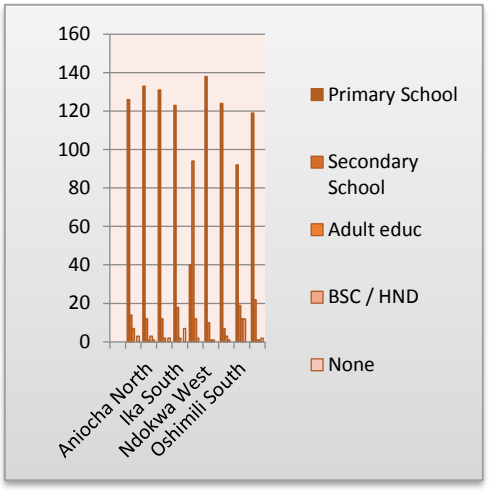

Figure 3: Distribution of households heads by educational attainment

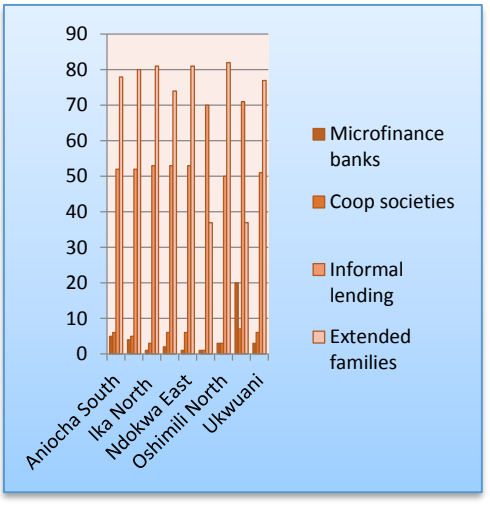

Figure 4: Access to Credit

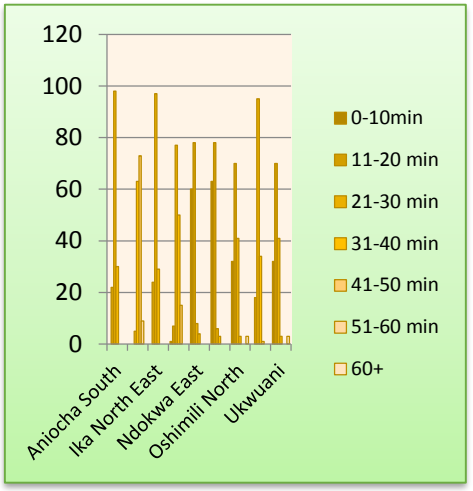

Figure 5: Household Access to Schools

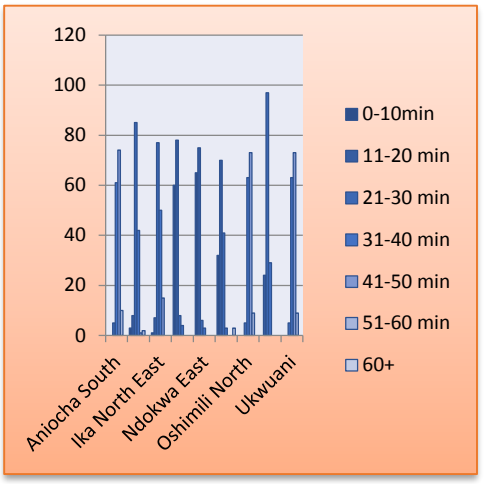

Figure 6: Access to Health Facilities Public

4.5.3: Mean Total Expenditure and Income in the 9 LGAs

Table 6 provides a summary of mean of the total expenditure as well as the declared income of households across the 9 LGAs in the senatorial zone, with their corresponding plots. The table provides a snapshot view of the extent of poverty in the Zone. In terms of expenditure, Oshimili South LGA has the highest mean monthly expenditure, measured at N75,229.06. Ndokwa West LGA has the lowest mean monthly expenditure per household, measured at N35352.00. This is followed by Ika South LGA, with a mean monthly household expenditure of N38,741.33.

In terms of declared mean monthly income per household, Oshimili South also ranks highest, with mean monthly household income recorded at N43,733.00. Ndokwa LGA recorded the lowest mean household monthly income of N11,366.00. The rank recorded by each LGA on the mean income scale is as shown in Table 7. For the entire district, based on the study sample, the mean household income per month recorded is N13,386. With a mean average household size of 5, this reduces to N2, 677.2 per capita per month, or N89.24 per capita per day, or simply US$0.45!

One visible feature of the data is that household expenditure tends to be in excess of declared household income, suggesting that households do not generally declare all sources of income. This suggests further that households may have other coping strategies outside primary and secondary employment avenues, or they may be living on implicit resources, or simply dis-saving. This is why, for policy reasons, the data sets on expenditure may be telling a more factual story about

the living conditions of households, compared to the data on their revealed incomes.

Table 4: Distribution of mean monthly expenditure on household spending on food.

LGA	MINIMUM	MAXIMUM	S.D	Mean	Mean Rank
Aniocha North	1000	60000	14235	16216	4
Aniocha South	1,300	60000	16686	19700	2
Ika N	3000	60000	16805	21013	1
Ika South	1000	60000	12107	15277	5
Ndokwa East	3000	60000	14952	18931	3
Ndokwa West	2000	11000	3012	4956	8
Oshimili North	700	11000	3194	5616	7
Oshimili South	500	11000	3060	4013	9
Ukwuani	3000	70000	14952	14753	6

Source: Field Survey, 2014

Table 5: Distribution of Monthly Mean Expenditure on Education

LGA	MINIMUM	MAXIMUM	S.D	MEAN	Mean Rank
Aniocha North	1000	20000	4690.61	8313.33	3
Aniocha South	1000	20000	4803.15	8486.67	2
Ika North	1000	38000	27605.32	23123.29	1
Ika South	1000	10000	2980.39	5000	5
Ndokwa East	1000	10000	2980.39	5000	5
Ndokwa West	1000	5000	3179.60	3313.72	7
Oshimili North	1000	20000	4339.60	7431.43	4
Oshimili South	1000	22000	5279.88	2375.70	9
Ukwuani	1000	5000	1784.66	3282.60	8

Table 6: Household Mean Expenditure and Income for Delta State

S/N	LGAs	Expenditure		Income	
		Mean	Rank	Mean	Rank
1	Aniocha North	42078.67	5	16800	8
2	Aniocha South	45726.67	3	19265	6
3	Ika North	46226.85	2	20771	2
4	Ika South	38741.33	8	19433	5
5	Ndokwa East	40993.33	7	11366	9
6	Ndokwa West	35352	9	18133	7
7	Oshimili North	43330.15	4	19522	4
8	Oshimili South	62519.85	1	30122	1
9	Ukwuani	41174.81	6	20183	3
MEAN		**44,015.96**		**19,510.56**	

Table 7: Household Mean Expenditure and Income

S/N	LGAs	Expenditure		Income	
		Mean	Rank	Mean	Rank
	Aniocha North	42078.67	4	16800	8
	Aniocha South	45726.67	3	19265	6
	Ika North	46226.85	2	20771	2
	Ika South	38741.33	8	19433	5
	Ndokwa East	40993.33	7	11366	9
	Ndokwa West	35352	9	18133	7
	Oshimili North	43330.15	5	19522	4
	Oshimili South	62519.85	1	30122	1
	Ukwuani	41174.81	6	20183	3
MEAN		**45,299.41**		**20,189.72**	

Source: Derived from field survey data, 2014.

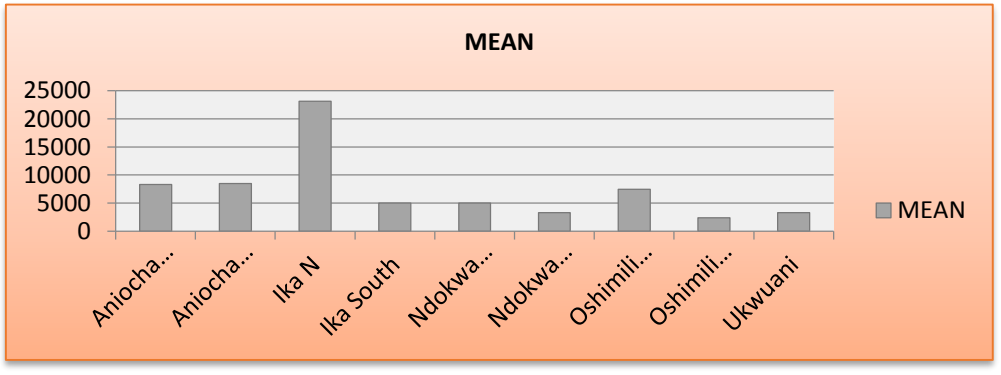

Figure 7: Distribution of Monthly Mean Expenditure on Education

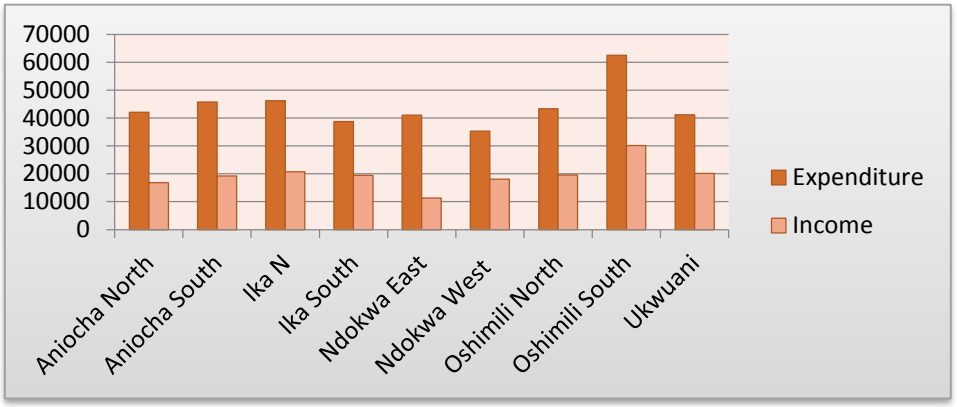

Figure 8: Mean Household Expenditure and Income for Delta State

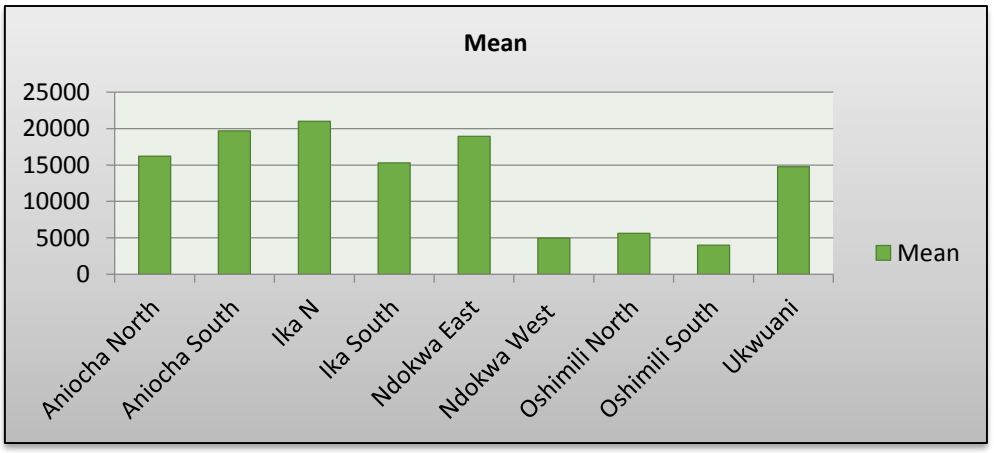

Figure 9: Mean Household Expenditure and Income

4.6 Expenditure Pattern of Household and Measures of Inequality

The total expenditure per capita and food expenditure per capita were applied in the determination of poverty. The reason being that in most low to medium income households, food attracts the greatest weight within the frame of the total household budget. As for income, it is often under-reported thus making the income approach suffer from conceptual and measurement problems.

4.6.1 Expenditure and Inequality across Local Government Areas

The mean per capita monthly food expenditure by the 9 LGAs is reported in Table 13. Average monthly food expenditure lies between ₦4,013 and ₦21,013 the corresponding per capita expenditure (PCE) on food range between ₦189.63 and ₦2,940. The Table also reports the Social Gini coefficient (which measures the

relative inequality in access to food among the people in each LGA) and the ranking of each LGA on this index. The average Social Gini coefficient for the District is 0.484 and since higher coefficients (those closer to 1) indicate greater inequality in the access to food by the populace, this average indicates that access to food is averagely distributed and relatively less unequal especially given the fact that a large number of households consume from their own farm outputs. A critical implication of the S. Gini coefficients is that LGAs with higher values are more vulnerable to the risk of food poverty. Figure 10 uses the S. Gini coefficient rank to plot potential vulnerability to food poverty across the 9 LGAs.

The Gini coefficients recorded in Table 8 are derived from the relevant Lorenz curves, using the DAD (Version 4.6) application package. One of the essential qualities of the Lorenz curve is that it orders individuals or households according to their poverty rating. The ordering is from the poorest to the least poor. It shows the percentage of the households in the economy that control a specific proportion of income. The overall Gini (2) estimate for the District is 0.343 suggesting that about 34 percent of the households in District control less than 20 percent of total household expenditure among the samples covered in the study using Oshimili South as the District proxy and may probably control less than 10 percent of the income share. The Lorenz curves for the 9 LGAs are presented from Figure 5.2 - Figure 5.26.

Table 8: Distribution of Monthly Mean Food Expenditure by Local Government Areas

LGAs	Mean Monthly Expenditure on Food	PCE on Food	S. Gini Index	Ranking of S.Gini Index
Aniocha North	16,216	189.63	0.511	4
Aniocha South	19,700	2055.25	0.480	6
Ika North East	21,013	2456	0.519	7
Ika South	15,277	1909	0.503	5
Ndokwa East	18,931	2940	0.529	8
Ndokwa West	4,956	1253	0.531	9
Oshimili North	5,616	2015	0.445	2
Oshimili South	4,013	578	0.457	3
Ukwuani	14,753	1165.10	0.381	1
Average			**0.484**	

Source: Computed Using Survey Data (2014), on DAD (Version 4.6).

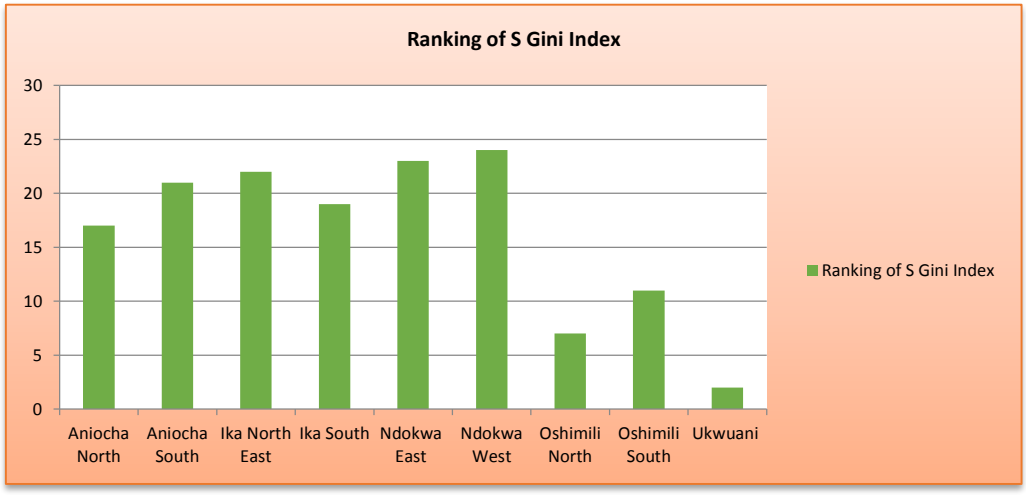

Figure 10: Potential Vulnerability to the Risk of Food Poverty

Table 9: Distribution of S.Gini Decomposition of Households By Total Expenditure

LGAs	S.Gini (1)	Population Share	Income Share	Absolute Share	Relative Share	Gini (2)	Ranking (Gini (1)	Ranking (Gini 2)
Aniocha South	0.21900654	0.03769269	0.03571353	0.00029481	0.00114028	0.351	3	4
Aniocha North	0.22303156	0.03769269	0.03744864	0.00031482	0.00121766	0.292	5	7
Ika North East	0.22402011	0.03749378	0.03555333	0.00029863	0.00115503	0.363	4	6
Ika South	0.19673942	0.03759324	0.03336822	0.00024679	0.00095455	0.398	8	9
Ndokwa East	0.19621507	0.07190453	0.05884951	0.00083029	0.00321142	0.301	9	3
Ndokwa West	0.19908355	0.03729488	0.03188079	0.00023671	0.00091554	0.392	7	8
Oshimili North	0.23194377	0.03431129	0.03141835	0.00025004	0.00096710	0.272	2	1
Oshimili South	0.28014363	0.03301840	0.04334588	0.00040094	0.00155078	0.354	1	5
Ukwuani	0.20920849	0.03361512	0.03055356	0.00021487	0.00083108	0.365	6	7

Source: Computed from field survey data, using DAD (Version 4).

