International Review of Business Research Papers
Vol. 8. No.2. March 2012. Pp. 118 - 131

Exchange Rate Volatility, Trade flows and Economic Growth in a Small Open Economy

Abba Abubakar Shehu* and Zhang Youtang**,

Unlike previous studies which focused more on the developed and emerging economies, this paper examines the causal relationship between exchange rate volatility (ERV), trade flows and economic growth of the sub-Saharan African countries with exclusive reference to Nigeria which is considered as small open economy. The empirical study is based on a time series data over the period of 1970-2009. We apply new advances in the field of time series econometrics to provide more reliable estimates. The results indicate significant effects of ERV on trade flows and economic growth of Nigeria. The finding support the preference of flexible exchange rate regime over the fixed regime as it facilitates more trade flows in Nigeria. We recommend effective diversification of the Nigeria economy by encouraging more manufacturing firms' production output sufficient enough to meet the demand of both domestic and regional markets of West Africa follow by full implementation of float exchange rate system by the authority concerned

Field of Research: International finance, Fixed exchange rate, Flexible exchange rate, Exchange rate volatility, and Trade flows

1. Introduction

The study of exchange rate volatility (thereafter called ERV) and its effect on trade flows is recently the most dominant literature in the field of international finance. Since the breakdown of Breton Wood agreement there was gradual global transformation of monetary system in which many countries are shifting from the conventional fixed exchange rate regime to more flexible and floating exchange rate system which gives room for more exchange rate fluctuations. Proponent of fixed exchange rate often argue that flexible exchange regime decreases volume of international trade in two separate ways, first it exposes importers and exporters to greater exchange rate risk due to fluctuations and therefore less willing to engage in international trade. Secondly it is claimed that unanticipated exchange rate volatility will induce government to erect either generalized or sectoral trade barriers, such barriers will be erected in order to offset the destabilizing effect of change in exchange rate that do not reflect changes in incomes, prices and other fundamental determinants of comparative advantage and international trade. However proponents of flexible exchange rate disagree with above assertion and argue that exchange rate risk can be hedged systematically and allows international trade flows without being affected.

Exchange rate volatility refers to as persistent fluctuations of exchange rate, which often results in persistent depreciation of the home currency. Therefore exchange

*Abba Abubakar Shehu, School of Management, Wuhan University of Technology, Wuhan PR, China 43007 E-mail:abbashehu07@yahoo.com
**Professor Zhang Youtang, School of Management, Wuhan University of Technology, Wuhan PR, China 430070 E-mail: zyt@whut.edu.cn

rate volatility exposes economic agent to a greater exchange rate risk. However exchange rate fluctuations can be anticipated or unanticipated, the unanticipated fluctuation has more significant effect as it determines aggregate demand through exports, imports, and the demand for domestic currency, and determines aggregate supply through the cost of imported intermediate goods (Kandil & Mirzaie 2008). In other words, an unanticipated exchange rate fluctuation boost demand of exports and reduces imports level as it raises the price of importable goods and services.

The exchange rate between the two countries' currencies is always associated with cross border capital and fund movements, thereby with cross border flows of goods and services. Changes in the exchange rate, depreciation or appreciation of the currency, have a significant effect on trade flows and profound implications for the overall economic growth. Domestic currency depreciation leads to an improvement in exports by the domestic country, and help achieve positive trade balance.

In 1986, Nigeria shift from fixed exchange rate regime to flexible exchange rate to match the new economic reform which is market oriented in nature. The main objective of the new exchange rate regime is to reduce government interventions, which deplete the foreign reserve, and allows the currency to depreciate in order to improve exports and reduces imports. This development causes persistent exchange rate variability, which yield persistent Naira devaluation. The main goal of this study is therefore to find out whether departure to float exchange rate contributes to the economic growth of Nigeria.

The present paper contributes to the existing body of literature in number of ways. First unlike most of the past studies that focused on advanced economies our focus is on sub Saharan Africa with special reference to Nigeria, which also is a classical representative of a small open economy. Second our study is the first attempt to directly identify the existence of relationship between exchange rate volatility, trade flows and economic growth in Nigeria. The finding of this study is expected to answer two broad questions; (1) Does relationship exists between ERV, exports imports and economic growth? (2) Is there any causal flows from ERV to exports imports and economic growth?

We employ the recent advances in econometric time series modeling and use the VAR technique as a tool to examine two empirical issues. First we examine whether long run equilibrium relationship exist among exchange rate volatility (ERV), exports, imports and economic growth in Nigeria. Second, provided the long run equilibrium exists, we determine the causal links between ERV exports and imports using Granger (1969) causality test. Our finding is robust as it shows bidirectional causal links from ERV to exports and unidirectional causal flows from ERV to imports and overall economic growth. The remaining part of this paper is organized as follows, section 2 presents literature review which also includes an overview of exports promotion developments in Nigeria, and how oil sector dominates the economy at expense of the other sectors, section 3 contains data and methodology, section 4 presents empirical results while section 5 concludes.

