

## **EXCHANGE RATE MOVEMENTS, IMPORT AND ECONOMIC GROWTH IN NIGERIA (1986-2010)**

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### **ABSTRACT**

*The study empirically investigates the effect of exchange rate volatility on import trade in Nigeria during the period 1986: 1-- 2009: 4. The study focuses on import trade because, the import aspect of trade flows has often been ignored by researchers. The study showed that exchange has been volatile in Nigeria as evident from the unusually high and unusually low standard deviation. Also, the econometric results show that exchange rate displays a clustering trend during the period under investigation which portrays high degree of volatility. Further, the econometric results indicated that a long run relationship exists between exchange rate volatility and trade flows. Also, the study showed a significant negative relationship between domestic output and import component of trade flows suggesting that increasing import tends to shrink production line in Nigeria. The study concluded that exchange rate volatility exerted a significant negative relationship with import in Nigeria.*

**Keywords:**Exchange rate volatility, Import, Export, GDP, Error correction model (ECM), International trade, Nigeria.

### **1. INTRODUCTION**

Since the move to floating exchange rate system in 1973, the effect of dramatic movement of exchange rate has continued to generate series of responses among the world's major currencies (Vergil, 2002). Prior to the introduction of Structural Adjustment Program (SAP) in 1986, Naira enjoyed appreciable value against US dollar, a factor that creates opportunity for rapid economic growth and stability (CBN, 2000). The introduction of new policy measures brought unstable exchange rate which resulted in high degree of uncertainty in Nigeria business environment. Domestic investors take dicey decisions whether to invest or not because of the unpredictable movement of the exchange rate (Shehu, 2008). The situation must equally have an effect on importation level of the country (Oloba and Abogan, 2013). Nigeria as a developing country striving to develop its industrial base needs to harness its foreign exchange market to enable domestic investors import relevant machineries, equipments and raw materials for the industrial consumption (Abba, 2009).

One standard theoretical argument that emanates from the above is that exchange rate volatility may hinder trade flows in the sense that exchange rate volatility represents uncertainty and will impose costs on risk-averse economic agents (Isitua and Neville, 2006). In Nigeria, data have shown that exchange rate has been volatile since the breakdown of the Bretton Wood Agreement in 1973 and more particularly after the implementation of the recent trade liberalization policy. In the year 1986-1991, 1992-1997, 1998-2003 and 2004-2009, the standard deviation measurement of exchange rate stood at 2.69, 1.72, 35.4 and 9.24 respectively. This is an indicator that exchange rate has been unusually high and unusually low within the period under investigation (Oloba and Abogan, 2013). This according to the literature is typical of a developing economy like Nigeria. Mckenzie (2009) is in support of this as he argues that developing economies particularly Sub-Saharan African countries have witnessed highest exchange rate volatility recently. International trade, as one of the major components of the national income of an open economy, has generated a lot of controversies as to whether it is favourable or unfavourable in Nigeria. Nigeria is a country that survives majorly on export of primary products and import of manufactured goods. It is therefore expected that the volatility in the exchange rate will have affected both the export and import components of trade.

However, in Nigeria, most recent empirical studies focused only on the export component of trade flows with little attention given to the import aspect of trade flows. The import aspect of trade flows is very important since economics theory stipulates that domestic GDP of a country is an important determinant of her import. Therefore, evidences from the import side of trade flows can help a country not only gather fresh information as regards the domestic output but also make relevant policies on growth. Given this lopsided situation, the basic objective of the paper is to examine the effect of exchange rate volatility on trade flows in Nigeria between 1986 and 2010 taking the import components of trade flows into consideration.

The rest of this paper is organised as follows: A review of related theoretical and empirical literatures is undertaken in section 3. Section 4 looks at the methodology. The empirical results and analysis are considered in section 5 while section 6 concludes the paper.