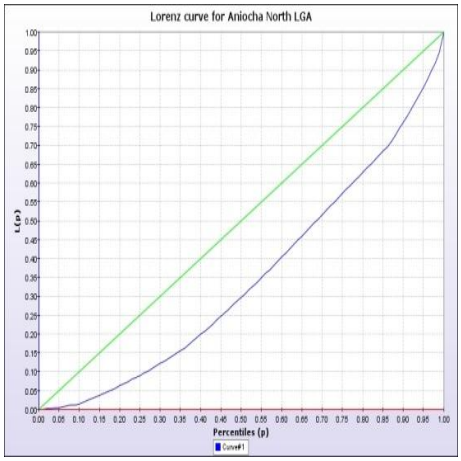

Figure 11(a): Lorenz curve for Aniocha South LGA

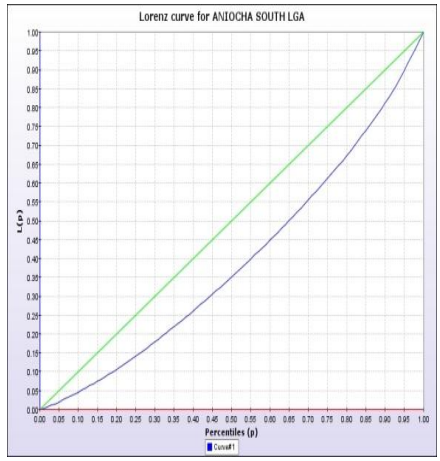

Figure 11(b): Lorenz curve for Aniocha North LGA

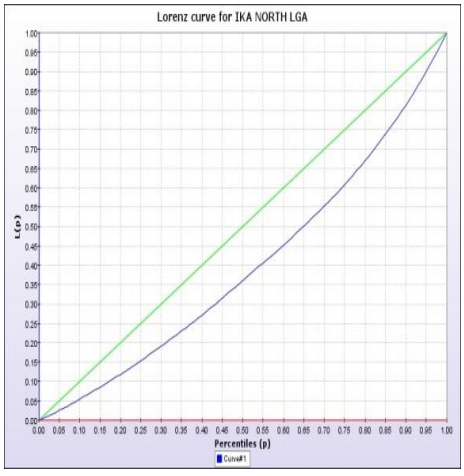

Figure 11(c): Lorenz curve for Ika North East LGA

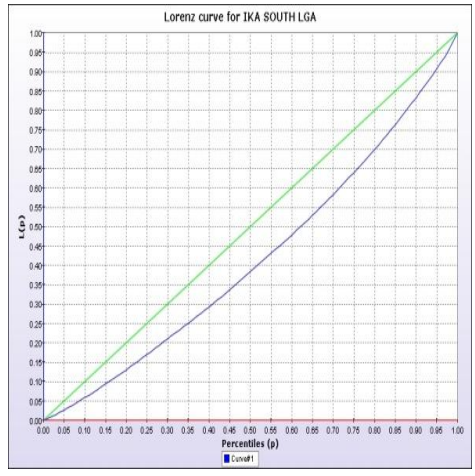

Figure 11(d): Lorenz curve for Ika South LGA

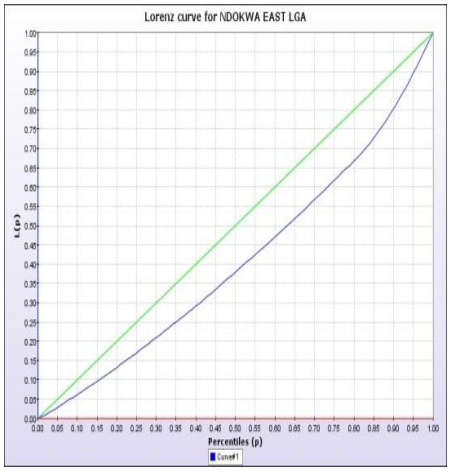

Figure 11(e): Lorenz curve for Ndokwa East LGA

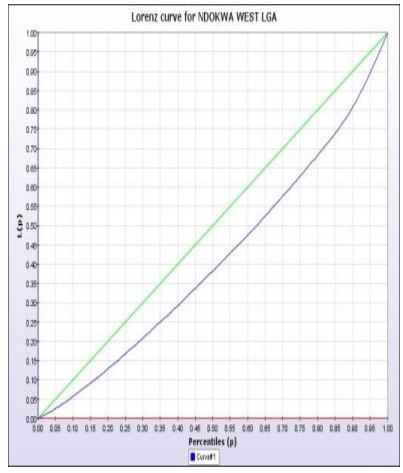

Figure 11(f): Lorenz curve for Ndokwa West LGA

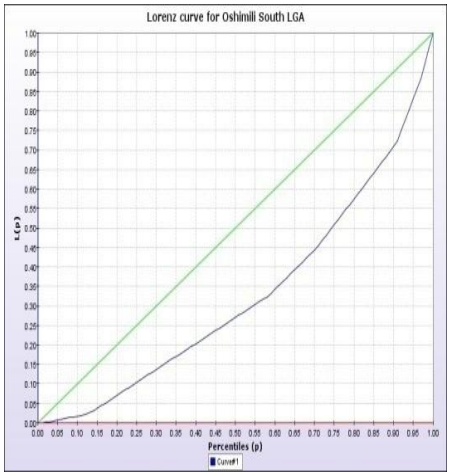

Figure 11(g): Lorenz curve for Oshimili South LGA

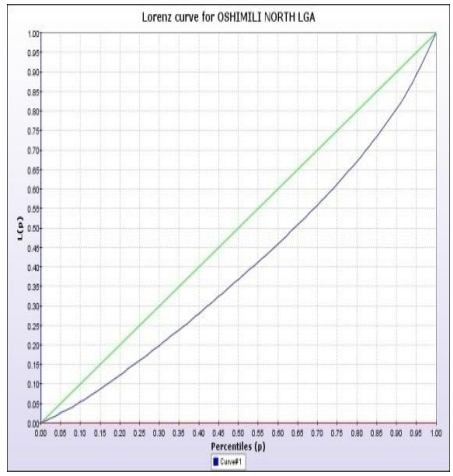

Figure 11(h): Lorenz curve for Oshimili North LGA

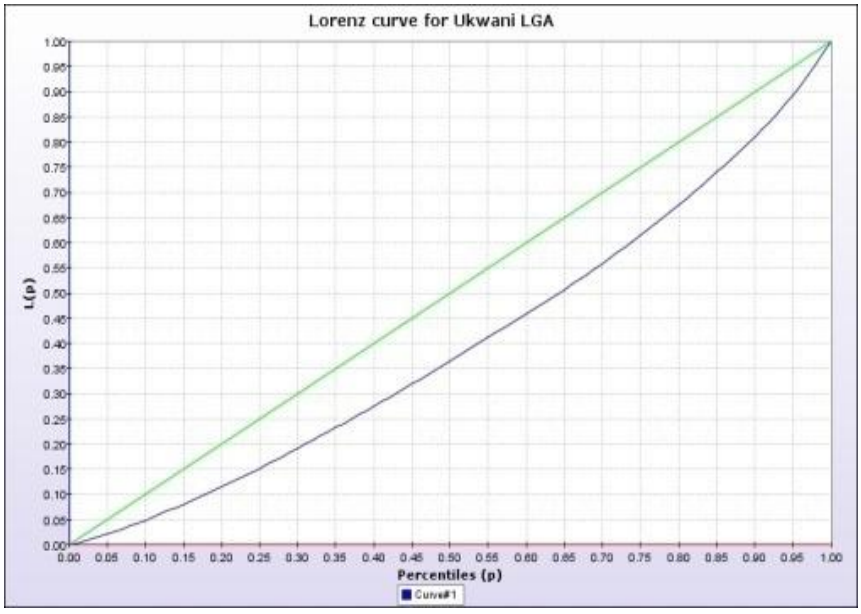

Figure 11(i): Lorenz curve for Ukwani LGA

The plot of ranks for each computed LGA Gini coefficients are presented in Figures 11 (a – i) using simple vulnerability scale. LGAs with high coefficients are symptomatic of high inequality in the distribution of mean spending. Since expenditures are closely correlated with income, LGAs characterized by relative higher inequality in effective spending would indicate greater risk of being poor.

4.7.1 Analysis of Poverty Profile

Poverty profile is critical in the formulation of pro-poor policies using some other indicators of poverty indices like poverty line, poverty incidence, poverty depth and head count index, etc.

The poverty line is used to determine the typology of poverty defined as a threshold which serves as the basis for classifying an economic agent as poor or the non-poor. Persons below the benchmark are poor while those above it are regarded as non-poor. The threshold in some instances represents the minimum welfare cost or minimum survival amount needed by the household to be alive. Following best global practices, core poor is measured using one third ($^1/_3$) of the monthly expenditure per capita (food or total expenditure), moderately poor category was determined using $^2/_3$ of expenditure per capita or food expenditure per capita.

4.7.1 Food Poverty: A Relative Measure of Poverty

The food core poor showed as reported in Table 10 the lowest percentage when compared with the moderate poor and the non-poor. This indicates that many households have moved from the core food poverty to the moderate food poverty implying that the Zone is already on the path to eradicating core food poverty. In terms of food per capita expenditure, the moderately poor recorded the highest proportion of the poor in all 9 LGAs of Delta State connoting that the proportion of the population in the Zone that are moderately food poor is more in number than the proportion of those that belong to the core food poor and non-food poor. The relative incidence of food poverty is the sum of core food poor and moderate food poor. The mean relative incidence of food poverty for the District is about 62 percent, implying that food poverty is widespread and relatively deep in the District.

4.7.2. Expenditure Poverty and Incidence of Poverty across LGAs

The expenditure poverty measured as mean of expenditure per capita is presented in Table 11. Based on the study sample, the distribution non-poor households are distributed across all the LGAs of District but they are more in Ndokwa LGA (55 percent). Oshimili South LGA had the highest percentage of the non-poor in the District. It can be conveniently inferred from the foregoing that the core poor, the moderately poor and the non-poor are found in all the LGAs. There is a striking relationship between the incidence of food poverty and poverty incidence based on expenditure per capita as Table 11 reports.

Table 10: Typology of Food Poverty by Local Government Area (LGAs)

LGA	Core Poor	Moderate Poor	Non Poor	Incidence of Food Poverty
Aniocha South	7%	43%	50%	50%
Aniocha North	7%	60%	33%	67%
Ika North East	9%	53%	38%	62%
Ika South	8%	60%	34%	68%
Ndokwa East	3%	52%	40%	55%
Ndokwa West	8%	49%	43%	57%
Oshimili North	21%	57%	22%	78%
Oshimili South	11%	51%	28%	62%
Ukwuani	4%	56%	40%	60%

Source: Derived from Field work, 2014

Table 11: Topology of Poverty across LGAs in Delta State (based on mean expenditure per capita)

LGA	**Core Poor**	**Moderate Poor**	**Non Poor**	**Incidence of Poverty**
Aniocha South	8%	51%	41%	59%
Aniocha North	2%	73%	25%	75%
Ika NE	18%	53%	29%	71%
Ika South	2%	53%	45%	57%
Ndokwa East	5%	30%	55%	55%
Ndokwa West	1%	59%	40%	60%
Oshimili North	5%	60%	34%	65%
Oshimili South	7%	48%	45%	55%
Ukwuani	13%	52%	35%	65%

Source: Survey, 2014

4.7.3 The Location of the Poor in Delta State.

The poor (either core or moderately poor) are found in all the Local Government Areas. The poor referred to in the study consists of the combination of all the poor according to their benchmarks (food poverty, poverty as measured by expenditure per capita and income poverty).

4.7.4 Where are the Core Poor?

Table 12 presents the distribution of the core poor by local government areas and communities. On the average the core poor are found more in Oshimili North a predominantly agrarian yam producing Local Government Area (Inoni, 2010).

Table 12: Distribution of the Core Poor by Local Government Areas and Communities.

Aniocha South	14%
Aniocha North	12%
Ika North	18%
Ika South	15%
Ndokwa East	17%
Ndokwa West	17%
Oshimili North	23%
Oshimili South	13%
Ukwuani	21%

Source: Survey, 2014

A careful examination of these communities shows that the core poor (core poverty) are widespread in all the communities selected for this study (typical rural and urban or semi-urban communities). One characteristic that is common to all the communities is that the core poor are found mostly in rural areas that are predominantly agrarian. Hence, all the communities where the core poor are found are either large farm settlements or enlarged camps for agrarian related activities, fishing communities and landlocked terrains.

5.5 Where are the Moderately Poor?

The Table 13 displays the various LGAs and the communities/percentages of the population of the moderately poor. The moderately poor households are widely distributed across all the LGAs of the District. However, the distribution of the moderately poor varies from one Local Government Area to the other with a larger concentration in Aniocha South.

5.6. Watts Index: A Measure of Poverty Depth

Table 14 shows the depth of poverty for all the LGAs. Poverty depth is measured by applying the Watts index which also measures the severity of poverty. The Watts index as a requirement for adequate and satisfactory poverty index means it must be relatively static. The index must conveniently reflect any positive change in the income of the non-poor households as poverty reduces or at least alleviating. The index must satisfy the transferability condition which states that any form of inequality reducing transfer(s) among the poor households should indicate a concerted reduction or elimination of poverty. The index is usually expressed as a percentage. The Watts index for District of 30.56 percent implying that on the average, about 30% of the population in the District lie below the poverty line. Most of the LGAs indices are lower than the District average and hence, poverty spread in the District is relatively not profound.

5.7. Headcount Index: A Measure of Poverty Rate

The headcount index (Po) is an indicator of poverty that measures the proportion of the households that are categorized as poor. The headcount index clearly shows the incidence and the disparities of poverty across LGAs in the District.

Table 15 shows that the average poverty rate for Delta is 69.37 percent. This means that about 70 percent of the population falls under the non-poor category. Most of the LGAs have poverty rates that are higher than the District average poverty rate.

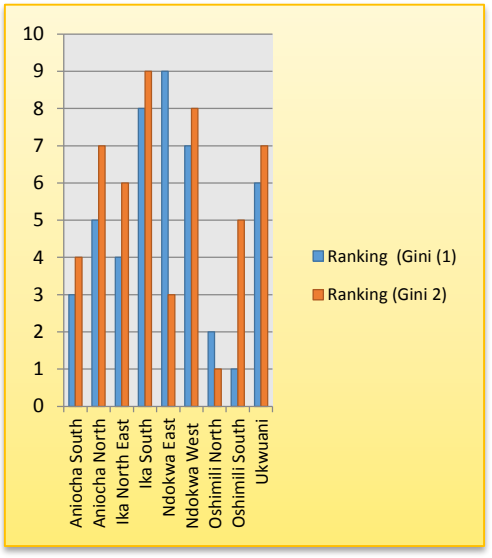

Figure 12: Gini Coefficients of Poverty Risk.

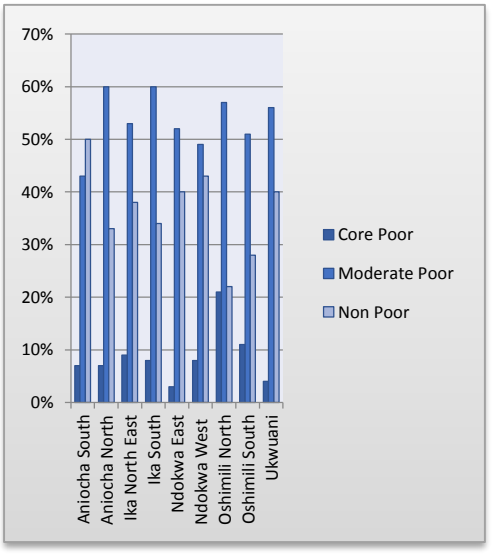

Figure 13: Typology of Poverty Based on Food Poverty and Relative Incidence of Food Poverty

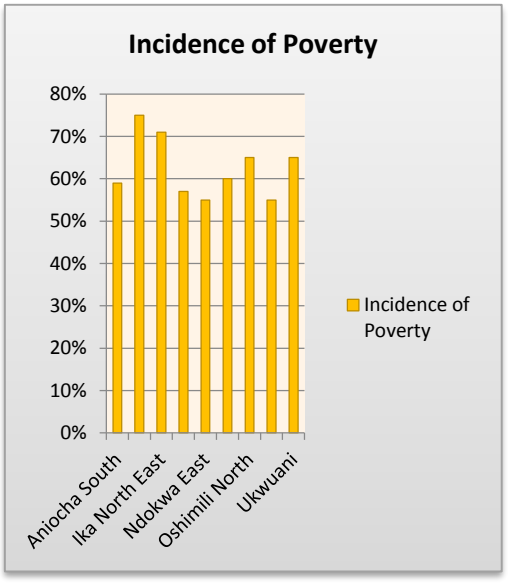

Figure 14: Incidence of Poverty according to Monthly Mean Expenditure

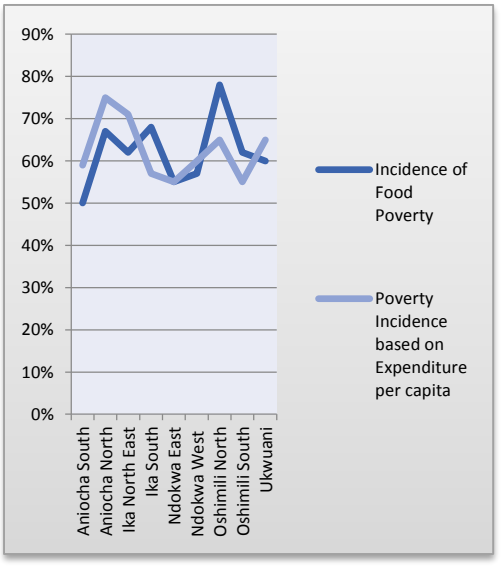

Figure 15: Incidence of food poverty and poverty incidence based on expenditure per capita

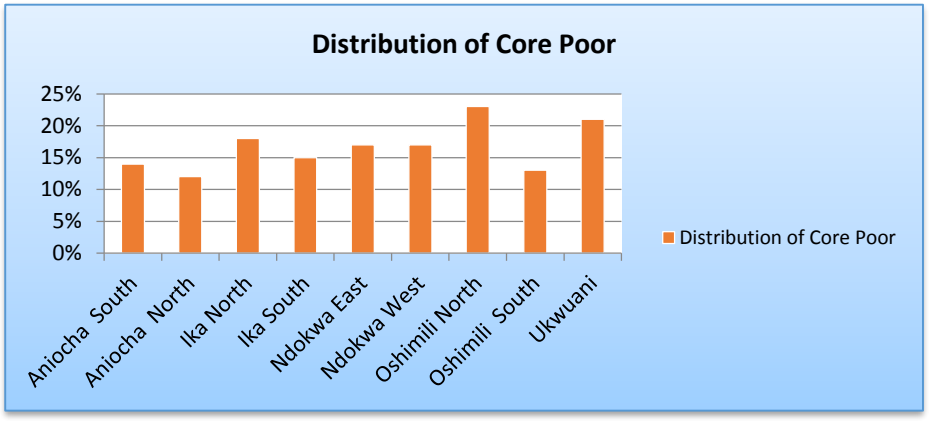

Figure 16: Distribution of Core Poor

Table 13: Distribution of Moderately Poor People

LGA	% Moderately Poor
Aniocha North	27%
Aniocha South	60%
Ika North East	44%
Ika South	58%
Ndokwa East	53%
Ndokwa West	56%
Oshimili North	54%
Oshimili South	52%
Ukwuani	

Source: Survey, 2014

Table 14 Watts Index for the 8 LGAs

S/N	LGA	Watts Index (%)
1	Aniocha South	20
2	Aniocha North	52
3	Ika N	16
4	Ika South	64
5	Ndokwa East	24
6	Ndokwa West	27
7	Oshimili North	22
8	Oshimili South	26
9	Ukwuani	24

Source: Survey, 2014

5.8 Foster-Greer-Thorbecke (FGT)

Finally, The Foster-Greer-Thorbecke (FGT) Poverty decomposition measure shows that there are more females (about 61 percent) who are below the poverty line than males in district implying there are more poor females than males as inferred from Table 16.