2. Literature Review

2.1 Empirical Studies

Since the commencement of the floating exchange rate system in 1973, there was increasing number of studies that have investigated the impact of exchange rate uncertainty or volatility on trade flows. Economic theory and empirical studies are ambiguous on the impact of increased exchange rate variation as some models can predict negative or positive impacts depending on key parameters. However substantial number of empirical studies concludes significant inverse relationship with few supporting significant positive relationship. Some of these studies consist of Bini-Simaghi (1991), Brada and Mendez (1988), Bahmani-Oskooee and Wang (2008). On the other hand sample of the studies that find no significant relation include Koray and Lastrapes (1989), McKenzie (1998), Lee (1999), and Herwartz Weber (2005).

Brada and Mendez (1988) test whether flexible exchange rates reduce the volume of international trade more than do fixed rates. They assume that differences between the volumes of trade with two types of partners should reflect systematic differences on commercial policy between fixed and floating regime countries. Brada and Mendez (1988) use gravity model of bilateral trade flows, which premise that bilateral trade between two countries is positively related to their respective incomes and negatively to the distance between them. They use bilateral trade flows among thirty developed and developing countries from 1973 to 1977 a period that includes both turbulent and tranquil times of exchange rates volatility. The result shows that bilateral trade flows among countries with the floating exchange rates are higher than those among countries with fixed rates. Inevitably, exchange rate uncertainty does lower the volume of trade among countries regardless of the nature of their exchange rate regimes, its effects are less than the trade – reducing effects of respective commercial policies imposed by fixed exchange rate countries.

Bahmani-Oskooee and Kovyryalova (2008) investigate the impact of exchange rate uncertainty on trade flows. Rather than using aggregate import and export data between one country and the rest of the world or between one country and her major trading partners they concentrate on 177 commodities traded between the United States (US) and the United Kingdom (UK) and employed cointegration and error-correction techniques to analyze the data covering 1971-2003. The results reveal that the volatility of the real bilateral dollar-pound rate has a short-run significant effect on imports of 109 and exports of 99 industries. In most cases, such effects are adverse. They also find that the number of significant cases is somewhat reduced in the long run with imports of 62 and exports of 86 industries which are significantly affected by the exchange rate volatility. They conclude that in most cases the effect is negative supporting the opponents of floating rates.

Similar study by Bahmani-Oskooee and Wang (2008) determine whether a country's comparative advantage commodities are adversely affected by exchange rate volatility, they decompose bilateral exports and imports between two countries into industry level data and concentrate on one of the major trading partners of Australia i.e. the US, and employ data from 107 industries that engage in trade between the two countries. They equally employ methodology that distinguishes the short run effects from the long-run effects i.e. bounds testing approach to cointegration and error-correction modeling. The empirical results show that exchange rate uncertainty has short-run effects on imports and exports of majority of the industries for which

data was available (60% of the cases). However, the short run effects last into the long run only in the limited number of industries, though number of US importing industries affected in the long run were found to be almost twice as many as US exports by industries. Alternatively, exchange rate uncertainty affects Australian exports to the US more than it affects her imports.

In contrast to the studies that reveal negative relation between exchange rate volatility and trade flows Koray and Lastrapes (1989) produced contrary result, their study focus on the relationship between the real exchange rate volatility and bilateral imports of the united states(US) from the United Kingdom(UK), Germany, France, Japan and Canada .They constructed a VAR model and estimated for each bilateral case using monthly data from 1959 to 1989.Overall the evidence from the general time series model for the countries suggests a weak relationship between US bilateral trade flows and a measure of exchange rate variability.

Furthermore, two results emerge from the empirical investigation by Lee (1999). First neither price nor volume is significantly affected by the volatility of the exchange rate. The effect on prices is hardly significant. The conventional negative effect of the volatility on volumes vanishes when relative prices are included in the regression. Second the volatility of the exchange rate depresses import prices of durables more strongly than those of non-durable. The difference is statistically significant for relative prices but not for volume. This is consistent with the basic hypothesis that the volatility has a negative effect on demand for durable imports. However, Herwartz and Weber (2005) find weak causal Links operating from exchange rate uncertainty to trade growth for the 15 industrialized countries including G7.