### **1.1. Motivation of the Study**

This paper motivates the author for two main reasons. First, the paper is justified based on the fact that developing economies have witnessed greater exchange rate volatility in the last few years as reported by Mckenzie (2009). For instance, the global economic downturn, which started during the last quarter of 2008 and lasted through to the second quarter of 2009 adversely, affected developing countries' exchange rate more severely than that of their developed counterpart. It becomes necessary to embark on a research in a bid to discovering fresh evidences given the new trends. Second, the relationship between the exchange rate volatility and trade flows has been shown to be ambiguous both at the theoretical level and the empirical level. The study is thus worth researching over and over again in a bid to seeing if a more general consensus way of expressing the link between the exchange rate volatility and trade flows can be established

## 2. LITERATURE REVIEW

### 2.1. Review of the Theoretical Literature

The question of whether exchange rate volatility has independent adverse effects on exports and trade has attracted a lot of attention in the literature. Beginning with the example of a rudimentary exporting firm to illustrate how exchange rate volatility can affect the level of the firm's exports, the simplest case described by Clark (1973), for example, consider a competitive firm with no market power producing only one commodity, which is sold entirely to one foreign market and does not import any intermediate inputs. The firm is paid in foreign currency and converts the proceeds of its exports at the current exchange rate, which varies in an unpredictable fashion, as there are assumed to be no hedging possibilities, such as through forward sales of the foreign currency exports sales. Moreover, because of costs in adjusting the scale of production, the firm makes its production decision in advance of the realization of the exchange rate and therefore cannot alter its output in response to favourable or unfavourable shifts in the profitability of its exports arising from movement in the exchange rate. In this situation the variability in the firm's profits arises solely from the exchange rate, and where the managers of the firm are adversely affected by risk, greater volatility in the exchange rate with no change in its average level leads to a reduction in output and hence in exports, in order to reduce the exposure to risk. This basic model has been elaborated by a number of authors, e.g. Hooper and Mann (1978), who reached the same conclusion of a clear negative relationship between exchange rate volatility and the level of trade.

### 2.2. Empirical Literature Review

Given the nature of the topic, studies have sought to confirm the theoretical foundations of this quest of the impact of exchange rate volatility on trade flows using bilateral rather than aggregate trade data between and among countries respectively, yet they find little or no relationship (Baum *et al.*, 2004).

One of the recent most significant attempt by researchers to inquire the direction of exchange rate movement and trade link is reflected in Olayungbo (2011) investigates the impact of exchange rate volatility on trade. The study covers 40 selected sub-Saharan African countries for the period 1986-2005 adopting a gravity model with pooled OLS allowing for fixed effect and panel Generalized Methods of Moment (GMM) techniques. Their results show that the net effect of exchange rate volatility on aggregate trade is positive using the two approaches. Joseph and Akhanolu (2011) conducted an empirical investigation of the link between exchange rate volatility and trade in Nigeria. Using annual data for the period of 1970-2009, the study estimates the exchange rate volatility with the use of Generalised Auto regressive methods. The study revealed that an inverse and statistically insignificant relationship exist between aggregate trade and exchange rate volatility in Nigeria.

Mckenzie (2009) collected a cross sectional data on 4 sub-Saharan African countries between 1986 and 2007 and used this to conduct a research on the impact of exchange rate volatility on

trade flows. The popular OLS estimating technique was used and he concluded that exchange rate volatility has a negative effect on trade flows of African countries.

In another study, [Takaendesa et al. \(2005\)](#) conducted a research on the impact of real exchange rate volatility on South Africa's export flows to the United States for the period between the first quarter 1992 and fourth quarter 2004 using the two—good-two-country model of international trade. In the study, they used the exponential generalized auto regressive conditional heteroscedasticity (EGARCH) model to measure real exchange rate volatility, in line with one of the objectives of their study which is to improve the work of [Bah and Amusa \(2003\)](#) who used the pure autogressive conditional heteroscedasticity (ARCH) and the generalized autoregressive – error correction methods to measure variability in exchange rate. They concluded that real exchange rate has a negative effect on real exports of South Africa.

In Nigeria, in an empirical investigation conducted by [Shehu \(2008\)](#) used quarterly observations (1986-2006) for the analysis using cointegration method of estimation. He concluded that Naira Exchange rate volatility decreases non oil export by 3.65% while the same estimate for the US dollar volatility increased export of non-oil in Nigeria by 5.2% in the year 2003 (Shehu, 2003).

In another study, [Isitua and Neville \(2006\)](#) investigated the effect of exchange rate volatility on trade flows in Nigeria. Their study employed the generalized auto-regressive conditional heteroskedasticity (GARCH), cointegration analysis and Error correction Model (ECM) to analyze data collected from 1985 first quarter to 2005 fourth quarter. The study found that exchange rate volatility has a significant and negative effect on Nigeria exports.