Table 15: FGT (Poverty Decomposition)

LGA	Head Count Index	Population Share	Absolute Contribution	Relative Contribution
Aniocha South	0.75541455	0.02353129	0.01777588	0.03130298
Aniocha North	0.70277023	0.02471532	0.01736919	0.03058681
Ika North East	0.74741107	0.02286720	0.01709120	0.03009727
Ika South	0.80065900	0.02499846	0.02001524	0.03524644
Ndokwa East	0.92451560	0.03825958	0.03537158	0.06228866
Ndokwa West	0.87588519	0.02762391	0.02419537	0.04260758
Oshimili North	0.64860910	0.05274077	0.03420814	0.06023987
Oshimili South	0.23948531	0.05361077	0.01283899	0.02260922
Ukwuani	0.54894179	0.03891852	0.02136400	0.03762159
Total	**69.37**	**1.0**	**0.61786543**	**1.0**

Source: Derived from Survey, 2014, using DAD (Version 4.6).

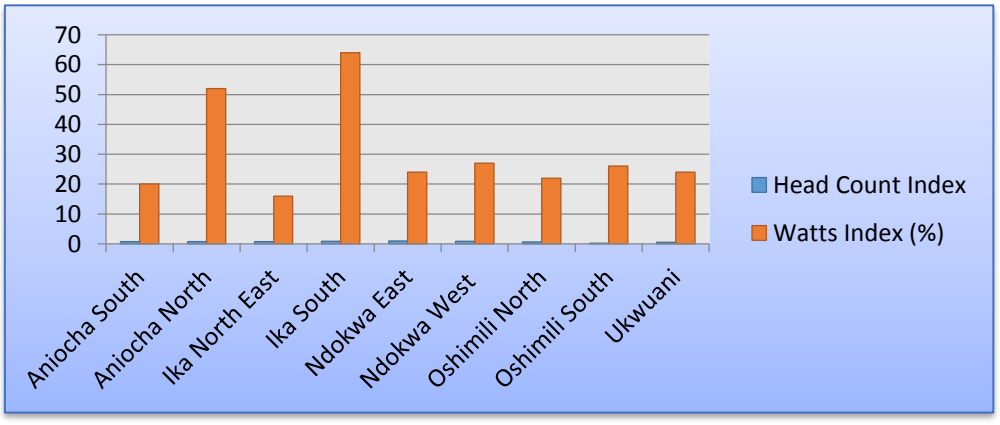

Figure 17: Plot of Headcount index and Watts Index

5. SUMMARY AND RECOMMENDATIONS

Worsening socio-economic conditions and living standards of people in most developing countries is one reason which underlined the focus on a global partnership to reduce extreme poverty as espoused in one of the Eight Millennium

Development Goals (MDGs) developed as part of the Millennium Declaration, pledged by all 191 nations to be accomplished by the year 2015. As a result of this in the last two decades efforts of governments in developing countries and the development partners have been geared toward eradication of poverty. The extent to which the task on poverty alleviation for sustainable economic development has been achieved, informed the Delta State Government in Nigeria to Commission series of studies in May, 2014 of which this paper is a by-product. The study aimed at achieving this task ascertaining and understanding the severity and depth of poverty, its incidence and causes, and to identify communities and LGAs that are more prone to poverty by examining the Socio-Economic Profile and Poverty of Delta State. The emphasis of this paper however, is on 9 LGAs of Delta North Senatorial District of the State.

The data used in the study is predominantly primary in nature and are derived from an in-depth and on-the-spot interview of household to household heads using a structured questionnaire in the period June to August, 2014. The sample size chosen for this analysis is 1,350 households (with 10 communities selected from each LGA and 15 households selected from each community). DAD software version 4.6 and IBM SPSS version 21 were used for the analysis. Some recent system innovation instruments used in analyzing poverty issues are the Lorenz curves and Gini coefficients. Lorenz curves and Gini coefficients are computed in order to measure the degree of inequality in income distribution among the 9 LGAs in the Zone. Specifically, the poverty indicators computed include the Poverty Head Count Ratio/Poverty Incidence; the Disparity in Income Distribution Index; Measure of Relative Poverty, and the Dollar per Day, respectively to examine the socio-economic conditions, poverty and inequality of the senatorial district. The analysis of results indicates that female-headed households tend to earn less income, compared to male-headed households; implying that female-headed households are more likely to be in poverty, compared with male-headed households in the district. Second, household expenditure tends to be in excess of declared household income, suggesting that households have other coping strategies outside primary and secondary employment avenues, or they may be living on implicit resources, or they might be dis-saving. Third, the monthly households mean expenditure in the district is computed at N13, 386 for an average household size of 5 for the entire sample and which is about N2, 677.2 per capita per month, or N89.24 per capita per day, or simply US$0.45 per capita expenditure per day. In addition, the communities in the district are mainly rural and agrarian.

Fourth, the level of educational attainment tends to increase household expenditure. If current expenditures reflect greater potential of higher income

due to greater educational achievements, it could be deduced that lack of education predisposes households to poverty and makes them more vulnerable to the risk of remaining in poverty. Conversely, the more educated is head of the household, the more likely is he/she being able to move the household out of poverty. Fifth, although food poverty remains a problem in developing countries, generally speaking, the senatorial district is on the path to eradicating core food poverty. The overall Gini (2) estimate for the District is 0.343 suggesting that about 34 percent of the households in District control less than 24 percent of total household expenditure among the samples covered in the study using Oshimili South as the District proxy.

Based on the headcount index, the average poverty rate for district is 69.37 percent. This implies that about 31 percent of the population falls under the non-poor category. Most of the LGAs have poverty rates that are higher than the senatorial average. Finally, The Foster-Greer-Thorbecke (FGT) Poverty decomposition measure shows that there are more females (about 61 percent) who are below the poverty line than males in district implying there are more poor females than males.

6.1 Recommendations

The following recommendations are suggested, based on the findings of the study:

First, to bridge the gender poverty gap of household heads, women should be brought into the mainstream of economic activities at both the rural and urban levels. One reason for this gap is not unrelated to educational attainment and as such, women's participation in specialized training programmes is recommended. This would improve the living and socio-economic conditions of women. Second, there should be deliberate public policy efforts tailored at financial inclusion of rural dwellers in the development space. This is important in the enhancement of agricultural productivity and value addition of the agrarian communities. Equally paramount is the political will at all levels of government sustain and develop the educational sector, so as to facilitate greater access by the people to education at all levels. The more educated the people are, the greater is their income earning capacity. Finally, since poverty is relatively more endemic in the rural communities of the district, greater attention in the design and implementation of pro-poor development strategies should be directed to such communities. To accomplish this, geospatial technology which is an amalgam of inter-related systems and tools used to analyze, manage, store, or retrieve and present visualize spatial data even in a disaggregated format should be used as a technological innovation to formulate policies to eradicate poverty.

It also enables pundits to identify, measure incidence, depth and severity of poverty. The geospatial technology field is inter-disciplinary and consists of three areas: (a) geographic information systems (GIS); (b) remote sensing; and (c) global positioning system (GPS). The application of GIS enhances the geographic disaggregation of information by plotting such information on maps.

REFERENCES

Alkire, S. (2002), *Valuing Freedoms. Sen's Capability Approach and Poverty Reduction*. Oxford: Oxford University Press.

Alkire, S. (2008) "Choosing Dimensions: The Capability Approach and Multidimensional Poverty", In N. Kakwani and J. Silber (eds), *The Many Dimension of Poverty.* New York: Palgrave Macmillan 89-119.

Alkire, S and Foster James (2011), Counting and Multidimensional Poverty Measures", OPHI Working Paper 7

Alkire, Sabina & Foster, James (2011), "Understandings and misunderstandings of multidimensional poverty measurement". *The Journal of Economic Inequality*. 9(2): 289-314.

Anyanwu, J.C. (2012), "Accounting for Poverty in Africa: Illustration with Survey Data from Nigeria". *Working Paper 149*. African Development Bank, Tunis, Tunisia.

Atkinson, A. B., (1987) "On the Measurement", Econometrica 44 (4): 749-764.

Atubi, A. S. Efe and Akpokvwovwor, (2014), "Poverty Analysis Rosk and Vulnerability and Facilities Mapping in Delta State", Unpublished Report.

Chakravarty S. (1983), "A New Index of Poverty", Mathematical Social Sciences, 6(3): 307-313.

Foster, J., J. Greer, and Thorbecke, E. (1984), "A Class of Decomposable Poverty Measures", Econometrica 52(3), pp. 761-776.

Foster, J., J. Greer, and Thorbecke, E. (1984), "A Class of Decomposable Poverty Measures", Econometrica, 52 (3), pp. 761-776.

Gaffikin, L., J. Ashley and P.D. Blumenthal (2007), "Poverty Reduction and Millennium Development Goals: Recognizing Population, Health, and Environment Linkages in Rural Madagascar" *MedGenMed.* 9(4): 17.

Goulden C and C. D'Arcy (2014), "A definition of Poverty", Joseph Rowntree Foundation programme paper Anti-poverty strategies for the UK. https://www.jrf.org.uk/file/46780/download?token=NkTSFAsD[12-06-2014].

Inoni, E. (2010), Economic Analysis of Yam Beetles (*Heterolygus Meles*, BILLB) Infestation in the North Agricultural Zone of Delta State, Nigeria. *Agriculta Tropica Et Subtropica*, 43(4): 241-247.

Leigh N. and S. Lee (2005), "Philadelphia's Space in between: inner-ring suburb Evolution", Opolis 1(1): 13-32.

Li L., J. Henry and T. Davis (1999), "Integration of Statistics and geography: Statistical Canada's use of Geostatistical Data and GIS", Statistical Journal of the UN: Economic Commission for Europe 16(1): 49-58.

McGillivray M. and M. Clark (2007*), Understanding Human well-being: Analytical Approaches*, Tokyo: United Nations University Press.

Nussbaum (2003), "Capabilities as Fundamental Entitlements: Sen and Social Justice", *Feminist Economics*, 9(2/3): 33-59.

OPHI (2014), *Measuring Multidimensional Poverty: Insights from Around the World*. Oxford: University of Oxford.

Ravallion, M. (1992), Poverty Comparison: A Guide to Concepts and Methods, Washington DC: The World Bank.

Rogers D., Emwanu T. & Robinson, T. (2006), "Poverty mapping in Uganda: An analysis using remotely sensed and other environment data", *Pro-Poor Livestock Policy Initiative (PPLPI)*, Working Paper Number 60. Rome: Food and Aggriculture Organisation of the United Nations (FAO).

Sen A. (1992), "Inequality Re-examined", New York: Russell Sage Foundation.

Unwin D., and A. Unwin (1998), "Exploratory Spatial Data Analysis with Local Statistics", Journal of the Royal Statistical Society, Series D, 47(3):415-21.

Zheng B. (1997), "Aggregate Poverty Measure", *Journal of Economic Surveys,* 11:123-162.

DO MARKET SENTIMENTS DETERMINE THE NAIRA EXCHANGE RATE? EVIDENCE FROM NIGERIA

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Abstract

The study investigates the role of market sentiments in the determination of the Naira-dollar exchange rate. Using monthly data covering the period 2005M01 to 2013M09 and the Bid-ask-Spread at the foreign exchange market as proxy for market sentiment, the study employes a hybrid-model incorporating non-fundamental factors in the standard exchange rate determination model. The key question addressed is whether market sentiment is significant in determining the Naira-Dollar exchange rates. The results indicate that the market sentiment variable is significant at 1 per cent level. In addition, the inclusion of the market sentiment variable improves the overall robustness of the model in terms of the goodness-of-fit statistics. The important conclusion from the findings is that, the Naira-dollar exchange rate is determined not only by economic fundamentals as contained in the standard literature, but also by non-economic fundamentals such as the market sentiments/expectations.

Key words: Financial Market, Market Sentiment, Error Correction Model, Bid-ask Spread

JEL Classification: E44, D84, C22, E49

1. INTRODUCTION

Exchange rate management has become a contemporary issue in economic discussions in recent times, as indicated by an upsurge in the literature and rise of interest among policy makers, political analysts and academic researchers for a better understanding of the factors behind movements in exchange rates. This has made exchange rate to assume centre stage in contemporary economic management and policy, especially in economies where high volatility in rates has created distortions in the economy.

High volatility in a country's exchange rate is treated with great concern because of its pervasive effects on all sectors of the economy. The private sector operators including those in the financial markets are concerned about the impact of exchange rate fluctuations on their portfolios, which could result in capital gains

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or losses. In the same vein, public policy-makers charged with the overriding consideration of improving social and economic welfare of the people, are also concerned about the consequences of exchange rate movements on maintaining price stability and other macroeconomic goals such as reduction in unemployment, sustainable economic growth and strong external reserves position, among others.

In Nigeria, the management of the exchange rate remains one of the key challenges of the central bank. As in most developing economies, exchange rate index in Nigeria is one of the most volatile macroeconomic indices, swinging sharply in response to policy pronouncements and key macroeconomic developments. In particular exchange rates in Nigeria have been most volatile during periods of economic crisis, reflecting uncertainties in the economy. In addition to macroeconomic fundamentals, exchange rates in Nigeria tend to respond to news and information in the market resulting in swings in the rates reflecting intra-day activities in the market. Several studies have documented the key drivers of exchange rates in Nigeria. Most of these studies, however dwell on economic fundamental, which no doubt are predominant factors in the long run, (Agu, 2002; Omoruyi, 2004; Obadan, 2006; Bakare and Olubokun, 2011; Adesoye, 2012).

A number of studies have emphasized the crucial role played by non-fundamental factors such as market sentiments in explaining exchange rate movements (Haushofer, Moser, Schardax, and Unger (2005, Lyons 2002, Evans and Lyons 2004 Rebitzky, 2006; Yu, 2010). Empirical studies on significance of market sentiments as a determinant of exchange rate movement in Nigeria is scanty. This study is an attempt to contribute to this discourse. In particular the study aims at investigating the role of market sentiment as a determinant of exchange rate movements in Nigeria. Key questions addressed in this study include: whether market sentiment is a significant determinant of exchange rates in Nigeria. What is the relative importance of these factors (macroeconomic fundamentals and market sentiments) in explaining exchange rate movements? What policy inferences could be drawn from the knowledge of these relationships? Answers to these questions may upscale understanding of key determinants of exchange rate movements in Nigeria. Understanding what drives movements in foreign exchange rate and their dynamic interaction with the economy is a critical first-step in maintaining stability in that market. In addition, understanding the roles played by market sentiments in foreign exchange rate

determination in Nigeria would broaden the knowledge of foreign exchange rate dynamics in Nigeria and assist policy makers in stabilizing the market.

The rest of the paper is organized as follows: following this introduction, section two discusses exchange rate management in Nigeria. Section three contains the literature review while section four discusses the theoretical framework and methodology for the study. In section five, the results of the empirical analysis are discussed while section six contains the concluding remarks.

2.0 EXCHANGE RATE MANAGEMENT IN NIGERIA

Nigeria practiced different exchange rate regimes at different periods reflecting her level of development and macroeconomic conditions at each time. The key considerations behind the evolution of Nigeria's exchange rate regimes in Nigeria include: the macroeconomic objectives of government, the level of development of the financial sector, the structure of the economy, developments in the balance of payments, among others. In general, policy makers would adopt the exchange rate arrangement that guarantees optimal attainment of set objectives and the most desirable impact on policy targets. The periodicity of the exchange rate regimes in Nigeria include – fixed exchange rate system from 1960 through July 1986, dual exchange and its variants (1986-1998) and managed or dirty float from 1999 till date.

2.1 Fixed Exchange Rate Regime and its Variants: 1960 – July 1986

The fixed exchange rate regime in Nigeria corresponded with the era of exchange control, which was backed by the Exchange Control Act of 1962. Economic considerations were the basis for the adoption of a fixed exchange rate regime from independence till deregulation in 1986. These considerations included the need to: adjust the demand for foreign currencies to their supply, maximize the use of available foreign exchange by ensuring that essential imports of goods and services for development are given priority and lastly to ensure a rapid build-up of the country's reserves. The Act was also complemented with ad hoc administrative measures designed to ensure that the macroeconomic objective of maintaining external viability was achieved.

Exchange rate of the domestic currency was administratively determined by pegging the Nigerian currency to the pound sterling from 1962-1972 on a ratio of 1:1 or at parity. This parity was discontinued in June 1972 when the pound sterling was floated but the fixed relationship with the dollar continued. From this period the sterling rate of the Nigerian pound was determined through the floating sterling/dollar cross rates.

In 1973 the US dollar was devalued by 10.0 per cent, and Nigeria followed suit to maintain the naira (introduced in January 1973) to dollar rate. The devaluation was also done to ensure that the local currency value of exports did not fall, protect the domestic products from excessive competition from imports and discourage increased outflow of capital.

An appraisal of the fixed exchange regime or the exchange control system adopted prior to Structural Adjustment Programme (SAP) showed that it induced an overvaluation of the naira exchange rate giving vent to massive importation of finished goods with the attendant adverse consequences for the nation's external reserves and domestic production of manufactures. In addition, the period was bedeviled by sharp practices perpetuated by end-users of foreign exchange, which included over-invoicing of imports, under-invoicing of exports and administrative corruption. These and many other problems facing the economy informed the need for the adoption of the market-determined exchange rate regime, the Second-Tier Foreign Exchange (SFEM), in 1986.