The empirical literature concerning the effect of ERV on trade flows in Nigeria also delivers mixed results, Ibikunle and Isaac (2011) found inverse and statistically insignificant relationship between aggregate trade and ERV. Aliyu (2010) finds stable and long run equilibrium relationship between non-oil exports and the Naira exchange rate. Similarly in a panel study that comprises some ECOWAS countries including Nigeria, Omisakin, Oyinlola and Adeniyi (2010) found significant relationship between trade flows and ERV for the selected countries.

More importantly, our study differs with above in some ways, for example Ibikunle and Isaac (2011) use aggregate trade data without precisely capturing real exports and imports separately. Aliyu (2010) considers non-oil exports only therefore his model precludes imports and economic growth. Despite the fact that Omisakin, Oyinlola and Adeniyi (2010) study found significant effect of ERV on trade flows yet it failed to adopt proper measure of exchange rate volatility making it a little bit ambiguous, and also it is not country specific that warrants adequate attention for analysis. The focus of our study is to investigate how ERV affects exports, imports and the economic growth of Nigeria, we use annual total volume of exports, imports GDP and exchange rate to compute our model.

2.2 An overview of Export Promotion Developments in Nigeria

Prior to the Nigerian independence in 1960, agriculture was the dominant sector of the economy, contributing about 70% of the Gross Domestic Product (GDP), employing substantial number of the working population, constituting two-third of the labor force and accounting for about 90% of foreign exchange earnings and federal government revenue. The early period of post-independence up until mid 1970s saw

a rapid growth of industrial capacity and output as the contribution of the manufacturing sector to GDP rose from 4.8% to 8.2%. This pattern changed when oil suddenly became of strategic importance to the world economy (Adedipe 2004).

The crude oil exploration and exports commenced in 1958 and gradually the oil exports began to increase with astronomical quantity in the mid 1970s due to the Middle East war that brought about oil scarcity and escalating prices, this led to massive accumulation of wealth, which resulted in an increased government capital expenditure. Although, Nigeria benefitted greatly from the oil boom revenue by developing her infrastructural facilities and service sector of the economy, yet both industrial and agricultural output fell drastically.

Table (1) reports the total volume of oil and non-oil exports, it shows that in 1960 non-oil exports which mainly consist of agricultural and industrial outputs outweigh oil exports. During this period Nigeria is a self-sufficient food producing country and a large net exporter. However, with the incessant demand and hike in the oil price in the mid 70s, the country shifted her focus to oil exports neglecting other sectors of the economy. Table (1) shows how oil exports grew exponentially from 1970 to date with non-oil exports growing at a very low rate.

Table 1: Total Value of Nigeria Exports

Year	Oil Exports Million (N)	Non-oil exports Million(N)	Percentage of world exports
1960	8.8	330.6	0,356
1970	510.0	375.4	0.394
1980	13,632.3	554.4	1.274
1990	106,626,5	3,259.6	0.393
2000	1,920,900.4	24,822.9	0.325
2009	9,680,184.2	94,318.7	0.368

Source; UNTACD database and CBN statistical Bulletin (2009)

Fundamentally, it is argued that Nigeria benefitted tremendously from the oil revenue. The phenomenal increases of foreign exchange earnings surplus contribute to high foreign reserves, which subsequently led to overvaluation of Naira (Nigeria currency). This development according to Adedipe (2004) encouraged import-oriented consumption habit that soon turned Nigeria into a perennial net importer, which became a major problem when oil earnings decreased with lower international oil prices. External reserves collapsed, fiscal deficits mounted and external borrowing ensued with the “jumbo loans” taken in 1979. Most of Nigeria’s macro-economic indices became unstable and worrisome.