In conclusion, from the theoretical and empirical survey, we can infer that findings from various authors are not uniform. Literatures have also shown that researchers are beginning to develop interest in this area given the inconclusive findings of past studies and its theoretical foundations. But, an important dynamism observed from the overall empirical studies is that better part of the studies conducted in the developed countries concentrated on import component of trade flows more than export component and yet there are mixed results. In Nigeria, as a proxy for developing countries, most studies have laid emphasis on export component of trade flows with little review on the import aspect of trade. This study intends to fill that gap providing fresh evidence from the import aspect of trade flows.

### 3. METHODOLOGY

To empirically examine the effect of exchange rate volatility on trade flows in Nigeria, this paper follows a simple traditional import demand framework as employed by [Aydin et al. \(2004\)](#) as a fresh attempt to model the trade flows of Turkey. According to the framework, growth of real income (output) and expansion of imports go hand-in-hand, since nearly 70 % of all imports are done for the procurement of intermediate manufactured inputs and raw materials. That is, real domestic output is an important determinant of import. Also, regarding the fact that real exchange rate is beginning to emerge as a central issue in the public and policymaking debates, it

should be mentioned that the real exchange rate is revealed as a significant determinant of imports.

$$imp_t = f(rexc, dgdpt) \dots\dots\dots 1$$

Where *imp<sub>t</sub>* represents import trade in a country over time, *rexc<sub>t</sub>* is the real exchange rate and *dgdpt<sub>t</sub>* gives a measure of the domestic income at time t

Following [Isitua and Neville \(2006\)](#), [Takaendesa et al. \(2005\)](#), [Bah and Amusa \(2003\)](#) and [Vergil \(2002\)](#), exchange rate changes can be factored into (1) above as an important variable of interest. The theoretical argument in support of this stipulates that exchange rate volatility represents a risk which will impose cost on risk-averse economic agents and therefore depress trade behaviour. Thus we have;

$$impt = imp(er, Yi, V) \dots\dots\dots 2$$

Where *er* represents real exchange rate, *Yi* is the domestic output. Following other studies, such as [Olayungbo \(2011\)](#), [Shehu \(2008\)](#) and [Keshab and Mark \(2005\)](#), other determinants of international trade such as trade openness and political stability can be factored in and we can state this explicitly;

Where *tdop* and *pol* represent trade openness and political stability respectively

$$imp_t = \alpha_0 + \alpha_1 er + \alpha_2 Y_t + \alpha_3 V_t + \alpha_4 tdop + pol + e_t \dots\dots\dots 3$$

Where, political stability is exogenously determined. That is, it does not depend on the level of international trade. *e<sub>t</sub>* is the error term.

Data for the conduct of this study heavily rely on both internal and external secondary sources. The dependent variables, quarterly import and export trade in Nigeria data were sourced from the CBN Statistical Bulletin and annual reports, 2009. Nigeria Gross Domestic Product, as an important determinant of her import, and Foreign GDP as included in the model are obtained from the International Financial Statistics, 2010. Nigeria quarterly exchange rates defined in real terms were obtained from the UNCTAD Statistical Records Book, 2009. Data on trade openness were defined as the proportion of GDP that goes into international trade in Nigeria and obtained from the International Financial Statistics, 2010. Political stability was introduced into the model as a dummy variable and it was denoted as 0 during the military regime and 1 during the civilian regime. All data cover the period between 1986 and 2009. The choice of this period is to capture the period during which Structural Adjustment Programme (SAP) was introduced in Nigeria. During the SAP era, the naira was allowed to determine its real value in the foreign exchange market.

#### 4. EMPIRICAL RESULTS

For the purpose of empirically analysing the effect of exchange rate volatility on trade flows in Nigeria, the analysis begins with the examination of various descriptive statistics used. The descriptive statistics of data series gives information about sample statistics such as mean, median, minimum value, maximum value and distribution of the sample measured by the skewness,



#### 4.3. An Error Correction Model of the Impact of Exchange Rate Volatility on Trade Flows

Given the fact that a long run relationship exists among the variables employed in this study as confirmed by the various statistical inferences made so far, an error correction model which shows the adjustment from the short run to long run equilibrium is constructed. Initially an overparameterised Error Correction Model is specified to include the lags of the difference of variables. Using the p-value of variables, the insignificant leads and lags were dropped, reducing the model to parsimonious Error Correction Model. This is represented in table 4.4(see appendix)

#### 4.4. Discussion of the Results

The results of the reduced short run dynamics of the models are presented a table (see appendix). As expected, the error correction term (ECM(-1)) assumes the expected negative sign and significant in the model. Taking the absolute value of the error correction term in the model, about 27.1 percent of the disequilibrium in the model is offset by short run adjustment within a quarter. In this case, the full adjustment is achieved and completes its cycle within the period. In other word, the speed of adjustment from short run disequilibrium to long run equilibrium is 27.1%. The various diagnostics statistics given above therefore reveal that the models could be relied on in making useful inference about the effect of exchange rate volatility on trade flows in Nigeria.