2.2 Deregulation of the Exchange Rate in 1986

In September 1986, the management strategy of Nigeria's exchange rate, changed from a fixed regime to a deregulated regime under the Second-tier Foreign Exchange Market (SFEM). The SFEM was the institutional framework embedded in the economic reform programme, called, Structural Adjustment Programme (SAP), that was meant to achieve a realistic exchange rate. It was an auction-based market system of exchange rate determination. Since the inception of the SFEM, exchange rate management policies and strategies have been constantly fine-tuned. The different exchange rate variants adopted so far under the dual regime included:

The second-tier foreign exchange market (SFEM) operated in 1986 through 1987, involved two different rates operated side by side in the market. Pre-SFEM or official rates for transactions such as debt service payments, contributions to international organizations and the expenses of Nigerian embassies abroad. Other transactions were settled at the second-tier market (SFEM). The second-tier rate was determined by auction at the SFEM. The exchange rate determination methods changed from the average pricing method (1986/87) to the Dutch Auction System (1987). These methods were not flawless as they created the problem of multiplicity of rates mainly in the DAS, while the exchange rate further depreciated.

Unified exchange rate under the Foreign Exchange Market (FEM), was introduced in July 1987 with the merger of the first-tier and second-tier rates. Consequently,

all transactions were subjected to market forces. The merger also increased demand pressure and led to the continued depreciation of the naira exchange rate between July and November 1987.

2.3 Floating Exchange Rate Regime

Full deregulation of the exchange rate system was achieved in March 1992 when the IFEM rate was merged, thereby narrowing the parallel market premium. Under the arrangement, the CBN bought and sold foreign exchange in the market as well as meeting completely the demands of authorized dealers. Renewed demand pressures, destabilizing speculative activities and rent-seeking characterized the market resulting in another round of widening parallel market premium. The need to correct these distortions and especially deepen the autonomous supply source, led to the current dispensation the Inter-bank Foreign Exchange Market (IFEM) on October 25, 1999.

The Inter-bank Foreign Exchange Market (IFEM) is a two-way quote system expected to broaden and deepen the foreign exchange market on a daily basis and discourage speculative activities. It was also meant to be purely private sector funded with the CBN only playing an intervention role to set the market on course and ensure that the rates do not deviate from pre-determined bands that would be derived using the purchasing power parity model. Exchange rate under IFEM is determined by market forces but guided through the setting of a band that prescribes the margin of fluctuation on both sides of the predetermined exchange rate.

3.0 LITERATURE REVIEW

While there exists a lot of evidence, which shows that exchange rates are linked to fundamentals in the long run (MacDonald and Taylor, 1994; Mark, 1995), the findings in the empirical literature that exchange rate models fail to outperform naïve (random walk) forecasts over shorter-term horizons (Cheung, Chinn and Garcia Pascual, 2005) suggest that perhaps more factors than economic fundamentals may be motivating movements in exchange rates. The findings of Meese and Rogoff, (1983) and Froot and Thaler, (1990) suggest the difficulties in using only macroeconomic fundamentals to explain exchange rate movements.

Thus, the alternative view is that exchange rates are determined, at least in part, by market sentiment (Menkhoff and Rebitzky 2007). The behaviour of participants in the foreign exchange market is based largely on expectations. As rational economic agents, buyers and sellers in the foreign exchange market expects a

particular price of the currency in the future that can maximize their profit and tend to behave in such a way that their expectations are realized.

In an attempt to determine the factors that could be responsible for substantial appreciation of EUR/USD exchange rate between 2002 and 2003, Haushofer, et al (2005) find both economic fundamentals and non-fundamental factors to have played vital roles. With regard to the fundamental factors, it was revealed that the accommodating stance of US monetary policy coupled with the increasing current account deficit contributed to the depreciation of the US dollar and the appreciation of the Euro.

Another factor that had considerable dampening effects on market sentiments and thus, stress on the US dollar was the accounting scandal in the US stock market as well as concerns arising from possible outbreak of wars and terrorism attacks.

With respect to non-fundamental factors, the authors find that trend analysis by market watchers could shape the behaviour of economic agents in the foreign exchange market. While the study helps in attributing the direction of movement in EUR/USD exchange rate to both fundamental and non-fundamental factors, it does not explain the extent of this movement and the relative contribution of these factors in determining the EUR/USD exchange rate during the review period.

Using a threshold vector error correction model, Rebitzky (2006) finds that sentiment is rather long-term anchored and connected to mean-reversion depending on the differences between exchange rates and PPP-rates. Furthermore, he observes that sentiments are affected by bond rates, though in different dimensions depending on the time frame.

Yu (2010) finds that returns on foreign exchange can be predicted by the forward premium (i.e., the interest rate differential). The study notes that investor sentiment is significant in predicting returns on foreign exchange. For many currencies, it is observed that the inclusion of both forward premium and investor sentiment improves the R^2 of the regressions. Corroborating these findings, Delong et al. (1990) shows market moods and sentiment, are significant in explaining changes in the exchange rates.

Safa and Maroney (2012) analyze spot foreign exchange bid-ask spread and the future market sentiment as two important variables to explain the exchange rate returns. They use two sentiment indices based on futures market return and volume. Time series and cross-sectional analyses of three different currency

exchange rates; Australian Dollar, British Pound and Canadian Dollar – to US Dollar suggest that the spot market bid-ask spread is one important variable that positively affects the spot exchange rate returns. The return based sentiment index does not seem to be a significant factor, but the volume based sentiment index affects the spot exchange rate returns significantly. The negative sign of sentiment indices implies lower spot market return associated with higher investor interest in futures market, although higher trading in futures market contributes positively in the spot market.

Taylor (2006) suggests open interest as the preferred measure of sentiment in the options market as they argue that the open interest of options is the final picture of sentiment at the end of the day or the week and is therefore likely to have better predictive power for volatility in subsequent periods. Open interest is the total number of future contracts entered into, but not yet offset, by a transaction or delivery. That is open interest is the sum of positive net positions in each contract across traders. Chen, Cuny and Haugen (1995) test a theoretical model of basis and open interest of stock index futures. They find that increased volatility decreases basis and increases open interest. Bessembinder, Chan and Seguin (1996) analysed open interest as an important factor analyzing foreign exchange return and finds that in a rising foreign exchange future market, trading volume varies positively with open interest – the divergence of trader opinion.

While the study commends the pioneering efforts of these studies, it is important to note that most of these studies concentrate on the advanced economies of America and Europe. Little evidence on the subject exists for the emerging market economies. In particular, there is hardly any empirical study investigating the importance of market sentiment in exchange rate determination in Nigeria. This, therefore, is among the first efforts at empirical modelling of sentiment as a determinant of exchange rate in the country.

4.0 THEORETICAL FRAMEWORK AND METHODOLOGY

4.1 Theoretical Framework

Theoretical literature suggests several frameworks for the study of exchange rate determination. In the study, the analysis is anchored on the Purchasing Power Parity (PPP) framework, which lends itself to empirical observations in developing and emerging market economies. The PPP, by pricing goods in the same currency helps compare their values across countries (Pilbeam, 1998). The PPP theory is built on the law of one price (LOP) which states that trade and effective arbitrage in the goods market could result to identical prices across countries in

the absence of a competitive market structure, transport costs, quotas and other stringent trade conditions. The testable version of the absolute PPP is given by:

$$s_t = \beta_0 + \beta_1(p - p^*)_t + \varepsilon_t \text{.....(1)}$$

Where s_t, p and p^* are the natural log of nominal exchange rate, domestic and foreign price indices respectively while ε_t is the error term. This version of the PPP states that' the price of a common basket of good in the two countries will be the same at all times because of costless spatial arbitrage or zero transportation cost. . In equation (1), β_0 is the logarithm of the exchange rate observed in the base period whose presence according to Krichene (1998) is justified on two grounds. First, the transportation costs, tariff and non-tariff barriers leads to market segmentations and creates a wedge among prices across countries. Second, the use of a constant was also necessary when prices are in terms of indices.

The absolute PPP theory, posits that, a rise in the domestic price level caused by expansionary monetary policy could lead to depreciation of the nominal exchange rate. This proposition is however valid in a condition when $\beta 0 = 0$ and $\beta 1 = 1$. It should also be noted that the common basket of goods which is valued in a common currency could be affected by real factor.

However, owing to the inclusion of trade impediments such as transport costs, official intervention in the foreign exchange market and other conditions, the restriction that $\beta 0 = 0$ is relaxed and $\beta 1 = 1$ to accommodate measurement related errors. The coefficients of the estimated parameters in equation 1 are biased and exhibited an usual t-distribution due to the non-stationary behaviour of general price levels and the nominal exchange rates. As a result, the cointegration tests of PPP are usually devoid of any imposed restrictions on the estimated coefficients in equation 1.

In reality, the equilibrium price of a good may be different when valued in a common currency due to the wedge between prices across countries which is caused by transport costs, information asymmetry and protectionism. Furthermore, availability of non-traded goods tends to hinder arbitrageurs from exploiting profitable investment opportunities. Also, price differences in similar goods observed across countries are due to the non-traded neutrality of money in the short-run. The observed price differences may simply be a reflection of difficulties encountered in the instantaneous and costless shifting of commodities and does not necessarily imply market failure. Despite these distortions, the relative PPP is expected to hold. The testable version of relative PPP is given by:

$$\Delta s_t = \alpha_0 + \alpha_1(\Delta p - \Delta p^*)_t + \varepsilon_t \text{.....(2)}$$

Where, Δ is the first difference operator. For the relative PPP to hold the coefficient restrictions $\alpha_0 = 0$ and $\alpha_1 = 1$ must not be rejected. If these restrictions hold then relative PPP argues that the rate of change in exchange rate is equal to the inflation differential among two countries (Cassel, 1918).

The absolute PPP in equation (1) shows comparative prices in different currencies in a given location and common basket of identical goods. Owing to the fact that the PPP hypothesis is regarded as a theory of exchange rate determination, hence, its validity may depend on the degree of the exchange rate flexibility. The absolute PPP cannot be tested empirically if comparable data are not available, particularly, on the price levels across countries. However, Bhatti (1996) has pointed out that the distinction between absolute and relative PPP becomes practically impossible because the domestic and foreign price levels are inevitably measured in relative terms by assuming unit price in some base year.

In terms of analysis of time series properties, co-integration has been found to be the most useful tool for testing the PPP hypothesis as a long-run relationship. Many economists still hold the view that over the long-run, relative prices may move in proportion to the changes in the nominal exchange rate, so that the real exchange rate will revert to parity. If the variables entering equation (1) are non-stationary, then PPP is tested first by testing the cointegration between s and $(p - p^*)$, and then testing the coefficient restrictions. If $s = I(1)$ and $(p - p^*) = I(1)$ then the necessary condition for absolute PPP to hold is that $\varepsilon_t \approx I(0)$, while the sufficient condition is that $(\beta_0, \beta_1) = (0,1)$

$$\Delta s_t = \gamma + \sum_{i=0}^{k} \alpha \Delta s_{t-1} + \sum_{1=0}^{k} \beta_i \Delta(p - p^*)_t + \rho EC_{t-1} + \omega_t \text{.....(3)}$$

Where ρ is the speed at which the deviations from the PPP are corrected, where $\rho < 0$ indicates a reduction in the exchange rate in the current period. A negative and significant error-correction coefficient indicates the tendency for the exchange rate to revert to its long-run equilibrium path. When $\rho = 0$, it shows no statistical relationship between the exchange rate and the deviation from PPP. In this case there is no tendency for the exchange rate to revert back to its long-

run equilibrium[14]. While $\rho > 0$ implies that the exchange rate is greater than its long-run equilibrium path.

From the review of both theoretical and empirical literature, it is clear that the analysis of sentiments in foreign exchange markets has grown with the availability of data on what should represent the sentiments of participants in the foreign exchange market. The analysis has moved from questions dealing with the degree of market rationality and how sentiments are formed to the forms of expectations heterogeneity. Now with the increasing use of market microstructure approach to the analysis of exchange rates, the focus has shifted towards the influence of market volume or volatility on expectations in exchange rates (Rafael, 2006). From the literature, it is evident that empirical analysis of sentiments has focused more on its influence on equity markets, where it has been established that market sentiments do in fact influence financial prices. Unfortunately, no such corresponding evidence exists on how market sentiments influence the foreign exchange market in Nigeria. The important question for the study is to empirically establish whether there exists a co-integrating relationship between the Naira-Us Dollar exchange rate and market sentiments. This, the study wants to test against the null hypothesis that there is no co-integrating relationship.

4.2 Model Specification

Empirical models of foreign exchange market have generated a lot of interest in the recent time. The conventional approach adopted in modelling exchange rate dynamics assumes that macroeconomic fundamentals are the key drivers of exchange rate movements in both short and medium term horizons. However, many pundits have challenged this view (Mark, 2009; Meese & Rogoff, Haushofer, Moser, Schardax, and Unger (2005). Lyons (2001) is of the opinion that in addition to macroeconomic fundamentals, other variables reflecting non-fundamental factors may also be crucial. Evans and Lyons (2004) propose a framework based on portfolio shifts that incorporate elements from market microstructure. They emphasize that some information necessary for the determination of exchange rates is not publicly available and that market participants and trading mechanism differ substantially in ways that may affect prices (Lyons, 2001). In this context, a variable like market sentiments becomes an imperative element in exchange rate determination (Evans and Lyon, 2002). The model can be stated as follows:

[14] What is implied here is a kind of mean-reversion

$$\Delta s_t = \alpha + \beta \Delta m_t + l \Delta x_t ....(4)$$

Where Δs is the change in the nominal exchange rate, Δm is innovations concerning the macroeconomic information, Δx is a market microstructure variable, α is a positive integer and the subscript t refers to time. The model, which is a kind of hybrid, was found to have performed better in terms of significance, sign and magnitude of the estimate parameters as well as the R^2 (the overall fit of the model) than the traditional models that used macroeconomic variables or fundamental factors only. In a related work, De Mdeiros (2005) makes two modifications to the model and arrives at a modified version of the above equation. First he defines the macroeconomic information increment Δm as the change in interest rate differentials, $\Delta m = (i - i^*)$ plus a white noise random term. Secondly, he replaces the dependent variable with the change in the log of spot exchange rate. With this adjustment, the specification becomes comparable to the standard macroeconomic model taking the form:

$$\Delta s_t = \alpha + \beta \Delta (i_t - i_t^*) + l \Delta x_t + \varepsilon_t ....(5)$$

For this empirical investigation, the above model is adjusted by adding more macroeconomic variables that better explains the specific features of the Nigerian economy; the study then estimates two versions of the model. The first is the traditional macroeconomic model suggested by the PPP framework, while in the second model, the study adds one variable capturing the market sentiment, $Spread$, which is the difference between the highest and the lowest bid at the wDAS/rDAS. The final version of the model is given by equation 6 and 7.

$$D\log S_t = \beta_0 + \beta_1 D\log S_{t-1} + \beta_2 D(i - i^*)_t + \beta_3 D\log m2 + ...$$
$$+ \beta_4 D\log RGDP + \beta_5 DLogCPI + \lambda EC + \omega ....(6)$$

$$D\log S_t = \beta_0 + \beta_1 D\log S_{t-1} + \beta_2 D(i - i^*)_t + \beta_3 D\log m2 + \beta_4 D\log RGDP + ...$$
$$+ \beta_5 DLogCPI + \beta_6 DLogFX\_DD + \beta_7 DLogFX\_SS + \beta_8 Spread + \lambda EC + \varpi_t ....(7)$$

The log-run versions of equations 6 and 7 are estimated and the residuals saved which are then added to the error correction versions of the equations. The Error Corrections versions of equations 6 and 7 are estimated and named "Model 1" and "Model 2", respectively. Each model is estimated using WDAS, interbank and BDC rates as the dependent variable. This enables the study to cover the three segments of Nigerian foreign exchange market. Parameters of model 1 and model 2 are compared in terms of their significance, signs and sizes of the

coefficients, the overall fit of the model in terms of R^2, Akaike and Schwartz Information criteria. The Model with highest R^2 and least Akaike and Schwartz information criteria are interpreted as good and deemed to have outperformed the others.

4.3 Generating Market Sentiment Variable

Sentiment is the net amount of market player's optimism or pessimism reflected in any asset or asset price at a particular time. It is the collection of emotion and bias in determining a price over or under the supposed "value". Market sentiment has been a subject of study by behavioural finance experts, who are interested in the ways that human bias affects prices; Behavioural scientists have found that prices are a combination of fact and emotion. When emotion becomes excessive and prices thereby deviate substantially from the norm, a price reversal usually occurs, i.e. a reversion to the mean. It is thus important for the technical analyst to know when prices are reflecting emotional extremes. Developing a proxy for market sentiment and generating a series for such proxies can be a challenging task in economic analysis. While several authors leveraged on existing surveys in those countries, due to absence of any such survey in Nigeria, we rely on the use of proxy variables as a measure of market sentiment. One such proxy found in financial literature has been the Bid-Ask Spread in the foreign exchange market (Brown and Cliff 2005).

A common sentiment measure in the finance literature is the bull-bear spread, which Osler (2008) defines as, the difference between the lowest price at which one can buy a currency (the bid) and the highest price at which one can sell it (the ask). Also, Admati and Pfleiderer (1988) argue that the price discovery mechanism in foreign exchange market is as a result of adverse selection process. The study develops an asymmetric information model where uninformed traders choose to trade at one time, since this brings low adverse selection costs to dealers and thus low spreads. Bessembinder (1994) find that the spreads widened with foreign currency inventory risk, price risk and liquidity risk and that, high spreads reflects high inventory risk.

4.4 Data Sources

For this investigation, monthly data covering the period 2005M01 to 2013M09 is utilized. In line with extant literature, The following macroeconomic/fundamental variables were included in the model: money supply (M2), price variable represented by the consumer price index (CPI), income represented by the real gross domestic product, (RGDP), interest rate differential computed as the spread between 3-month Nigerian Treasury Bill rate and the 3-month US treasury bill rate

(Interest Diff.), Exchange rates used are the end period spot nominal exchange rates between the Naira and the US dollar at the wDAS, BDC and Interbank segments of the foreign exchange market respectively In addition the proxy for market sentiments (*Spread)* i.e. the difference between the highest and the lowest bids at the auction market, is added. All the macro variables, except the interest rate differential (Int_Diff,) enter the model in their natural logarithmic forms. Table 1 contains the descriptive statistics of all the variables used in the analysis. The table indicates both normal and non-normal distributions of the variables.