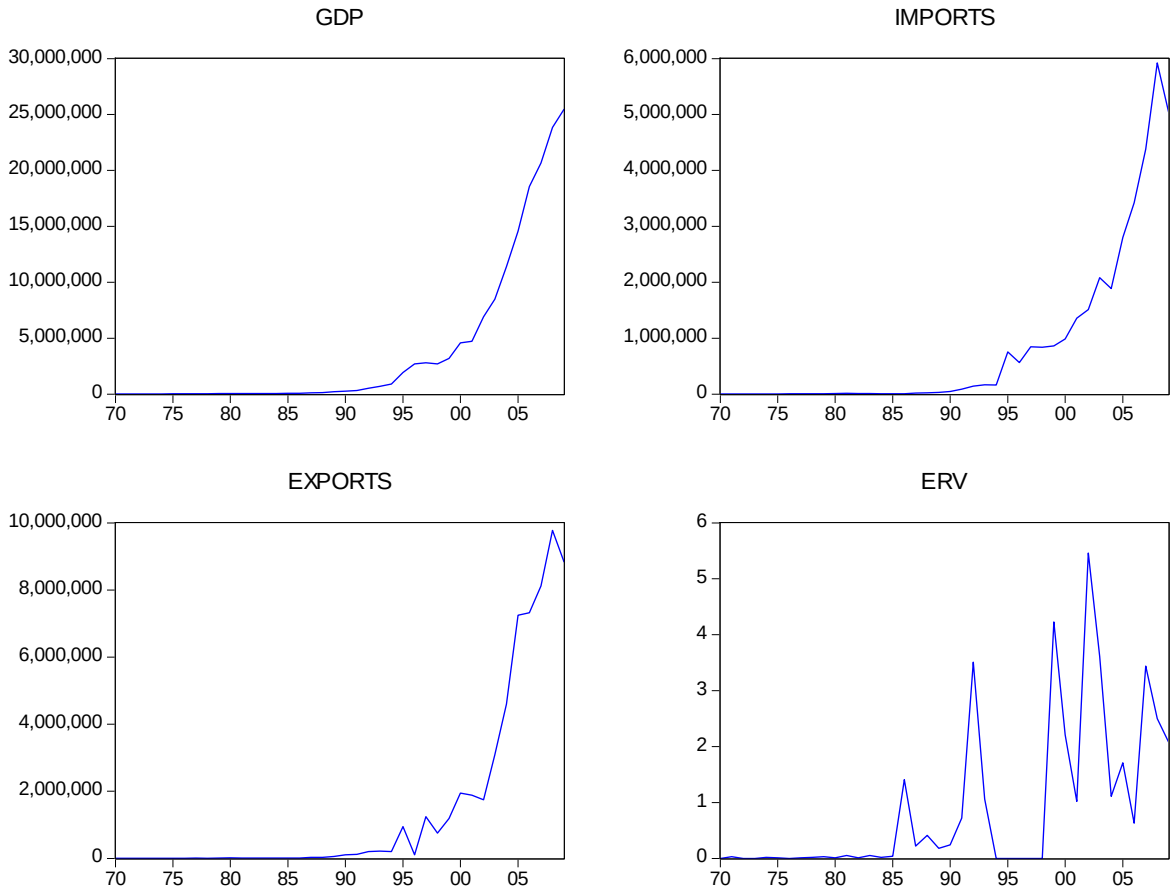
In order to resuscitate the devastating economy, a comprehensive structural adjustment program (SAP) was introduced in 1986, the fundamental objectives of the SAP include restructuring and diversifying the productive base of the economy so as to reduce dependency on the oil sector and imports, achieve fiscal and balance of payments viability over the medium term and promote non-inflationary economic growth. Several policies were designed to achieve the stated objectives, prominent among them includes departure from controlled to float exchange rate regime, privatization and commercialization of government owned companies, elimination of price controls and commodity boards, rationalization and restructuring of tariffs in

order to aid industrial diversification and so on. Despite the fact that government pursues these policies and programs vigorously significance success is yet to be recorded in achieving the desired objectives effectively.

One conspicuous effort made by the government to promote exports was the establishment of Nigeria export-import bank (NEXIM) in 1991. The bank is saddle with the responsibility of providing export credit guarantee and export credit insurance facilities to its clients. It also provides credit in local currency to its clients in support of exports. Recently this year, the bank budgeted 250 billion Naira for the disbursement in the next five years to boost non-oil exports in the country. Although the bank succeeded in achieving remarkable improvement in the financing of exports in the country, yet many exporters particularly small scale industrialists are financially handicapped making it difficult for them to exploit the lucrative global exports market even at regional level.

The establishment of export processing zone (EPZ) in 1992 indicates another unique effort to move Nigeria from import substitution towards an export-oriented economy. Free trade zones were established across the regions of the country, under these zones all products and services are designated for export with specific exceptions. Enterprises in the zones are exempted from custom duties, local taxes and foreign exchange restrictions, and qualify for incentives-tax holidays, rent free land, no strikes or lockouts, no quotas in the EU or US markets. Notwithstanding, Nigeria export promotion council (NEPC) was established in 1990 prior to EPZ to equally provides funds to exporters. Surprisingly, with all these efforts and strong determination Nigeria economy remains largely dependent on oil without achieving remarkable growth in non-oil exports.