From the model, a significant negative relationship exists between exchange rate volatility and import trade. This is in line with the theoretical position that a risk-averse economic agent will trade less given volatility in exchange rate. To examine the effect of GDP on import, we look at the coefficient of DGDP in the estimated import model. It shows that a negative relationship exists between domestic output and import trade in Nigeria. Moreover, only the third lag of the GDP being significant means that this relationship starts to take effect only after the third quarter. This relationship is significant at 5% level. This is however contrary to our apriori expectation. This result is in contrast with economic theory because an increase in domestic income is expected to increase the volume of import. Several other studies like [Isitua and Neville \(2006\)](#); [Bah and Amusa \(2003\)](#); [Vergil \(2002\)](#); and [Takaendesa et al. \(2005\)](#) also arrived at this conclusion.

### 5. CONCLUSION

The effect of exchange rate volatility on trade components has become one of the most controversial issues in economics research. This area has become so important given the voluminous empirical literature conducted on it following the arrival of the flexible exchange rate system in 1973. However, both the theoretical and empirical studies have yielded conflicting results on the issue so far. Although, most models of trade argue that exchange rate volatility increases uncertainty and risk and therefore hinders trade flows, some other studies suggest otherwise. From most studies conducted in Nigeria, models of trade have been featured with long-run export trade framework with less attention to the import trade framework whereas

trade constitutes both export and import sides. Given this imbalances, the paper investigates the effect of exchange rate volatility on the import sides of trade in Nigeria. In the study, both statistical and econometrics techniques were adopted. Descriptive statistics, cointegration test and error correction model were used as analytical tools.

The main findings of this paper indicate that a long run relationship exists between exchange rate volatility and import trade flows in Nigeria as evident from the cointegration test conducted on the variables. Also, import trade displays a negative trend with increase in exchange rate volatility meaning exchange rate depreciation may increase import trade but its appreciation may increase export and lastly; there is a negative relationship between gross domestic product and import in Nigeria which is contrary to our apriori expectation.

### **5.1. Policy Recommendation**

From the findings of this study, two main policy implications can be drawn. One, the theoretical argument that a risk-averse economic agent would trade less given volatility in exchange rate holds since exchange rate volatility exhibits a significant negative relationship with import trade in the long run. In the light of the above, the study suggests that Nigeria may have to reduce her import and resort to local production due to exchange rate volatility. Two, the inverse relationship between import and domestic output implies that increasing import tends to shrink production line in Nigeria and also, other factors such as excessive desire for foreign made goods, ignorance etc might be responsible for increase in the demand for imported goods thereby resulting in increase in import trade and not increase in gross domestic product.

## **REFERENCES**

- Abba, G., 2009. Impact of foreign exchange volatility on import: A case of Nigeria foreign exchange market. Proceedings of the 7th International Conference on Innovation and Management.
- Aydin, M.A., U. Ciplak and M.E. Yucel, 2004. Export supply and import demand models for the Turkish economy. The Central Bank of the Republic of Turkey Research Department Working Paper 04/09.
- Bah, I. and H. Amusa, 2003. Real exchange rate volatility and foreign trade: Evidence from South African exports to the United States. *The African Finance Journal*, 5(2): 1-20.
- Baum, C.F., M. Caglayan and N. Ozkan, 2004. Nonlinear effects of exchange rate volatility on the volume of bilateral exports. *Journal of Applied Econometrics*, 19(1): 1-23.
- CBN, 2000. The foreign exchange market and its management in Nigeria. The Central Bank of Nigeria Research Department.
- Clark, P.B., 1973. Uncertainty, exchange risk, and the level of international trade. *Western Economic Journal*, 11(3): 302-313.
- Hooper, P. and C. Mann, 1978. The effects of exchange rate uncertainty on the prices and the volume of international trade. *Journal of International Economics*, 8(Nov): 483-511.