5.0 THE EMPIRICAL RESULTS AND ANALYSIS

The results of the analysis using data covering the period 2005 to 2013 are presented below. Table 1 presents the results of the descriptive statistics, which contains useful information about the nature and behaviour of the data series used in our analysis. All the variables except the LRGDP, LCPI, LEXD and INT_Diff are negatively skewed suggesting presence of left tail. Save for the LEXD, all the variables have kurtosis of less than 3 indicating they are moderately peaked. The Jarque-Bera statistic indicates normal distribution for most of the variables

Table 1: Descriptive Statistics

	LBDC	LINTERBANK	LWDAS	LRGDP	LM2	LCPI	LEXDD	LFX_DD	LFX_SS	LSPREAD	INT_DIFF
Mean	4.982109	4.949438	4.943499	10.987660	15.418840	4.565359	0.282093	19.059430	18.777330	-0.887152	6.529024
Median	5.025375	5.004731	4.996149	10.978880	15.535640	4.538960	0.214994	19.090280	18.792240	-0.752367	6.450000
Maximum	5.196460	5.089628	5.065040	11.448190	16.779500	5.003275	2.167337	21.073100	19.859160	2.360264	14.980000
Minimum	4.776559	4.760401	4.768345	10.591950	14.042450	4.109531	-0.783727	16.958230	16.737130	-4.856485	-1.270000
Std. Dev.	0.110404	0.107976	0.103489	0.210693	0.862581	0.265056	0.421719	0.679996	0.646991	1.501273	4.314219
Skewness	-0.507012	-0.336137	-0.339316	0.121142	-0.153184	0.111657	1.853248	-0.330863	-0.275652	-0.165604	0.421975
Kurtosis	2.124693	1.620849	1.579672	2.239909	1.492535	1.678962	9.123247	3.539625	2.508216	2.563781	2.105402
Jarque-Bera	7.850528	10.298800	10.840690	2.784425	10.352620	7.853176	224.141200	3.189707	2.387825	1.312438	6.617443
Probability	0.019737	0.005803	0.004426	0.248525	0.005649	0.019711	0.000000	0.202938	0.303033	0.518809	0.036563
Sum	523.121500	519.691000	519.067400	1153.704000	1618.978000	479.362700	29.619720	2001.240000	1971.620000	-93.150960	685.547500
Sum Sq. Dev.	1.267658	1.212508	1.113846	4.616713	77.380810	7.306461	18.496040	48.088970	43.534090	234.397500	1935.699000
Observations	105	105	105	105	105	105	105	105	105	105	105

5.1 Results of the Diagnostic Tests

An examination of Figure 1 in the Appendix suggests the presence of trend and stationarity issues thereby raising concerns about spurious regression. Therefore

unit root tests on the variables are conducted to ascertain the order of integration of these variables. The method of Augmented Dickey-Fuller (ADF) test is used for this purpose. The results of the ADF tests are reported in Table 1 of the Appendix. As shown in the Table, all the variables are I(1) except the Bid-ask-Spread (Spread) which is I(0). In addition the same test is run for the Error Correction variables and the results indicates that all the error correction variables are I(0), suggesting that error correction model may be appropriate for the analysis.

Two tests were conducted to check for cointegration relationships among the variables. They are the single equation Engel-Granger test and the multivariate cointegration test of Johansen. The Johansen method has the added advantage of suggesting the number of cointegrating vectors in the equation. Tables 2 and 3 of the Appendix report the results of the Engel-Granger test and the Johansen Trace statistic and Maximum Eigen Values tests. The results of both tests indicate evidence of cointegration relationships among three variables in the model, thus establishing long-run relationships.

5.2 Results of the Error Correction Model

The results of the empirical model indicate that all the variables are consistently significant and of the appropriate signs except for the money supply and interest rate differential variables which were eventually removed from the model. For all the segments of the market, the inclusion of market sentiment variable improved the fit of the model, producing estimates that meet the a priori expectations and that are statistically significant.

Tables 5-7 indicate that the inclusion of market microstructure variables, including the Bid-ask-Spread improved the overall performance of the models. Apart that these variables are highly significant with a priori signs, the overall fit of the models improved The R^2 were higher in model two (2) than in Model one (1) for all the three segments of the market; while the Akaike and Schwarz information criteria consistently recorded lower values in model 2 than in model 1, suggesting a better or superior fit for model 2 than model 1. The sums of squared residuals were lower in model 2 than in model 1 indicating smaller estimation errors.

Table 5: Results of Error Correction Models for wDAS rate

Dependent Variable: Wdas	*Model*1	*Model*2
C		
$DLogS_{t-1}$	0.153521***	0.762963***
DInt _ Diff	-0.000330	0.0012745*
DInf _ Diff	-0.000142	0.001844
*DLogM*2	0.003749**	
$DLogRGDP_{t-1}$	-0.022289	0.017940
DLogCPI	(0.423515)**	0.392178***
DLogFX _ DD		0.001317**
DLogFX _ SS		(0.0045822)**
Spread		0.002835***
EC _ wDAS	0.882710	(0.799592)***
R^2	0.432754	0.383693
AIC	-5.716432	-4.739108
SIC	-5.535186	-4.610433
Sum squared resid	0.354687	0.045336

Table 6: Results of Error Correction Models for Interbank rate

Dependent Variable: Interbank rate	*Model* 1	*Model* 2
C		
$DLogS_{t-1}$	0.699387***	0.839702***
DInt _ Diff	-0.000462	0.002235
DInf _ Diff	-0.000137	0.001110
*DLogM*2	0.003567*	
$DLogRGDP_{t-1}$	-0.004598	0.273558**
DLogCPI	0.411275***	0.392178***
DLogFX _ DD		0.011724**
DLogFX _ SS		
Spread		0.002229***
EC _ wDAS (−1)	(-0.798467)**	(0.798467)***
R^2	0.370877	0.454183
AIC	-5.495697	-4.88028
SIC	-5.314451	-4.559353
Sum squared resid	0.473647	0.018334

Table 7: Results of Error Correction Models for BDC rate

Dependent Variable: BDC	$Model1$	$Model2$
C		
$DLogS_{t-1}$	0.256730	0.473880
$DInt\_Diff$	0.881382***	0.7445***
$DInf\_Diff$	0.000004	0.0012745*
$DLogM2$	-0.000571	0.001844
$DLogRGDP_{t-1}$	-0.017201	0.017940
$DLogCPI$	(0.423515)**	(0.32541)*
$DLogFX\_DD$		0.005866**
$DLogFX\_SS$		(0.0045822)**
$Spread$		0.003558***
EC_BDC	(0.657884)***	-0.588183
R^2	0.347929	0.383693
AIC	-4.763093	-4.739108
SIC	-4.760868	-4.610433
$Sum\ squared\ resid$	0.354687	0.045336

5.3 Policy Implications

The overall results suggest that, the spot market bid-ask spread representing market sentiment has significant impact on the Naira/US dollar spot exchange rate in Nigeria. The findings suggest that apart from economic fundamentals which had been portrayed in the standard literature as the major determinants of the Naira-US dollar exchange rate, the role of non-economic fundamentals cannot be ignored. The finding is important as any meaningful Naira/US dollar exchange rate determination model must provide for the inclusion of a market sentiment variable, since it gives a superior explanation of the behaviour of the Naira/US dollar exchange rate. It also means that tot better understand the behaviour of the Naira/US dollar exchange rate, we should incorporate market sentiment dynamics in spot market exchange rate policies. The policy implication of this finding is that the central bank should step up its communication. With more effective communication strategy, the Bank can influence market expectations, thereby reducing negative market sentiment. Negative sentiments are formed when the market does not believe that the central bank can effectively take care of adverse shocks in the market. So the key issue here is central bank credibility and communication. Effective communication can improve central bank credibility and therefore reduce negative sentiment which impacts on exchange rate.

6.0 CONCLUSION

The standard macro-based models of exchange rate have not been able to fully explain the movements in exchange rate between Naira and the US dollar. This study shows that a hybrid model which incorporates non-fundamental variables such as market sentiment in addition to the standard macro fundamental variables present a better fit than models based on macro fundamental variables only. Results show that the inclusion of market sentiment variables improves the model with higher R^2, lower standard errors and lower values for the standard information criteria such as Schwarz in formation and Akaike information criteria. The findings suggest that market sentiment variables are important variables in explaining the behaviour of the Naira/US dollar exchange rate.

The policy implication of the finding is that, the monetary authorities should take into cognizance the role played by market sentiments in the Naira/US dollar exchange rate determination process. If sentiment is an important driver of exchange rates in Nigeria, then the CBN would need to step up communication in order to influence market expectations. Communicating their policies in a transparent manner will help the Central Bank to align the expectations of market participants with the Banks policy objectives and thus reduce negative sentiments in the market.

REFERENCES:

Adesoye, A. Bolaji (2012), "Exchange Rate Policy and Price Determination in Nigeria: Testing the Long-Run Relevance of PPP Model", European Journal of Humanities and Social Sciences, Vol. 14, No. 1. 2012

Agu, C. (2002), "Real Exchange Rate Distortions and External Balance Position of Nigeria: Issues and Policy Options", Journal of African Finance and Economic Development 2002, V 5 2, pp 143-174.

Bakare, Adewale Stephen and Olubokun Sanmi (2011), "The Exchange Rate Determination in Nigeria: The Purchasing Power Parity Option", Mathematical Theory and Modeling**,** Vol.1, No.2, 2011

Bessembinder, H. (1994), "Bid-Ask Spreads in the Interbank Foreign Exchange Markets", *Journal of Financial Economics* 35 (3), 317-348.

Bessembinder, H., Chan, K., Seguin, P. J. (1996), "An Empirical Examination of Information, Differences of Opinion, and Trading Activity", Journal of Financial Economics 40 (1), 105-134.

Chen, N., Cuny, C. J., Haugen, R. A. (1995), "Stock Volatility and The Levels of the Basis and Open Interest in Futures Contracts*", The Journal of Finance* 50 (1), 281-300.

Cheung, Y.-W., Chinn, M.D., Garcia Pascual, A., (2005), "Empirical Exchange Rate Models of the Nineties: Are Any fit to Survive?", *Journal of International Money and Finance* 24, 1150–1175.

DeLong, J. B., Shleifer, A., Summer, L. H and Waldmann, R. J. (1990),"Noise Trader Risk in Financial Markets", *Journal of Political Economy, 98(4): 703-38*.

Froot, Kenneth A., and Richard H. Thaler (1990), "Anomalies: Foreign Exchange", *Journal of Economic Perspectives*, 4(3): 179-192.

Frydman, R. and Goldberg, M. D. (2003), "Imperfect Knowledge Expectations, Uncertainty Adjusted UIP and Exchange Rate Dynamics", in Aghion, P., Frydman, R.

Hopper, G. P (1997), "What Determines the Exchange Rate: Economic Factors or Market Sentiment?*", Business Review***,** Federal Reserve Bank of Philadelphia *September/October,* 1997, pp. 17-29

Khan, Muhammad Arshad and Abdul Qayyum *(2007), "Exchange Rate Determination in Pakistan: Evidence Base on Purchasing Power Parity Theory", Pakistan Economic and Social Review* Volume 45, No. 2 (Winter 2007), pp. 181-202

Lyons Richard (2001), *The Microstructure Approach to Exchange Rates,* MIT Press, Dec. 2001

Lyons Rich and Martin Evans, (2004), "*A New Micro Model of Exchange Rate Dynamics*", Econometric Society 2004, **North American Winter Meeting**s 622, Econometric Society

Lyons Richard (2002), "The Failure of Empirical Exchange Rate Models: Room for Optimism?", *Economic Policy***,** May 2002

MacDonald, R. and Taylor, M. P. (1994), "The Monetary Model of the Exchange Rate: Long-run Relationships, Short-run Dynamics, and How to beat a Random Walk", *Journal of International Money and Finance 13, 276–290.*

Menkhoff, L., Rebitzky, R. R. (2007), "Investor Sentiment in the US dollar: Longer-term, Nonlinear Orientation on PPP", *Discussion Papers***,** School of Economics and Management of the Hanover Leibniz University, No. 376

Meese, Richard A. and Rogoff, Kenneth (1983a), "Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?", *Journal of International Economic**s***, February 1983, 14(1/2), pp. 3-24.

Meese, Richard A. and Rogoff, Kenneth (1983b), "The Out-of-Sample Failure of Empirical Exchange Rate Models: Sampling Error or Misspecification?", in Jacob Frenkel, ed., *Exchange Rates and International Macroeconomics*. Chicago**:** *NBER* and University of Chicago Press,

Obadan, M. I. (2006), "Overview of Exchange Rate Management in Nigeria from 1986 to Date", In the *Dynamics of Exchange Rate in Nigeria*, The *Bullion***,** Central Bank of Nigeria 30 (3), 1-9.

Obstfeld, M., Rogoff, K.S. (2000), "The Six Major Puzzles in International Macroeconomics: Is there a Common Cause?" in Bernanke, B.S., Rogoff, K.S. (Eds.), *NBER Macroeconomics Annual 2000***.** MIT Press, Cambridge, p. 339–390.

Rebitzky, R. R (2006), "Sentiment in Foreign Exchange Markets: Hidden Fundamentals by the Back door or Just Noise? *Centre for European Economic Research (ZEW), April*

Safa M. Faisal and Neal C. Maroney (2012), " Bid-Ask Spread, Futures Market Sentiment and Exchange Rate Returns" *Journal of Economic Cooperation and Development***,** 33, 4 (2012), 63-85

Sarno, L. (2005), "Viewpoint: Towards a Solution to the Puzzles in Exchange Rate Economics: Where do We Stand?", *Canadian Journal of Economics 38(3): 673-708*

Sarno, L., Taylor, M. P. (2002), *The Economics of Exchange Rates*, Cambridge University Press, Cambridge.

Stiglitz, J. and M. Woodford (eds.), *Knowledge, Information and Expectations in Modern Macroeconomics***:** In honor of Edmund S. Phelps, Princeton, NJ: Princeton University Press.

Wang, C. (2004), "Futures trading activity and predictable foreign exchange market movements", *Journal of Banking & Finance* 28 (5), 1023-1041.

Yu, J. (2010), "A Sentiment-based Explanation of the Forward Premium Puzzle", University of Minnesota, September

Appendices

Figure 1: Graph of the Variables used in the Regression

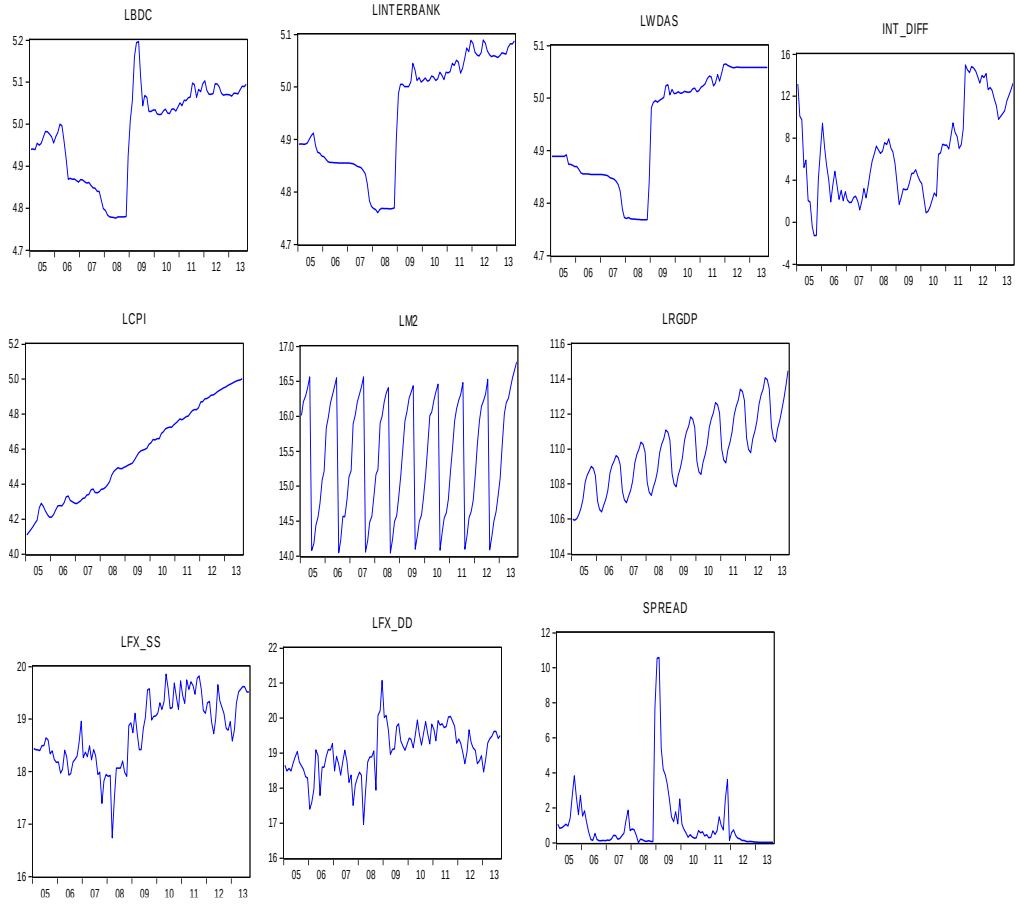


Table 1: Results of the Unit Root Tests

	At Level		At First Difference		
	t-Statistic	p-value	t-Statistic	p-value	Order of Integration
LCPI	-0.446475	0.8959	-6.663124	0.0000	I(1)
LM2	-0.638285	0.8558	-12.679720	0.0001	I(1)
LRGDP	2.572445	1.0000	-3.642190	0.0067	I(1)
Int_Diff	-1.735459	0.4105	-8.557506	0.0000	I(1)
Spread	-3.477567	0.0006	-8.566942	0.0000	I(0)
LFx_DD	0.044464	0.6948	-12.443640	0.0000	I(1)
LFx_SS	0.498593	0.8214	-10.348390	0.0000	I(1)
LwDAS	0.603110	0.8451	-6.518056	0.0000	I(1)
LBDC	0.313569	0.7744	-6.056227	0.0000	I(1)
LInterbank	0.653485	0.8557	-6.315809	0.0000	I(1)
EC_Wdas	-8.434958	0.0000			I(0)
EC_BDC	-6.921478	0.0000			I(0)
EC_Interbank	-8.249195	0.0000			I(0)