Figure 1: Charts depicting variables trend from 1970-2009



3. Data and Methodology

3.1Data and Descriptive Statistics

In this study we refer to Nigeria as one of the good representative of small open economy that participates in international trade, but small enough compared to its trading partners such as USA, UK, Netherlands, and China. Although, the country is rich in terms of abundant mineral resources still it is classified among developing countries. Annual time series data (1970 - 2009) for GDP, exports and imports all in current prices of the Nigerian currency were compiled from the various issues of the statistical bulletin of central bank of Nigeria (CBN), the justification of using 1970 as the beginning of our data period is to enable us capture the beginning of exchange rate variability in Nigeria although the period is within fixed exchange rate regime. Data pertaining exchange rates were sourced from United Nations Conference on Trade and Development (UNTACD). We Follow Marques and Mallick (2006) and Tedesch and Bugamelli (2008) procedure by taking the unit value of annual exports outflows, imports inflows and the total value of GDP, the use of Naira/USD official exchange rate is employed simply because USD remains the most universally acceptable currency in the world follow by the fact that USA is one of the major trading partners to Nigeria especially on the export side. Following vast pool of literature (Tenreyro 2007, Bahmani-Oskooee & Wang 2008, Aliyu 2010) we use 12-month annual standard deviation of official exchange rate to determine exchange rate volatility Significant variations of the exchange rate are recorded from 1987 upward when Nigeria began to implement a comprehensive package of economic reforms followed by a managed float regime that replaced fixed exchange rate

system. Figure (1) showcases 1990 as the very year when Nigeria has begun to achieve remarkable growth of GDP, imports and exports volumes. This could be traced to the positive results realized via the economic reform, which turn the economy into the market oriented. The ERV chart shows significant exchange rate shock in 2000, after experiencing steady movement from 1970 to 1980 with little fluctuations from 1990 to 2000. This clearly demonstrates the historical antecedent of exchange rate evolution in Nigeria from controlled period to partially market oriented that allows for subtle variability and less government intervention in the supply of foreign exchange and the determination of the rate.

The descriptive statistics, which are expressed in Nigeria currency, are reported in table (2) over the sample period, the exchange rate volatility range between 0 and 5.46 per USD. The average volume of exports and imports are approximately 850.26m and 1,497.74m respectively. Gross domestic product (GDP) range from 1,782m to 28,989,985m and the annual average of GDP is approximately 3,908,381m

Table 2: Descriptive statistics

	Maximum	Minimum	Mean	Median	Standard deviation
GDP	28,989,985	1,782	3,908,381	242,174	7,021,031
Imports	5,821,450	756	850,259	38,289	1,487,076
Exports	9,774,611	886	1,497,738	83,757	2,781,076
ERV	5.4600	0.00	0.9010	0.0500	1.4086

3.2 Model Specification

This paper adopts the statistical framework of Vector autoregressive (VAR) methodology to determine the causal flows from ERV to trade flows and economic growth. Mathematically, the VAR system representation can be written as follows:

$$X_{1t} = \propto_1 + \sum_{i=1}^{k} \beta_i X_{t-i} + \sum_{i=1}^{k} \Upsilon_i Y_{t-i} + \varepsilon_{1t} \quad (1)$$

$$Y_{1t} = \propto_2 + \sum_{i=1}^{k} \theta_i X_{t-i} + \sum_{i=1}^{k} \Upsilon_i Y_{t-i} + \varepsilon_{2t} \quad (2)$$

Where the ε's are the stochastic error term while X and Y are the variables and k maximum lag length. We treat all the variables ERV, GDP, exports and imports endogenously in the model as shown below:

$$X_t = (erv, \exp, imp, gdp) \quad (3)$$

In order to avoid biasness in determining lag length, we use Schwarz information criterion (SC) and Akaike information criterion (AIC), in choosing the correct lag order of 3 for the computation of the VAR model.

3.3 Methodology

We employ new advances in the field of time series econometrics in order to provide more reliable estimates. We make use of the Augmented Dickey-fuller (ADF) test to test the stationarity of the four time series, GDP, exports, imports and ERV. A variable that has a unit root is non-stationary in the level form but becomes stationary after being differenced once such a variable is also called integrated of order one and it is usually denoted by 1(!). Hacker and Hatemi-j (2004) pointed out that it is crucial to test for unit root because in the presence of the unit roots the standard distribution of test statistics are not correct and there is a risk of having spurious regression results. In this study, the ADF tests are conducted on level, first and second differenced observations by estimating the following three models of (4) no intercept no trend (5) intercept no trend and (6) intercept and trend model:

$$\Delta y_t = \gamma y_{t-1} + \sum_{t=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (4)$$

$$\Delta y_t = \infty_0 + \gamma y_{t-1} + \sum_{t=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta y_t = \infty_0 + \infty_{2t} + \gamma y_{t-1} + \sum_{t=1}^{k} \beta_i \Delta y_{t-i} + \varepsilon_t \quad (6)$$

Where $\Delta \mathbf{y_t} = \mathbf{y_t} - \boldsymbol{y_{t-1}}$ is the first difference of the series $\mathbf{y_t}$; $\Delta \boldsymbol{y_{t-i}} = (\mathbf{y_{t-1}} - \boldsymbol{y_{t-2}})$ is the first difference of $\boldsymbol{y_{t-1}}$, etc, ∞, γ and $\boldsymbol{\beta_i}$ are parameters to be estimated and $\boldsymbol{\varepsilon_t}$ is a stochastic disturbance term. The three equations differ in the inclusion or exclusion of the deterministic elements ∞_0 and ∞_{2t}. Having established the non-stationarity of the four variables, the next step is to test for the presence or absence of a long-run equilibrium among the variables. We use the Johansen co-integration test, which is the most widely used in literature.