Isitua, K. and N.I. Neville, 2006. Exchange rate volatility and Nigeria-USA trade flows: An econometrics appraisal of the evidence. Conference of the African Econometrics Society, July, 2006. Dakar, Senegal.

Johansen, S. and K. Juselius, 1990. Maximum likelihood estimation and inference on cointegration – with an application to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2): 162-210.

Joseph, A.I. and I. Akhanolu, 2011. An empirical investigation of the link between exchange rate volatility and trade in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 2(3): 175-183.

Keshab, R.B. and K.A. Mark, 2005. The effects of exchange rate on trade balance in Ghana: Evidence from cointegration analysis. *Research Memorandum*, 52.

Mckenzie, M.D., 2009. The impact of exchange rate volatility on international trade flows. *Journal of Economics Surveys*, 13( 1): 71-106.

Olayungbo, D., 2011. Effects of exchange rate volatility on trade in some selected Sub-Saharan African countries. *Modern Economy*, 2(4): 538-545.

Oloba, O.M. and O.P. Abogan, 2013. Exchange rate volatility in Nigeria; Evidence from a parametric measure. *Australian Journal of Business and Management Research (AJBMR)*, 3(5): 12-17

Shehu , A., 2008. Impact of foreign exchange volatility on imports: A case of Nigerian foreign exchange market (1987-2008). *Proceedings of the 7th International Conference on Innovation and Management*, 2007.

Takaendesa, T., I. Tsheola and O. Aziakpono, 2005. Real exchange rate volatility and the effects on trade flows. *Journal of International Financial Markets, Institutions and Money*, 8: 21-38.

Vergil, H., 2002. Exchange rate volatility in Turkey and its effect on trade flows. *Journal of Economic and Social Research*, 4(1): 83-99.

**BIBLIOGRAPHY**

Omojimite, B.U., 2010. The impact of exchange rate reforms on trade performance in Nigeria. *Journal of Social Studies*, 23(1): 52-62.

**Appendices**

Unrestricted Cointegration Rank Test (Trace) for Import model

Hypothesized no of CE	Trace Statistics	Probability**
None*	94.82551	0.0002
At most one	46.50622	0.0666
At most two	24.19531	0.1923
At most three	9.019306	0.3636
At most four	2.271297	0.1318

Trace test indicates one cointegrating equation at the 0.05 level

\*denotes rejection of the hypothesis at the 0.05 level

## Unrestricted Cointegration Rank Test (Max-Eigen Val) for Import model

Hypothesized no of CE	Max-EigenVal	Probability**
None*	48.31929	0.0005
At most one	22.31091	0.2048
At most two	15.17600	0.2768
At most three	6.748010	0.5194
At most four	2.271297	0.1318

Max-eigen value test indicates one cointegrating equation at the 0.05 level

\*denotes rejection of the hypothesis at the 0.05 level

**Parsimonious Error Correction Model for Import**

Dependent Variable: DIMPORT

Method: Least Squares

Sample (adjusted): 1987Q3 2009Q4

Included observations: 90 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.190935	0.105175	1.815397	0.0432
DDGDP(-3)	-0.475278	0.057424	-2.329733	0.0457
DREXC	-0.093690	0.047303	-1.980651	0.0511
DREXC(-2)	0.059044	0.040561	1.455705	0.1494
DTDOP	0.915014	0.028784	31.78855	0.0000
DTDOP(-1)	-0.050944	0.031528	-1.615810	0.1101
DTDOP(-2)	-0.025719	0.029650	-0.867433	0.3883
VOL	-0.077615	0.021303	-3.643325	0.0005
DPOLDUM(-3)	-0.132738	0.045536	-2.915009	0.0046
ECMB(-1)	-0.270224	0.037582	-2.134631	0.0359
R-squared	0.937003	Mean dependent var		0.062156
Adjusted R-squared	0.929916	S.D. dependent var		0.167155
S.E. of regression	0.044252	Akaike info criterion		-3.293412
Sum squared resid	0.156656	Schwarz criterion		-3.015655
Log likelihood	158.2035	Hannan-Quinn criter.		-3.181404
F-statistic	132.2124	Durbin-Watson stat		1.460760
Prob(F-statistic)	0.000000			

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