Table 2: Engel-Granger Cointegration Test

Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
INTERBANK	-5.318700	0.1155	-44.89420	0.1073
LCPI	-5.209395	0.1421	-56.83349	0.0128
LM2	-1.333976	0.9999	-12.93136	0.9919
LRGDP	-1.536087	0.9998	-10.97588	0.9970
INT_DIFF	-4.965039	0.2148	-32.86128	0.4532
SPREAD	-5.665941	0.0565	-49.32544	0.0528
LFX_SS	-8.208764	0.0000	-82.25802	0.0000
LFX_DD	-8.108973	0.0000	-80.86878	0.0000

Table 3a: Johansen Cointegration Test - Trace

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.832014	348.4111	159.5297	0.0000
At most 1 *	0.454748	170.0238	125.6154	0.0000
At most 2 *	0.392247	109.3731	95.75366	0.0042
At most 3	0.271902	59.57449	69.81889	0.2487
At most 4	0.146274	27.84246	47.85613	0.8205
At most 5	0.064401	12.02802	29.79707	0.9309
At most 6	0.051665	5.371187	15.49471	0.7682
At most 7	0.000664	0.066412	3.841466	0.7966

Trace test
indicates 3

Table 3b: Johansen Cointegration Test - Maximum Eigenvalue

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.832014	178.3873	52.36261	0.0000
At most 1 *	0.454748	60.65067	46.23142	0.0008
At most 2 *	0.392247	49.79860	40.07757	0.0030
At most 3	0.271902	31.73203	33.87687	0.0882
At most 4	0.146274	15.81445	27.58434	0.6815
At most 5	0.064401	6.656830	21.13162	0.9661
At most 6	0.051665	5.304775	14.26460	0.7030
At most 7	0.000664	0.066412	3.841466	0.7966

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

DYNAMIC OLS ESTIMATION OF THE EFFECT OF TRADE ON NIGERIA'S ECONOMIC GROWTH

By Oziengbe Scott Aigheyisi

Abstract

The paper employs the Stock-Watson's Dynamic Ordinarily Least Squares (DOLS) estimation technique and the pairwise Granger-causality test to investigate the effect of international trade on Nigeria's economic growth in the period from 1981 to 2013. The empirical analyses find ample evidence in support of positive and significant effect of trade on economic growth. The Granger-causality test results indicate that trade Granger-causes economic growth in Nigeria. The study also finds that capital formation positively and significantly affects economic growth. Furthermore, the study finds that increase in government final consumption expenditure, currency depreciation and increase in lending interest rate adversely affect Nigeria's economic growth. Based on the empirical evidence, the paper proffers for policy considerations, greater but cautious integration of Nigeria's economy with the global market, massive investment in the non-oil sector to boost domestic output, reduce import demand and hence halt the sharp depreciation of the national currency, reduction in government final consumption expenditure, while increasing capital expenditure, reduction in lending interest rate and creation of enabling environment conducive for expansion of private sector investment in capital formation.

Keywords: International Trade, Economic Growth, Dynamic Ordinary Least Squares

JEL Classification Codes: C22, F43 , O47

1.0 INTRODUCTION

International trade theories predict positive effect of trade on economic growth. The argument is that by opening up their economies to foreign trade (i.e. by integrating their economies with the global market), countries derive several benefits such as having access to improved technology, advanced knowledge and skill, variety of goods and services and global partnership, greater inflows of foreign investment, etc which are needed to catalyze the growth of their economies. A combination of these benefits translates into improved economic growth on the condition that trade openness does not engender dumping – that is increased inflows of foreign goods into the domestic market to the detriment of home country's industrial (particularly, manufacturing) sector. The presumed positive effect of international trade on economic growth is a basic tenet of the export-led growth hypothesis. International trade comprises exports and imports activities. Preponderance of exports (especially of final, manufactured goods, not of primary commodities) over imports in the combination of trade enhances a country's balance of trade position, engenders improved foreign exchange earnings, strengthens the national currency, and ultimately results in sustained higher growth rate for the economy *ceteris paribus*.

However, where there is preponderance of imports (especially of final, consumer goods) and where export comprises mainly of primary (crude) products which have close substitutes and whose demand in the foreign markets is highly elastic, unrestricted trade may be harmful to the growth of the economy. Thus international trade could be seen as a two-edged sword which could be beneficial if well handled, and harmful if not properly handled.

Trade openness has been proffered by the Bretton Woods institutions (the World Bank and the International Monetary Fund), the developed countries and the multinational corporations (MNCs) as a panacea to the ailing economies of Less Developed Countries (LDCs). This prescription is based on the classical theories of trade such as the comparative advantage theory of international trade, and other theories of international trade which suggest that trade between or among nations could be mutually beneficial. However, there has been intense debate on the effect of trade openness on economic growth. While some researchers argue that trade is beneficial to all countries participating in it, and that even some of the erstwhile less developed countries such as those in Asia (China, India, etc) have benefited by it (Rodrik, 1998; Sun and Heshmati, 2010; Ray, 2012; Fung and Peng 2012). Others pundits such as Ndiyo and Ebong (2003), Alaba (2006), Rabbanee, Haque and Hassan (2010) and Crockett (2011) argue, however that trade openness has been detrimental to the growth of the LDCs. The latter group also argues that the developed economies benefit from trade to the detriment of the less developed and poor countries. They contend that by embracing unrestricted trade unprepared, the markets of the LDCs have become dumping grounds for goods from the western world and this has adversely affected their economies. Thus the empirical evidence on the effect of trade on economic growth remain largely inconclusive (Omoju and Adesanya, 2012).

The objective of this study is to reinvestigate the effect of international trade on the growth of Nigeria's economy with a view to recommending appropriate policies that are germane to boosting the nation's economic growth. A major contribution of this study to the extant literature is in its methodology. While known previous studies in this regard adopted the methodologies of ordinary least squares, vector autoregression (VAR), error correction model etc., none to our knowledge has employed the method of Dynamic Ordinary Least Squares (DOLS) proposed by Stock and Watson (1993). This is a robust single equation approach that corrects for regressor endogeneity (arising from cointegrating relationships) and serially correlated residuals. The paper applies the methodology of DOLS to investigate the effect of trade on Nigeria's economic growth in the period 1981 through 2015.

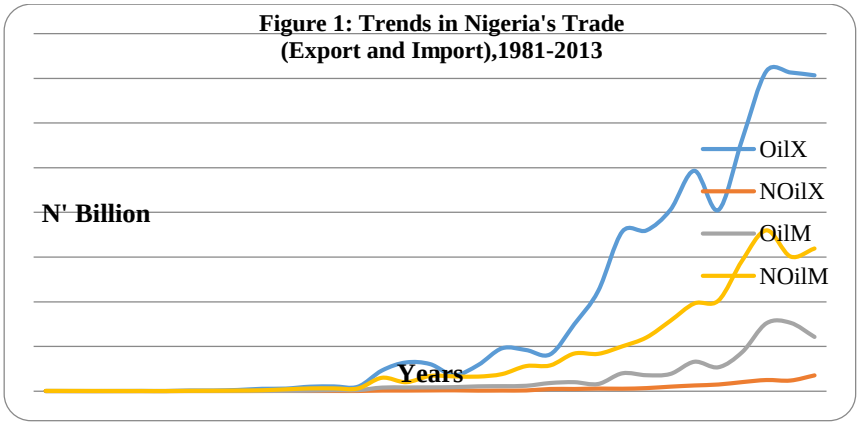
2. SOME BACKGROUND INFORMATION AND STATEMENT OF PROBLEM

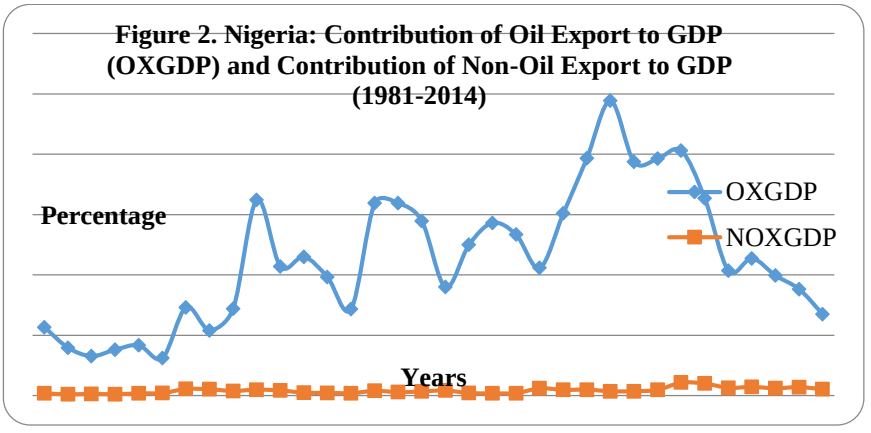
Nigeria embarked on the process of liberalizing her economy in the 1980s. A key measure taken was the adoption of neoliberal economic policies embodied in the IMF-World Bank Structural Adjustment Programme (SAP) introduced in 1986 by the Babangida's administration. Major elements of the SAP policy included trade and financial (capital account) liberalization which sought to integrate Nigeria's economy in the global market and financial system, respectively.

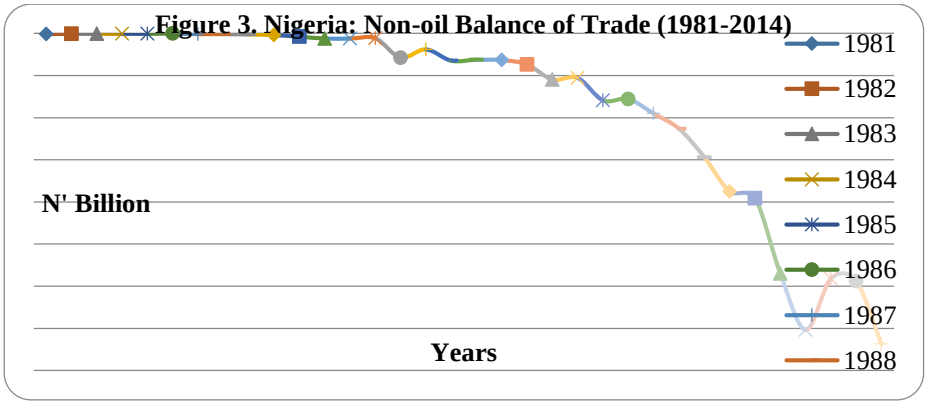
Figure 1 shows the trends in the value of Nigeria's exports (oil export (OilX) and nonoil (NOilX)) and imports (oil import (OilM) and nonoil import (NoilM)). Data from the Central Bank of Nigeria statistical Bulletin 2014 are used to plot the graphs. It may be observed that Nigeria's trade has been dominated by oil exports, a clear indication of the near mono-cultural nature of the country's economy and the fact that oil is its main stay, accounting for over 95% of her export earnings and 70% of her government revenue.

Until recently (about four years ago) when the federal government began to take conscious steps towards diversifying the economy away from the crude oil sector upon the realization that the oil sector could not be wholly relied upon to sustain the economy, and upon the realization that that the non-oil sectors hold tremendous potentials that could be harnessed to drive the growth of the nation's economy, the non-oil sector was almost completely neglected, and its contribution to the nation's economy was quite low compared to the contribution of the oil sector. The gap between the contributions of oil to GDP and that of non-oil to GDP was quite huge (See Figure 2). These raised doubts on the effectiveness of various export promotion strategies and trade policies which the country has implemented over the years in her bid to boost non-oil export performance of the country. Figure 1 shows that Nigeria's trade has been dominated by oil exports. This is hardly contentious considering that the country is a net exporter of crude oil, being one of the world's largest producers of crude oil. The value of non-oil exports in total trade has been regrettably low, attesting to the weakness of the non-oil sector and low level of output arising therefrom. Non-oil import is next only to oil export in the value-composition of Nigeria's international trade. The value of non-oil imports exceeds that of non-oil exports indicating that the country has been a net importer of non-oil products. The observations that oil export earnings consistently exceed nonoil export earnings and that non-oil import consistently exceeds oil import within the period under review buttresses the fact that the country has been a net exporter of crude oil (which is a primary product) and a net importer of nonoil commodities. Undoubtedly, this has been responsible for the unfavourable terms of trade the

country faces in the global market and the persistent deficit in its non-oil balance of trade in the period under review (See Figure 3).







3. LITERATURE REVIEW

3.1 Theoretical Literature

Theoretical literature on the relationship between trade and growth has its root in the absolute advantage theory of trade propounded by Adam Smith, the comparative cost theory of international trade propounded by David Ricardo and the neoclassical and modern theories of trade propounded by Hecksher and Ohlin and their followers (Jayme, 2001). The absolute advantage theory suggests that output expansion results when countries produce and export commodities for which they have absolute cost advantage. The comparative cost theory which is an improvement on the absolute advantage theory suggests that if countries specialize in the production of commodities for which they have comparative cost advantage and export same to countries that are comparatively disadvantaged or less advantaged in the production of such commodities, global output of that commodity will increase.

The Hecksher-Ohlin theory of international trade (which has been challenged by the Leontief Paradox) premises trade between two countries on differences in resource endowments. According to this theory, countries should specialize in the production of commodities that use more of the factor of production (capital or labour) with which they are more richly endowed, and export same to countries less endowed with that factor, but more endowed with the other factor. In other words, a country is expected to specialize in the production of a commodity intensive in the factor of its relative endowment. The outcome of this is that there would be expansion of output within the countries, and global output of goods and services will also increase. Thus the theories suggest that international trade is a necessary ingredient for economic growth.

The neoclassical growth models show that international trade affects economic growth through its (positive) effects on factor accumulation. The endogenous growth models also show that economic integration (of which international trade is an integral part) affects the rate of growth of an economy through its effects (market spillover, market size effect and competition effect) on incentives to invest in research and development (R&D). Thus the model is optimistic that deliberate investment in R & D engendered by international trade brings about technological progress which is a strong driver of economic growth (Donaldson, 2011). The export-led growth (ELG) hypothesis of Findley (1984) and Krueger (1985), and the neoclassical theory of international trade suggest that export growth positively affects economic growth. However the internally-generated growth hypothesis attributed to Jung and Marshall (1985) argues that output growth engenders trade (export) growth. This is an offshoot of the Vent for Surplus

theory postulated by Adam Smith which states that output growth stimulates greater export after domestic demands have been met.

The new trade theory attributed to Krugman (2008) relaxes the restrictive assumptions of constant returns to scale, perfect competition and the absence of market failures in the traditional theories, and uphold the assumptions of monopolistic competition and increasing returns to scale argues that trade between two countries with similar economic landscapes is possible and concludes that by adopting protectionist measures to protect infant industries, output of local firms will expand and welfare will be enhanced.

3.2. Empirical Literature

Darrat (1986) tests the validity of the export-led growth (ELG) hypothesis for Hong Kong, Korea and Singapore and Taiwan using Granger-causality analysis. The results give no supportive evidence of the ELG hypothesis as it shows no causality between exports and economic growth for Hong Kong, Korea and Singapore. However, for Taiwan, the causal effect was from economic growth to exports, contrary to the implication of the ELG hypothesis.

Edwards (1997) uses a comparative data set spanning the period, 1960 through 1990 for 93 countries to analyze the robustness of the relationship between openness and total factor productivity growth. The analysis suggests that more open economies experience faster productivity growth irrespective of the openness index used. Yanikkaya (2003) does a cross-country empirical investigation of the relationship between trade openness and economic growth for over 100 countries (developed and developing) over a period of three decades (1970-1997) using various trade openness measures. The analysis of the three-system equations specified and estimated for the investigation reveals that there is no simple and straight forward relationship between trade liberalization and economic growth. The study finds, contrary to conventional views that trade barriers positively and significantly affect growth particularly in developing countries.

Kumar (2006) investigates the relationship between export and economic growth in India in the period, 1950/1951 to 2001/2002, using cointegration and error correction analysis. The empirical results show that export and nominal GDP are cointegrated, and that export positively affects economic growth in the short run. This finding is corroborated by those of Pradhan (2010) who also tests the export led growth (ELG) hypothesis for India. Using various time series techniques and Granger causality test he finds significant short- and long-run relationship

between the variables, with causality running from export to GDP. Chatterji, Mohan and Dastidar (2013) also examine the relationship between trade openness and economic growth of India in the period from 1970 2010 using vector autoregression method. The results suggest that trade positively affects the growth of the country's economy. There are, however, no indications that trade barriers adversely affect growth.

Herzer, Nowak-Lehmann and Silverstovs (2006) examine the export-led growth hypothesis in Chile using annual time series data by focusing on the impacts of manufactured and primary exports on economic growth via their impacts on productivity growth. The results show that productivity (and hence, economic growth) is enhanced by manufactured export but adversely affected by primary export.

Siddiqui and Iqbal (2005) investigate the impact of liberalization on GDP growth in Pakistan in the period from 1972 to 2002. The analysis indicates that trade adversely affects growth of GDP in both short- and long-run. However, when trade is disaggregated into export and import components, it is observed that the effects of export and import on trade are not statistically significant.

Podkaminer (2014) also investigates the relationship between trade and world output. The analysis shows that the effect of trade on global output is statistically not significant, but that it is actually expansion in output that leads to expansion in trade. The finding evidently supports the internally-generated growth hypothesis.

In their investigation of the relationship between trade openness and economic growth, Huchet-Bourdon, Le Mouël and Vijil (n.d.) propose a *more elaborative* method of measuring trade openness that take quality and variety dimensions of countries integration of world trade into account. The analysis which involves the system-GMM estimator for an unbalance panel of 158 countries in the period from 1980 to 2004, the analysis reveals that countries exporting quality products grow more rapidly, and that trade may adversely affect countries that specialize in low quality products.