Cointegration is an econometric property of time series variables. If two or more time series are themselves non-stationary, but their linear combination is stationary, then the series are said to be co-integrated. In practice, cointegration is a means for correctly testing those hypotheses concerning the relationship between two series with unit roots. The cointegration test is based on the maximum likelihood estimators of a vector autoregressive (VAR) process. The likelihood ratio-test statistic for the hypothesis of the at most r co-integrated relationship and the at least $m = n - r$ common trend is given by:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \ln\left(1 - \hat{\lambda}_i\right) \quad (7)$$

$$\lambda_{\max} = -T \ln\left(1 - \hat{\lambda}_{r+1}\right) \quad (8)$$

Where λ_{trace} is the trace statistic, $\lambda_{\max}$ is the eigen-max statistic, $\hat{\lambda}_i$ denotes the smallest estimated eigen-values, and T is the sample size. The null hypothesis

tested in λ_{trace} is no cointegration. In fact, for bivariate cointegration test, up to two null hypotheses can be tested. If the null that $r = 0$ is rejected, at least one cointegrating vector may exist, and the second hypothesis that $r \leq 1$ is subsequently tested.

Table 3: ADF Test for a unit root

Variables	*Model(1) No Constant & No trend*	*Model(2) Constant & No trend*	*Model(3) Constant & trend*
1. ADF Test for unit root on the level series			
GDP	-1.950	-2.943	-3.568
Exports	-1.952	-2.957	-3.568
Imports	-1.950	-2.948	-3.568
ERV	-1.949**	-3.610*	-4.211*
2. ADF Test for unit root on the first differenced series			
GDP	-1.952	-2.967	-3.574
Exports	-2.627*	-3.615*	-4.219*
Imports	-1.951	-2.954	-3.552
ERV	-2.622*	-3.621*	-4.226*
3. ADF Test for unit root on the second differenced series			
GDP	-1.953	-2.974	-3.581**
Exports	-2.630*	-3.626*	-3.580
Imports	-2.634*	-3.839*	-3.581**
ERV	-2.630*	-3.626*	-4.243*

Notes; * & ** denotes rejection of Null Hypothesis at 1% and 5% significance level

We apply Granger causality test to identify causal relationship between the variables under study. According to Granger (1969), a variable Y is caused by another variable X if Y can be predicted well from past values of Y and X than from past values of Y alone. The Granger test may be explained with the help of the following equations:

$$X_t = a_0 + \sum_{j=1}^{m} a_j x_{t-j} + \sum_{j=1}^{n} b_j y_{t-j} + e_t$$

(9)

$$Y_t = c_0 + \sum_{j=1}^{m} c_j x_{t-j} + \sum_{j=1}^{n} d_j x_{t-j} + w_t$$

(10)

Where X and Y are two stationery time series, a_0, c_0, a_j, c_j b_j and d_j are coefficients, e_t and w_t are uncorrelated white noise series. The definition of causality given above implies that if Y_t is to cause X_t, then some b_j are non-zero. If both the events occur simultaneously, there is said to be a feedback between X_t and Y_t.In other words, the null hypothesis Y_t does not strictly Granger-cause X_t is rejected if the coefficients on the lag values of Y_t in equation (9) are jointly significantly different from zero.

Bidirectional causality exists if the null hypothesis, that X_t does not strictly Granger-cause Y_t, is also rejected.

4. Empirical Results and Discussions

4.1 Unit Root Test

The results of the ADF tests are shown in table (3). They show null hypothesis of a unit root is accepted for the level series of GDP, exports and imports and rejected for level series of ERV in all the three models, based on the first differenced data only exports and ERV are rejected in all the models. However, based on the second differenced data all the four variables are rejected in either model (1) or (3) which indicate that all the four series are stationary. We therefore conclude that the GDP, exports, imports and ERV can be well characterized as 1(1) process or in short the four time series are all integrated in order 1(1).

4.2 Testing for Cointegration of the Variables

Next we examine whether the four time series form a cointegrating relationship. The test for cointegration provides the means of specifying any long run equilibrium relationship among the four variables, i.e. GDP, exports, imports and ERV. Table 4 presents summarized results of the Johansen cointegration rank test, which indicates the presence of two cointegrating vectors at 1 percent level of significance respectively. This means the null hypothesis of no cointegration is rejected for the rank less than or equal to 2 (r≤2). This showcases the evidence that there exists a long-term relationship among the four variables.

Table 4: Johansen Cointegration Tests

Null (H_0)	Alternative(H_1)	λ_{max}	99%CV	λ_{trace}	99% CV
Rank=0	r≥1	101.3358	32.71527	165.0565	54.68150
Rank≤1	r≥2	46.92438*	25.86121	63.72068*	35.45817
Rank≤2	r≥3	10.01633	18.52001	16.79630	19.93711
Rank≤3	r≥4	6.779976*	6.634897	6.779976*	6.634897

Trace and max-eigen value tests indicate 3 cointegrating eqn(s) at the 0.01 level
*denotes rejection of the null hypothesis at the 0.01 level

4.3 Granger Causality Test

Table 5 presents Granger Causality test results for the four variables. The results show that (1) the separate effects of GDP and imports on ERV are not statistically significant. (2)The separate effects of imports and ERV on GDP are statistically significant. (3)The effects of GDP on imports and exports are statistically significant. (4) The effects of ERV on GDP, exports, and imports are statistically significant. Consequently, the results show exports separate effects on GDP but not the reverse, whereas the causal links between ERV and exports is bidirectional, thus, our empirical findings can be summarily explained as follows:

I. Exchange Rate system plays significant role in determining exports, imports and overall economic growth. ERV causes more exports and at the same time discourages more imports into Nigeria. This conforms to many empirical findings (for example see Abbott & De Vita 2004 and Bahmani-Oskooee &

Kovyryalova 2008) and theoretical postulations that support floating system of exchange rate.

II. The bidirectional causal flows between imports and economic growth indicates Nigeria overdependence on imports. Although significant volume of imports is needed to boost industrial base of the country, which is the ingredient for economic growth, yet the nature of the importation is more of consumption purposes, which equally harm the survival of the domestic industries.

III. The one way or unidirectional links between exports and economic growth indicates poor performance of non-oil exports in Nigeria, the over reliance on oil exports as the main sources of foreign exchange earnings which its price fluctuates and the production many at times halted due to internal crises affects competitive export growth in the country. Table (1) shows how the percentage share to the global exports of Nigeria decline from 1.2 in 1980 to barely 0.37 in 2009, this clearly demonstrates the need for government to redesign its export policy and strategy to enable the country compete with other emerging economies in the world

Table 5: Granger causality test

Dependent Variable	F-statistics			
	GDP	Imports	Exports	ERV
GDP		5.7203 (0.0032)		21.7682 (1.E-07)
Imports	14.1236 (6.E-06)		9.3986 (0.0002)	3.28076 (0.0343)
Exports	12.4814 (2.E-05)	17.7873 (8.E-07)		5.5682 (0.0037)
ERV			5.5064 (0.0039)	
Conclusion	GDP=>Imports GDP=>Exports	Imports=>GDP Imports=>Exports	Exports=>Imports Exports=>ERV	ERV=>GDP ERV=>Imports ERV=>Exports

Notes; p-value in parentheses, lag interval 3 and number of observations 37

IV. The ERV has a vital causality links (bidirectional or unidirectional) with all the three variables. This means that the current manage floating exchange rate regime implemented in Nigeria is worthwhile since it facilitates trade flows and enhances economic growth. Subsequently, for other sub-Saharan African countries to achieve significant economic growth they must implement an appropriate exchange rate regime that would improve their competitive advantage and increase their level of exports to augment the substantial imports needed to harness the abundant mineral resources for both domestic and international markets.

5. Summary and Conclusion

With exception of few, most of the studies on the impact of exchange rate volatility on trade flows focus on developed countries without given regards to the less developed economies, this paper diverted from literature by focusing on sub-Saharan African

countries with particular reference to Nigeria. We examine causal linkages between exchange rate volatility, trade flows and economic growth (GDP) based on time series data over the period of 1970-2009. The Augmented Dickey Fuller (ADF) tests are carried out to test for unit roots for the variables involved. We use Johansen cointegration test to determine the number of cointegrating vectors and the results reveal the presence of two cointegrating equations, which indicate the existence of long run equilibrium relationship among the four variables. Next we test the null hypothesis of no causal flows from exchange rate volatility to exports imports and economic growth using Granger causality test through standard VAR model with stationary time series of the variables. The empirical results indicate significant effects of exchange rate volatility on trade flows and overall economic growth of Nigeria. Our empirical findings are in conformity with Aliyu (2010) results and in contrast to Ibikunle and Isaac (2011) findings. Conclusively, the findings support various economic researches which suggest that the exchange rate can be effective tool for economic development (see Mattoo & Subramanian 2009).