Yeboah, Naanwab, Saleem and Akufo (2012) examine the effect of trade openness and other macroeconomic variables on economic growth for 38 African countries using Cobb-Douglas production function estimated with alternative panel models (fixed and random effect models). The analysis indicates existence of positive relationship between trade openness and economic growth.

Mercan, Gocer, Bulut and Dam (2013) investigate the effect of trade openness on economic growth for the BRIC-T countries (Brazil, Russia, India and Turkey) in the period from 1989 to 2010 using panel data analysis. The empirical results indicate that the effect of trade openness on economic growth in the countries is positive and statistically significant.

Several Nigerian pundits have also investigated the effect of trade on economic growth of Nigeria. Edoumiekumo and Opukri (2013) examine the contributions of international trade (export and import) to economic growth of Nigeria measured by the real GDP, using a multiple regression model estimated with the OLS estimation technique, and Granger causality test. The empirical results show that exports positively and significantly impact economic growth. The impact of import on economic growth is, however, not statistically significant. However, The Granger causality analysis reveals unidirectional causality between export and RGDP, with causality running from real GDP to export. Unidirectional relationship is also observed between import and RGDP and between import and export, with causality running from import to RGDP and export.

Ehinomen and Da Silva (2014) employ the ordinary least squares estimation technique to investigate the effect of trade openness on output growth (proxied by real GDP) in Nigeria using data spanning the period from 1970 to 2010. The analysis indicates that positive and significant relationship exists between trade openness and output growth in the country, suggesting that the economy will grow more rapidly if it opens up to international competition. Further evidences from the study are that real exchange rate and real interest rate are also positively related to output growth. Unemployment rate is observed to be inversely related to output growth, suggesting that high rate of unemployment impedes the growth of the economy. Similar observations between trade openness and growth are reported in Adelowokan and Maku (2013), though Nduka et al (2013) argues that economic growth engenders export expansion which in turn positively affects economic growth.

Arodoye and Iyoha (2014) employ the methodology of Vector Autoregression (VAR) to investigate foreign trade–economic growth nexus in Nigeria using quarterly data that span the period 1981Q1 to 2010Q4. The study finds stable long-run relationship between foreign trade (export) and economic growth (real GDP). Further evidence from the analysis is that exchange rate Granger causes RGDP, export and foreign direct investment. No causal relationship is however observed between export and RGDP. This last finding is in sync with the findings of Ewetan and Okoduwa (2013) which indicate that the cointegration test and the Granger

causality test within the framework of a VAR model do not support the export-led growth hypothesis for Nigeria.

Anowor and Agbarakwe (2015) employ ordinary least squares (OLS) estimation technique to estimate a multiple regression model to examine the effect of foreign trade on Nigeria's economy using annual times series data that covers the period from 1981 to 2013. The empirical evidence indicates that export exerts significant positive impact on economic growth.

Emeka, Ikpesu and Amah (2012) also investigate the impact of trade (export) and FDI on Nigeria's economic growth measured as gross domestic product (GDP) using the OLS technique in the 1970-2008 period. The analysis indicates that exports and FDI positively and significantly affect GDP.

Omoju and Adesanya (2012) examine the effect of trade (measured as the sum of export value and import value) and other relevant variables such as foreign direct investment, exchange rate and government expenditure on economic growth (measured by real GDP) in Nigeria in the period from 1980-2010 using the OLS technique. The analysis reveals that trade, FDI, government expenditure and exchange rate positively and significantly affect Nigeria's economic growth.

4. THEORETICAL FRAMEWORK, MODEL SPECIFICATION AND ESTIMATION METHODOLOGY

The Neoclassical production function (Basic Solow growth model) identifies capital and labour as key inputs in the production process. The production function is expressed mathematically as:

$$Y_t = f(K_t, L_t) \qquad (1)$$

Where Y denotes real output (or real GDP), K = capital stock (gross capital formation), and L = Labour.

.

The Solow growth model (production function) has neoclassical properties and as such is characterized by constant returns to scale. It is also continuously differentiable, strictly concave and constantly increasing (Chang, 2012).

The New Growth theory opens up the possibility that international trade can also influence the long-run growth path of a country (Roe and Mohtadi, 1999). Barro and Lee (1994) identify openness to international trade as a source of economic growth. This is because it guarantees access to acquisition of leading

technologies of the developed countries. Incorporating this (that is, trade) into the neoclassical model, the growth function becomes:

$$RGDP = f(TRADE, K, L) \quad (2)$$

Expressing equation 2 in per capita terms we have:

$$RGDP/L = f(TRADE/L, K/L, 1) \quad (3).$$

Equation 3 can be expressed as:

$$rpcy = f(trade, capital) \quad (4)$$

rpcy = real per capita income (proxy for economic growth); *trade* = trade per capita, *capital* = capital per capita.

Equation 4 can be modified to incorporate other variables identified in growth literature as affecting economic growth such as government final consumption expenditure (*govexp*), (expressed in per capita terms), exchange rate (*exrt*) and interest rate (*intr*). Doing this will enable us avoid the problems of omitted relevant variables (such as autocorrelation) which could adversely affect the parameter estimates, rendering them unreliable for policy. Thus our trade-growth model is specified functionally as:

$$rpcy = f(trade, capital, govexp, exrt, intr) \quad (5)$$

A major example of the neoclassical production is the Cobb-Douglas (CD) Production function widely used in economic analysis to represent the relationship between amounts of two or more inputs and the amount of output produced by the combination of those inputs. If the CD production function is assumed, equation (5) can be expressed as:

$$rpcy = \beta_0 trade^{\beta 1} capital^{\beta 2} govexp^{\beta 3} exrt^{\beta 4} intr^{\beta 5} \quad (6)$$

By log-transformation, equation (6) becomes:

$$ln(rpcy) = \beta_0 + \beta_1 ln(trade) + \beta_2 ln(capital) + \beta_3 ln(govexp) + \beta_4 ln(exrt) + \beta_5 ln(intr) + \xi \quad (7)$$

This paper adopts the methodology of DOLS proposed by Stock and Watson (1993). The method improves on the classical (ordinary) least squares (OLS) by

coping with small sample and dynamic sources of bias. It is a robust single equation approach which corrects for regressor endogeneity (peculiar with cointegrating relationships) by inclusion of leads and lags of first differences of the regressors, and for serially correlated errors (residuals) by a generalized least squares (GLS) procedure to provide optimal estimates of cointegrating regressions (Al-Azzam and Hawdon, 1999).

The cointegrating (DOLS) model is specified as:

$$ln(rpcy) = \beta_0 + \beta_1 ln(trade) + \beta_2 ln(capital) + \beta_3 ln(govexp) + \beta_4 ln(exrt) + \beta_5 ln(intr) + \sum_{j=-k}^{p}(\theta_1 \Delta trade_{t-j}) + \sum_{j=-k}^{p}(\theta_2 \Delta capital_{t-j}) + \sum_{j=-k}^{p}(\theta_3 \Delta govexp_{t-j}) + \sum_{j=-k}^{p}(\theta_4 \Delta exrt_{t-j}) + \sum_{j=-k}^{p}(\theta_5 \Delta intr_{t-j}) + \mu_t \quad (8)$$

The *a priori* expectations are $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, $\beta_5 < 0$.

The variables are as previously defined; the β_is are long-run cumulative multipliers or long-run effects of changes in the explanatory variables on the dependent variable; p and k represents lag length and lead length respectively, of each explanatory variable.

Prior to estimating the model, the times series properties of the variables are examined using the unit root test to identify their order of integration. For this study we employed the Augmented Dickey Fuller and Phillips-Perron tests. This would be followed by the cointegration test to determine whether or not long-run relationship exists between the variables. The Johansen procedure shall be employed for the cointegration test.
Data used for the estimations are annual time series data for the period 1981 to 2013. They were sourced from the World Bank's World Development Indicators of 2014. All estimations are performed with the aid of EVIEWS 8 computer package.

The channels of influence of trade on economic growth have been identified and discussed in the review of theoretical literature. Summarily, unrestricted trade between or among nations engenders increased access to goods, services, technology and skills that are not locally produced or available in a country. It enhances the inflow of foreign direct investment to accelerate the rate of capital formation, generate employment, etc. It helps in efficient allocation of productive resources towards production of goods for which a country is comparatively advantaged, leading to expansion in both domestic and global

output of goods and services. The overall effect of these is increase in rate of growth of the economy.

Growth theories identify capital as a major determinant of economic growth. It is a key factor of production without which production is inevitable. The theories predict positive impact of capital on economic growth.

Government expenditure is seen as a stimulant of economic activities. This is in sync with the Keynesian Economics which suggests *inter alia* that fiscal bailout is a panacea to the economic woes of countries in depression. Increase in government expenditure (if productive), engenders increase in the rate of economic activities. The Ram's (1986) growth accounting model predicts that government spending generally affects economic growth and performance in a favourable manner. Hence *ceteris paribus*, government expenditure is predicted to positively affect economic growth.

International trade theory predicts positive relationship between exchange rate and economic growth. This prediction is premised on the notion that *ceteris paribus* increase in the exchange rate of the currency of a country relative that of its trading partner(s) (that is currency depreciation) encourages exports, as the export commodities of the country become cheaper in foreign markets, leading to increase in export earnings, boost in foreign exchange reserves etc. The depreciation of the domestic currency also has the effect of increasing the domestic currency prices of imported commodities, thus reducing the rate of importation. The over effect of currency depreciation is therefore to increase the rate of growth of the economy.

Lending interest rate is also referred to as the cost of loanable fund, needed for investment. All things being equal, higher domestic lending interest rates discourage domestic investment. Considering that investment is a critical factor in economic growth, reduction in investment rate as a result of increase in lending interest rate inevitably results in reduction in the rate of economic growth.

5. RESULTS AND DISCUSSIONS

5.1 Unit Root Test Result

Table 1 presents the results of the ADF and PP unit root tests of the variables of the model

Table 1. Unit Root Test Results

Augmented-Dickey Fuller (ADF) Test							
Variables	**Levels**			**First Difference**			**Order of Integration**
	ADF test stat	**Test Critical Value (5%)**	**Inference**	**ADF test stat**	**Test Critical Value (5%)**	**Inference**	
Lrpcy	-1.8252	-3.5578	NS	-4.8928	-3.5629	S	I(1)
Ltrade	-0.7772	-2.9571	NS	-3.8655	-3.6220	S	I(1)
Lcapital	-2.1624	-3.5578	NS	-5.1591	-3.5629	S	I(1)
Lgovexp	-2.2111	-3.5578	NS	-7.3922	-3.5629	S	I(1)
Lintr	-1.7438	-3.5578	NS	-4.5129	-3.5684	S	I(1)
Lexrt	-0.9056	-3.5578	NS	-5.2513	-3.5629	S	I(1)
Phillips-Perron Test							
Variables	**Levels**			**First Difference**			**Order of Integration**
	PP test stat	**Test Critical Value (5%)**	**Inference**	**PP test stat**	**Test Critical Value (5%)**	**Inference**	
Lrpcy	-1.8240	-3.5578	NS	-4.8431	-3.5629	S	I(1)
Ltrade	-0.7772	-2.9571	NS	-5.8698	-3.5629	S	I(1)
Lcapital	-2.3557	-3.5578	NS	-6.3224	-3.5629	S	I(1)
Lgovexp	-2.2520	-3.5578	NS	-7.2349	-3.5629	S	I(1)
Lintr	-1.7491	-3.5578	NS	-5.6347	-3.5629	S	I(1)
Lexrt	-0.8833	-3.5578	NS	-6.0878	-3.5629	S	I(1)

NS = Not stationary; S = Stationary

The results from the ADF and PP tests for unit root indicate that all the variables are integrated of order 1, that is, they are non-stationary at levels, but stationary at their first differences. Though the variables are individually non-stationary at levels, there is the possibility that a linear combination of the variables could be stationary, that is to say they could be cointegrated.

5.2. Cointegration Test

The results of the test for cointegration involving the Johansen approach to cointegration (Trace test and Maximal Eigenvalue test) are presented in Table 2.

Table 2. Cointegration Test – Johansen Approach

Sample (adjusted): 1983 2013
Included observations: 31 after adjustments
Trend assumption: Linear deterministic trend (restricted)
Series: LOG(RPCY) LOG(TRADE) LOG(CAPITAL) LOG(GOVEXP) LOG(EXRT) LOG(INTR)
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.768260	121.0179	117.7082	0.0303
At most 1	0.579409	75.69161	88.80380	0.3015
At most 2	0.457187	48.84272	63.87610	0.4663
At most 3	0.423383	29.90205	42.91525	0.5080
At most 4	0.205503	12.83419	25.87211	0.7510
At most 5	0.168031	5.702769	12.51798	0.4989

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.768260	45.32630	44.49720	0.0405
At most 1	0.579409	26.84889	38.33101	0.5373
At most 2	0.457187	18.94068	32.11832	0.7338
At most 3	0.423383	17.06786	25.82321	0.4520
At most 4	0.205503	7.131416	19.38704	0.8916
At most 5	0.168031	5.702769	12.51798	0.4989

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

The cointegration test results show that the variables are cointegrated, as both the Trace test and the Maximum Eigenvalue test indicate one cointegrating equation at the 5% level. Cointegration of the variables indicates existence of long-run relationship between them and this enhances the reliability of models estimated with the variables for policy.

5.3. Parametric Estimation Results

The estimated cointegrating (DOLS) model is presented in Table 3.

Table 3. Dynamic OLS Estimation Result

Dependent Variable: LOG(RPCY)
Method: Dynamic Least Squares (DOLS)
Sample (adjusted): 1983 2012
Included observations: 30 after adjustments
Cointegrating equation deterministics: C
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth =
4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(*trade*)	0.153576	0.041798	3.674214	0.0051
LOG(*capital*)	0.187659	0.021014	8.930301	0.0000
LOG(*govexp*)	-0.110909	0.025092	-4.420109	0.0017
LOG(*exrt*)	-0.001557	0.015255	-0.102083	0.9209
LOG(*intr*)	-0.356753	0.055313	-6.449666	0.0001
C	6.301548	0.232815	27.06676	0.0000
R-squared	0.988930	Mean dependent var		6.476941
Adjusted R-squared	0.964331	S.D. dependent var		0.236485
S.E. of regression	0.044663	Sum squared resid		0.017953
Durbin-Watson stat	2.353043	Long-run variance		0.000493

In conformity with theoretical predictions and in sync with previous studies such as those of Emeka, et al (2012), Edoumiekumo and Opukri (2013), Arodoye and Iyoha (2014), the DOLS estimation result indicates that trade positively and significantly affects economic growth as measured by real GDP per capita. The effect is highly significant even at the 1% significance level. The coefficient of the variable indicates that a 10% rise in trade (export plus import) (per capita) engenders a 1.5% increase in real GDP per capita. This underscores the importance of international trade in fostering rapid economic growth and development especially of developing countries like Nigeria. Also in line with theoretical prediction, capital per capita is observed to positively affect real GDP per capita. The effect is very highly significant even at 0.1% level, as indicated by the p-value of the estimated coefficient. The estimated coefficient indicates that a 10% rise in trade is associated with about 1.9% increase in real GDP per capita. This also points to the importance of capital in economic growth and development.

However, contrary to *a priori* expectation or theoretical predictions, government final consumption expenditure is negatively related to real GDP per capita. The effect of government consumption expenditure per capita on real GDP per capita is also highly significant even at the 1% significance level. This suggests that government consumption expenditures faiked to stimulate the economy as expected, but rather it was grossly unproductive and contributed significantly to retardation of the country's economic growth.

Exchange rate variable also has the contrary sign, and its effect on real GDP per capita appears to be small statistically not significant. This suggests that contrary to theoretical prediction, the depreciation of the nation's national currency did not aid the growth of the economy in the period covered by the study.

The coefficient of interest rate variable has the expected (negative) sign and is highly significant even at the 1% level. This indicates that lending interest rate is a major factor affecting the growth of Nigeria's economy. The coefficient of the variable indicates that a 10% rise in the interest rate is associated with 3.6% decrease in real GDP per capita. This observation is hardly contentious considering that high interest rate creates disincentive to investment and decrease in investment inevitable results in slow growth.

The coefficient of determination of about 99% indicates that the model has very high goodness of fit as it explains nearly 99% of the systematic variations in the dependent variable. The very low long-run variance of the model attests to its predictive power. Considering that leads and lags of the variables were incorporated in the estimation of the DOLS model to overcome the problem of autocorrelation, the D-W statistic indicates that the model is not plagued by this problem. This is further confirmed by the autocorrelation (AC) and partial autocorrelation (PAC) tests which indicate complete absence of the problem of autocorrelation as all the probabilities are greater than 0.05 as seen in Table 4.