The findings of this study provide important implication for policy makers in Nigeria and other sub-Saharan African countries. Firstly, devaluation of domestic currency provides important opportunity for economic growth, it boosts exports capacity and reduces volume of imports drastically. Secondly, for Nigeria, the floating exchange rate regime performs relatively better than fixed regime as it reduces tight control measures impose on the foreign exchange market which in many cases affects volume of trade. Thirdly, there exists no reciprocal relationship between economic growth and exports, this means the economy needs to be diversified to create positive correlations between economic growth and trade flows. Positive linkage from the growth of exports and the growth of imports needs to be sustained by the policy makers. To this end given the mono-economic nature of Nigeria we recommend that an immediate diversification of the economy by shifting emphasis from oil to manufacturing sector should be re emphasized, firstly, by looking inward to meet the domestic demand of basic manufacturing goods and secondly, look outward by supplying the regional markets of West Africa. More importantly, the floating exchange rate system should be allowed to operate fully without government intervention this will automatically reduce over spending of the reserve and at the same time achieve fiscal stability.

References

Aliyu, SUR 2009, 'Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation',*Research Journal of Internatıonal Studıes,* (2), 4-15.

Abbott, A & De Vita, G 2004, 'Real Exchange Rate Volatility and US Exports; An ARDL Bounds Testing Approach',*Economic Issues*, vol. 9, part 1

Adedipe, B 2004, 'The Impact of Oil on Nigeria's Economic Policy Formulation' *proceedings of conference on Nigeria: Maximizing Pro-poor Growth: Regenerating the Socio-economic Database,* Overseas Development Institute in collaboration with the Nigerian Economic Summit Group, Lagos Nigeria, pp 1-22

Bahmani-Oskoee, M & kovyryalova, M 2008, 'Impact of Exchange Rate Uncertainty on Trade Flows; Evidence from commodity Trade between the US and the United Kingdom'.*The World Economy*, vol. 7, pp 1097-1128

Bahmani-Oskoee, M & Wang, Y 2008, 'Impact of Exchange Rate Uncertainty on Commodity Trade between US and Australia', *Australian Economic papers,* pp 235-238

Brada, JC & Mendez, JA 1988, 'Exchange Rate Risk, Exchange Rate Regimes, and the volume of International Trade', *Kyklus*, vol. 41(2) pp 263-280

Bugamelli, M &Tedeschi, R 2008, 'Pricing-to-Market and Market structure', *Oxford Bulletin of Economics and Statistics*, vol.70(2), pp 155-180

Granger, CWJ 1969, 'Investigating causal relations by econometric models and cross-spectral methods', *Econometrica*, vol (**37)**, pp 424–438.

Haker, RS & hatemi, JA 2004, 'The Effects of Exchange Rates Changes on Trade Balances in the short and Long run',*Economics of Transition*, vol. 12(4), pp 777-799

Herwartz, H & Weber, H 2005, 'Exchange Rate Uncertainty and Trade Growth, a comparison of linear and non-linear (forecasting) Models', *Applied stochastic Models in Business and Industry*. Vol. 21, pp 1-26

Ibikunle, JA & Isaac, A 2011, 'An Empirical Investigation of the Link between Exchange Rate Volatility and Trade in Nigeria ', *Journal of Emerging Trends in Economics and Management Sciences* 2(3): 175-183.

Koray, F & Lastropes, WD 1989, 'Real Exchange Rate Volatility and US bilateral Trade, A VAR approach'*Review of Economics and Statistics,* vol. 71, pp 708-712

Kandil, M &Mirzaie, IA 2008, 'Comparative Analysis of Exchange Rate Appreciation and Aggregate Economic Activity: Theory and Evidence from Middle Eastern Countries.',*Bulletin of Economic Research* 60(1): 45-96.

Lee, J 1999, 'The Effect of Exchange Rate Volatility on Trade in durables',*Review of International Economics*, vol. 7, issue 7, pp 189-201

Mattoo, A & Subramanian, A 2009, 'Currency, Undervaluation and Sovereign Wealth Funds: A New Role for the World Trade Organisatoin',*The World Economy,*pp 1135-1164

Omisakin, O,Oyinlola, A & Adeniyi, O 2010, 'Relative responsiveness of trade flows to changes in exchange rate and prices in selected ECOWAS countries: Does orcutt hypothesis hold?'Journal *of Economics and International Finance* Vol. 2(6): 102–108.

Tenreyro, S 2007, 'On the Trade Impact and nominal Exchange Rate Volatility', *Journal of Development Economics*, vol.82, pp 485-508