Table 4. Autocorrelation and Partial Autocorrelation Tests

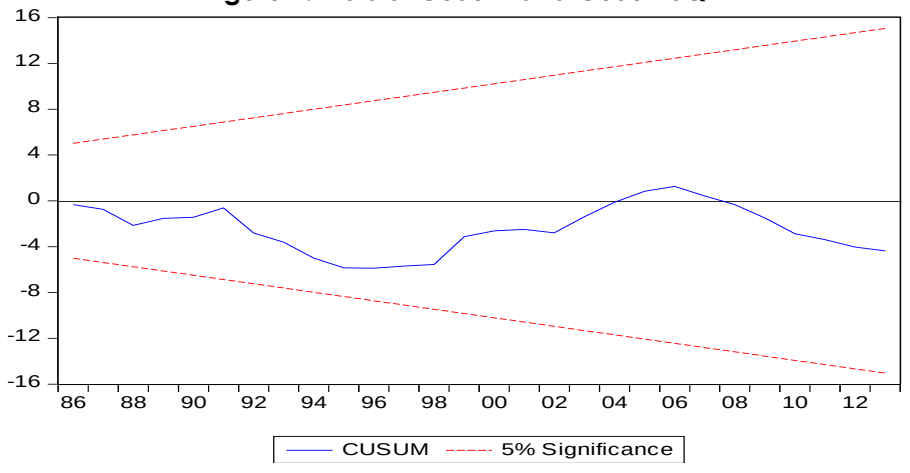
Sample: 1981 2013
Included observations: 30

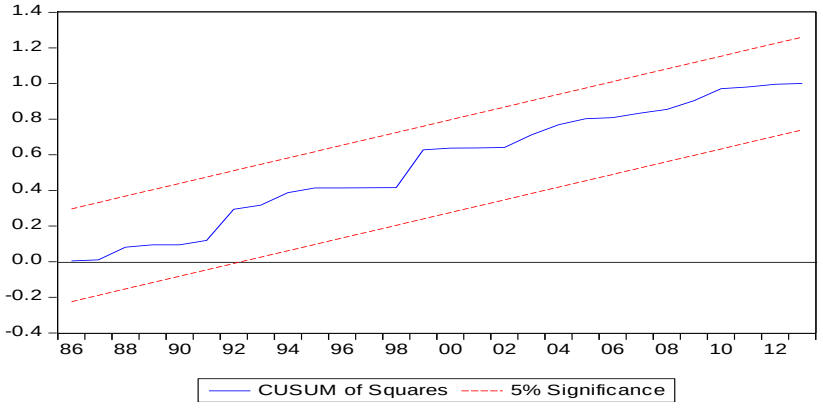
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |*. |	. |*. |	1	0.148	0.148	0.7221	0.395
. | . |	. | . |	2	-0.034	-0.057	0.7616	0.683
. |*** |	. |*** |	3	0.404	0.429	6.5786	0.087
. |*. |	. | . |	4	0.166	0.031	7.5906	0.108
. |*. |	. |*. |	5	0.123	0.193	8.1696	0.147
. | . |	.**| . |	6	-0.028	-0.292	8.2010	0.224
. *| . |	. *| . |	7	-0.077	-0.094	8.4471	0.295
. | . |	. *| . |	8	0.044	-0.145	8.5308	0.383
. | . |	. | . |	9	-0.043	0.058	8.6145	0.474
. | . |	. | . |	10	-0.052	0.056	8.7440	0.557
. | . |	. | . |	11	-0.042	0.068	8.8314	0.637
. *| . |	. *| . |	12	-0.091	-0.069	9.2778	0.679
. | . |	. *| . |	13	-0.048	-0.067	9.4059	0.742
. *| . |	. *| . |	14	-0.071	-0.122	9.7111	0.783
. *| . |	. | . |	15	-0.084	-0.023	10.163	0.809
. *| . |	. *| . |	16	-0.097	-0.068	10.805	0.821

5.4. Model Stability Test

The stability of (the parameters of) a model enhances its reliability for policy. The plots of cumulative sum of recursive residual (CUSUM) and cumulative sum of squared recursive residual (CUSUMSQ) were used to test the stability of the model over the study period. The plots are presented in Figure 4.

Figure 4. Plots of CUSUM and CUSUMSQ





The test indicates that the model is structurally stable as the plots of CUSUM and CUSUMSQ both lie between the 5% critical bounds.

5.5. Granger Causality Test Result

Further investigation of the effect of trade on economic growth was conducted by exploring the VAR-based pairwise Granger-causality test, involving one lag of each variable. The lag order was selected by appropriate lag order selection criteria. The results of the lag-order selection and pairwise Granger-causality tests are reported in Table A1 and A2 respectively in the Appendix. The result shows unidirectional causality between trade per capita and real GDP per capita with causality running the former to the latter. This further confirms the important of trade to economic growth. It also shows unidirectional causality between real GDP per capita and capital per capita, with causality running from real GDP per capita to capital per capita, suggesting that the growth of Nigeria's economy is a strong predictor of the rate of capital formation in the country. Real GDP per capita is also observed to Granger cause government expenditure per capita, suggesting that as the economy grows, government consumption expenditure also increases. This is in sync with the Wagner's law. Furthermore, exchange rate and lending interest rate are observed to Granger-cause real GDP per capita.

6. CONCLUSION AND POLICY RECOMMENDATIONS

The paper employed the Stock-Watson DOLS estimation technique to examine the long-run effects of trade on economic growth in Nigeria in the period from 1981 to 2013. Using data sourced from the World Bank's World Development Indicators of 2014, the analysis indicated that trade positively and significantly affected the growth of Nigeria's economy in the period covered by the study. It also showed that capital also played very crucial role in the growth of Nigeria's

economy within the period. Government consumption expenditure was however found to adversely affect the growth of the nation's economy within the study period. The analysis also revealed that increase in interest rate and exchange rate adversely affected Nigeria's economic growth within the period covered by the study.

In the light of the empirical evidence, the following are proffered for policy consideration:

I. Considering that trade positively affects the growth of Nigeria's economy, greater integration of the nation's economy with the global market is advocated. This however calls for caution as unbridled openness, could turn the country into dumping ground for foreign goods, adversely affecting home industrial sector. To this end, here is need for trade policy makers to consider imposing some restrictions on importation of certain categories of goods, especially those which the country has the capacity to produce locally. This is germane to protecting the local infant industries which may not be able to face the challenges of trade liberalization and compete on global scale. It also entails taking giant steps towards diversifying the nation's economy and developing the nation's real sectors (such as agriculture and industrial sectors) to enhance their capacity to produce for both local and foreign markets.

II. The observed adverse effect of increase in government final consumption expenditure per capita on the growth of real GDP per capita calls for urgent need for Nigeria's government to cut-down on her expenditure on final (consumption) goods and services and focus more on expenditure on capital projects which are growth-stimulating.

III. In view of the observation that gross capital formation positively affect economic growth there is need for the government to create the enabling environment for the private sector to increase its investment in capital formation. This also entails putting measures on ground (such as infrastructural development, provision of adequate security, lowering the cost of doing business, favourable tax laws, etc) to attract foreign investment in to the country considering that capital formation could be enhanced by inflow of foreign direct investment to the country.

IV. There is need to take urgent steps to halt the continuous depreciation of the value of the Naira against the major currencies of the world in the face of dwindling oil prices and declining foreign exchange reserves, as this could

engender hyper-inflation and unleash untold hardship on the citizens since the country is still highly dependent on import. This entails *inter alia* substantial investment in the non-oil sector of the economy by the government and the public sector to boost output arising there-from and diversify the productive base of the economy thereby reducing the precarious dependence on the oil sector and, restriction on importation of some categories of goods particularly those can be produced locally.

V. The observation that high lending interest rate adversely affect the growth of the nation's economy calls for appropriate use of monetary policy instruments by the monetary authority to control the lending interest rate to enable ultimate borrowers have easy access to funds to finance their business and investment and hence, contribute to the growth and development of the economy.

REFERENCES

Adelowokan, O. A. and Maku, A. O. (2013), "Trade Openness, Foreign Investment and Economic Growth in Nigeria: A Long Run Analysis", *European Journal of Globalization and Development Research*, 7(1), 445-458

Alaba, O. B. (2006, May), *EU – ECOWAS EPA: Regional Integration, Trade Liberalization and Development in West Africa*. Paper Presented at the GTAP Conference, United Nations Economic Commission for Africa (UNECA), Addis Ababa.

Al-Azzam, A and Hawdon, D. (1999), "Estimating the Demand for Energy in Jordan: A Stock-Watson Dynamic OLS (DOLS) Approach", *Surrey Energy Economics Discussion Paper* 97.

Anowor and Agbarakwe (2015), "Foreign Trade and Nigerian Economy", *Developing Country Studies, 5*(6), 77-82.

Arodoye, N. L. and Iyoha, M. A. (2014), "Foreign Trade – Economic Growth Nexus: Evidence from Nigeria", *CBN Journal of Applied Statistics, 5*(1), 121-141.

Barro R. J. and Lee J W. (1994), "Sources of Economic Growth". *Carnegie-Rochester Conference Series on Public Policy, 40*, 1-46.

Chang, R. (2012), "The Solow Growth Model". Retrieved from http://econweb.rutgers.edu/rchang/solowslides2012.pdf on Sunday October 11, 2015

Chatterji, M., Mohan, S. and Dastidar, S.G. (2013), "Relationship between Trade Openness and Economic Growth of India: A Time Series Analysis", *Department of Economics, University of Dundee Working Paper, No. 274*, April.

Crockett, S. (2011), 'Has Globalization Spread Democracy around the World?' Retrieved from e-International Relations (http://www.e-ir.info/2011/08/27/has-globalization-spread-democracy-around-the-world/). Accessed 07/04/2013

Darrat, A. F. (1986), "Trade and Development: The Asian Experience", *Cato Journal, 6*(2), 695-699.

Donalson, D. (2011), "Trade and Growth (Theory)", *Lecture 17*. 14581 MIT PhD International Trade", Retrieved from economics.**mit**.edu/files/7452 on 15th July 2015.

Emeka, E. J., Ikpesu, F. and Amah, P. (2012), "Macroeconomic Impact of Trade on Nigerian Growth: A Empirical Evaluation", *Research Journal of Management and Accounting, 1*(4), 79-83.

Edoumiekumo, S. G. and Opukri, C. O. (2013), "Economic Growth Factor in Nigeria: The Role of Global Trade", *American Journal of Humanities and Social Sciences, 1*(2), 51-55.

Edwards, S. (1997), "Openness, Productivity and Growth: What Do We Really Know?". *NBER Working Paper, No. 5978*, March.

Ehinomen and Da Silva (2014), "Impact of Trade Openness on Output Growth in the Nigerian Economy", *British Journal of Economics, Management and Trade 4*(5), May, 755-768

Ewetan, O. O. and Okoduwa, H. (2013), "Econometric Analysis of Export and Economic Growth in Nigeria", Retrieved December 27, 2015 from http://eprints.covenantuniversity.edu.ng/2319/1/2054_Olabanji_Olukayode_Henry_Okodua.pdf

Findley, R. (1984), "Trade and Development: Theory and Asian Experience", *Asian Development Review*, 2, 23-42

Fung, E. and Peng, Y. (2012), *Forces Driving China's Economic Growth in 2012: New Thought, New Strategies, New Initiatives*. Beijing: KPMG Advisory (China) Limited.

Gries, T. and Redlin, M. (2012), *Trade Openness and Economic Growth: A Panel Causality Analysis.* Retrieved from https://faculty.washington.edu/karyiu/confer/sea12/papers/SG12-112%20Redlin.pdf on Friday October 16, 2015

Herzer, D., Nowak-Lehmann, F. and Silverstovs, B (2006), "Export-Led Growth in Chile: Assessing the Role of Export Composition in Productivity Growth", *The Developing Economies, 44*(3), 306-328.

Huchet-Bourdon, M., Le Mouël, C and Vijil, M (n.d.), "The Relationship between Trade Openness and Economic Growth: Some New Insights on the Openness Measurement Issue", Retrieved from ecomod.net/system/files/**openness**_huchet-bourdon.pdf. Accessed 16/07/2015

Jayme, F. G. (2001), "Notes on Trade and Growth. *Economics Department", Universidade Federal de Minas Gerais Discussion Paper No. 166*, October

Jung, W. and Marshall, P. (1985), "Exports, Growth and Causality in Developing Countries", *Journal of Development Economics, 18*, 1-12

Krueger, A. O. (1985), "Import Substitution Versus Export Promotion", *Finance and Development, 22*, 20-23.

Krugman, P. (2008), "The Increasing Returns Revolution in Trade and Geography", *Prize Lecture*. Retrieved from http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2008/krugman_lecture.pdf on August 8, 2015

Kumar, P. A. (2006), "Export and Economic Growth in India: Causal Interpretation", *Journal of Global Economy, 2*(4), 245-277, December,

Mercan, M., Gocer, I., Bulut, S. and Dam, M. (2013), "The Efffect of Openness on Economic Growth for BRIC-T Countries: Panel Data Analysis". *Eurasian Journal of Business and Economics, 6*(11), 1-14.

Ndiyo, N. A. and Ebong, F. S. (2004), "The Challenges of Openness in Developing Economies: Some Empirical Lessons from Nigeria", In *Proceedings of the 45th Annual National Conference of the Nigerian Economic Society.*

Nduka,E. K., Chukwu, J. O., Ugbor, K. I .and Nwakaire, O. N. (2013), "Trade Openness and Economic Growth: A Comparative Analysis of the Pre and Post Structural Adjustment Programme (SAP) Periods in Nigeria", *Asian Journal of Business and Economics, 3*(3), 1-12.

Omoju, O. and Adesanya, O. (2012), "Does Trade Promote Growth in Developing Countries? Empirical Evidence from Nigeria", *International Journal of Development and Sustainability, 1*(3), 743-753.

Podkaminer, L. (2014), Does Trade Drive Global Output Growth? *Bank i kredyt, 45*(4), 311-330

Pradhan, N. C. (2010), "Exports and Economic Growth: An Examination of the ELG Hypothesis for India", *Reserve Bank of India Ocassional Papers, 31*(3), 35-66, Winter.

Rabbanee, F. K. Haque, M. M. and F. Hasan (2010), "Globalization and Human Development – Realities and Recommendations for Developing Countries", *Asian Affairs, 30(1)*: 32 – 49.

Ray, S. (2012), Globalization and Economic Growth in India: A Granger Causality Approach. *Journal of Law, Policy and Globalization, 2,* 18 – 30

Rodrik, D. (1998), "*Why Do More Open Economies Have Bigger Governments?",* Retrieved from http://www.hks.harvard.edu/fs/drodrik/Research%20papers /last.pdf . Accessed 11/04/2013

Rodrik, D (1999), *The New Global Economy and Developing Countries: Making Openess Work*. Washington D. C: John Hopkins University Press

Roe, T. and Mohtadi, H. (1999), "International Trade and Growth: An Overview from the Perspective of the New Growth Theory", Paper presented at AAEA Annual Meeting Post-Conference Workshop: Learning Workshop: *New Growth Theory and Application in Agricultural and Rural Economics* – Nashville, Tennessee, Renaissance Hotel, August 11.

Siddiqui, A. H. and Iqbal, J. (2005), "Impact of Trade Openness on Output Growth for Pakistan: An Empirical Investigation", *MPRA Paper No. 23757*

Sun, P. and Heshmati, A. (2010), "International Trade and its Effects on Economic Growth in China", *IZA Discussion Paper, 5151*, August.

World Bank (2014), *World Development Indicators*, Washington DC: World Bank

Yanikkaya, H. (2003), "Trade Openness and Economic Growth: A Cross-Country Empirical Investigation", *Journal of Development Economics, 72*, 57-89.

Yeboah, O., Naanwab, C., Saleem, S. and Akufo, A. (2012), "*Effect of Trade Openness on Economic Growth: The Case of African Countries",* Selected Paper Prepared for Presentation at the Southern Agricultural Economics Association Annual Meeting, Birmingham, AL, February 4-7.

APPENDIX
Table A1. VAR Lag Order Selection Criteria

Endogenous variables: LOG(RPCY) LOG(TRADE) LOG(CAPITAL) LOG(GOVEXP) LOG(EXRT) LOG(INTR)
Exogenous variables: C
Sample: 1981
2013
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-59.61367	NA	2.78e-06	4.233140	4.510686	4.323613
1	83.16371	221.0747*	2.97e-09*	-2.655724*	-0.712902*	-2.022412*
2	114.4973	36.38743	5.32e-09	-2.354666	1.253430	-1.178517

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

Table A2. Pairwise Granger Causality Test

Pairwise Granger Causality Tests
Sample: 1981 2013
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(TRADE) does not Granger Cause LOG(RPCY)	32	12.5210	0.0014
LOG(RPCY) does not Granger Cause LOG(TRADE)		0.51661	0.4780
LOG(CAPITAL) does not Granger Cause LOG(RPCY)	32	0.89677	0.3515
LOG(RPCY) does not Granger Cause LOG(CAPITAL)		20.1748	0.0001
LOG(GOVEXP) does not Granger Cause LOG(RPCY)	32	1.64474	0.2098
LOG(RPCY) does not Granger Cause LOG(GOVEXP)		14.5952	0.0007
LOG(EXRT) does not Granger Cause LOG(RPCY)	32	11.7097	0.0019
LOG(RPCY) does not Granger Cause LOG(EXRT)		0.85919	0.3616
LOG(INTR) does not Granger Cause LOG(RPCY)	32	6.79591	0.0143
LOG(RPCY) does not Granger Cause LOG(INTR)		2.09409	0.1586
LOG(CAPITAL) does not Granger Cause LOG(TRADE)	32	3.26625	0.0811
LOG(TRADE) does not Granger Cause LOG(CAPITAL)		13.9306	0.0008
LOG(GOVEXP) does not Granger Cause LOG(TRADE)	32	0.07786	0.7822
LOG(TRADE) does not Granger Cause LOG(GOVEXP)		8.58858	0.0065
LOG(EXRT) does not Granger Cause LOG(TRADE)	32	14.3899	0.0007
LOG(TRADE) does not Granger Cause LOG(EXRT)		1.28377	0.2665
LOG(INTR) does not Granger Cause LOG(TRADE)	32	2.26918	0.1428
LOG(TRADE) does not Granger Cause LOG(INTR)		0.34469	0.5617
LOG(GOVEXP) does not Granger Cause LOG(CAPITAL)	32	3.85623	0.0592
LOG(CAPITAL) does not Granger Cause LOG(GOVEXP)		0.19787	0.6597
LOG(EXRT) does not Granger Cause LOG(CAPITAL)	32	15.9923	0.0004
LOG(CAPITAL) does not Granger Cause LOG(EXRT)		1.61418	0.2140
LOG(INTR) does not Granger Cause LOG(CAPITAL)	32	4.36761	0.0455
LOG(CAPITAL) does not Granger Cause LOG(INTR)		1.37095	0.2512
LOG(EXRT) does not Granger Cause LOG(GOVEXP)	32	11.3064	0.0022
LOG(GOVEXP) does not Granger Cause LOG(EXRT)		0.65877	0.4236
LOG(INTR) does not Granger Cause LOG(GOVEXP)	32	8.74335	0.0061
LOG(GOVEXP) does not Granger Cause LOG(INTR)		1.83967	0.1855
LOG(INTR) does not Granger Cause LOG(EXRT)	32	0.00199	0.9647
LOG(EXRT) does not Granger Cause LOG(INTR)		0.00700	0.9339

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