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An Empirical Investigation of the Link between Exchange Rate Volatility and Trade in Nigeria

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Abstract
This study investigates the impact of exchange rate volatility on trade flow in Nigeria. Using annual data for the period of 1970 – 2009, the study estimates the exchange rate volatility with the use of Generalized Autoregressive Conditional Heteroskedasticity (GARCH). Model testing procedure includes the coefficient of determination, the Durbin – Watson and the F – Statistics. Results revealed that an inverse and statistical insignificant relationship exist between aggregate trade and exchange rate volatility in Nigeria. The study therefore recommends that monetary authority should ensure transparency in the process for determining exchange rate such that various economic distortions associated with exchange rate might be minimized. With this in place, there will be free air for trade flows into Nigeria, which eventually will lead to the growth of the economy.

Keywords: exchange rate, volatility, trade flow, heteroscedasticity and autoregressive

INTRODUCTION

Research related to exchange rate management still remains of interest to economists, especially in developing countries, despite a relatively enormous body of literature in the area. This is largely because the exchange rate in whatever conceptualization, is not only an important relative price, which connects domestic and world markets for goods and assets, but it also signals the competitiveness of a country's exchange power vis-à-vis the rest of the world in a pure market. Besides, it also serves as an anchor which supports sustainable internal and external macroeconomic balances over the medium-to-long term. There is, however, no simple answer to what determine the equilibrium exchange rate, and estimating equilibrium exchange rates and the degree of exchange rate misalignment remains one of the most challenging empirical problems in open-economy macroeconomics (Aliyu, 2008).

However, 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 (Alaba, 2003). Many analysts of international economics concur that the generalized floating of system in operation since the post Bretton Wood period have engendered substantial volatility in both developed and developing economies. Following the collapse of the pre- 1973 system, exchange rates fluctuated beyond book - maker's expectations (Alaba, 2003; Baum et al, 2010). In 1984, the IMF (1984) produced a study for the General Agreement On Tariffs And Trade (GATT) on the impact of exchange rate volatility on world Trade. That study was motivated by a significant slowdown in world trade. Some of these developments have reappeared, for example, the growth in world export of goods and services declined sharply in 2001 and 2002 from double-digit pace and the exchange value of the U.S dollar has fluctuated fairly sharply in the year (Clark et. al, 2004).

In Nigeria, one of the dramatic events was the devaluation of the Nigerian naira with the adoption of structural adjustment programme (SAP) in 1986. The main objective was the restructuring of the production base of the economy with a positive bias for the production of agricultural export. The foreign exchange reforms that facilitated a cumulative depreciation of the effective exchange rate were expected to increase the domestic prices of agricultural exports and therefore boost domestic production (Adubi and Okunmadewa, 1999). Significantly, this depreciation resulted in changes in the structure and volume of Nigeria's export as empirically determined by many researchers (Oyejide, 1986; and Osuntogun et al, 1993). The depreciation also increases the prices of export and studies have shown a marked increase in volume of export over the years.

Today, there is growing agreement in the literature that prolonged and substantial exchange rate misalignment can create severe macroeconomic

disequilibria and the correction of external balance will require both exchange rate devaluation and demand management policies. The main intuition behind this is that an increase in exchange rate volatility leads to uncertainty which might have a negative impact on trade flows or according to Anderton and Skudely (2001) the economic logic underpinning the negative link is the aversion of firms to engage in a risky activity, namely trade. Numerous studies have been conducted on the extent of the naira exchange rate and its misalignment in Nigeria (See Agu, 2002; Omotosho and Wambai, 2005; Obaseki, 2001; CBN, 2007*a*; CBN, 2007*b*; CBN, 2008), assessment of the impact of exchange rate volatility on export has in the recent past been nonexistent.

Against this background, the rest of the paper is organized as follows. Section two presents a survey of the literature and theoretical issues relating to exchange rate volatility and trade flows. Section three discusses the methodology employed in the study while section four analyses the empirical results. Finally, section five contains conclusions and recommendations.

LITERATURE REVIEW

An Overview of the Exchange Rate Policies in Nigeria

Exchange rate is an important economic variable as it appreciation or depreciation affects the performance or other macroeconomic variables in any economy (Hashim and Zarma, 1996). Its value can be used to assess overall performance of an economy and so very important variable in policy decision-making in a country.

Any government at any point in time seek the stability of the exchange rate because it provides economic agents the opportunity to plan ahead without fear of varying costs and prices of goods and services. On the other hand, instability of exchange rate can cause a negative distortion in any economy.
Nigeria started witnessing exchange rate instability in 1986 following the implementation of the government policy when it adopted the structural adjustment programme couple with the deregulation of the foreign exchange market as a result of supply constraint (Hashim and Zarma, 1996). The country's exchange rate policy has been aimed at preserving the external value of the domestic currency and maintaining a healthy balance of payments position, which indeed is a major provision of the enabling law (Sanusi, 2004).

The problem of foreign exchange market, which Nigeria is facing just like any other developing countries, has much to do with the gap that exists between supply of foreign exchange and its demand. The failure of the economy to supply enough foreign exchange to meet the demand forced the government to resort to rationing the available foreign exchange and this led to speculative hoarding and the development of a parallel market. All these cause the instability of the exchange rate in Nigeria. Broadly, Nigeria adopted two exchange rate systems, the fixed and flexible exchange rate system (Olukole, 1992).

The Fixed Exchange Rate System

Since independence in 1960 up to 1986, Nigeria adopted fixed exchange rate policy. Meaning that the government administratively determined the value of our local currency in foreign currencies. The system used in determining it was that of maintaining parity with pound sterling, using Gold content of the Nigerian Pound. At that time the Gold content of the Nigerian Pound was 2.48824 grams and later reduced to 1.24414 grams of fine Gold as a result of the change of the Nigerian Pound to Naira (Hashim and Zarma, 1996).

As a result of the crises that occurred in the international financial system, which led to the devaluation of Dollar and the suspension of convertibility of Dollar in Gold in 1971 –1974, the Gold content approach was changed to dollar peg in Nigeria. With this approach, the U.S dollar to naira exchange rate was fixed at U.S dollar 1.52 to Nigerian Naira 1.00 (Olukole, 1992) cited in (Hashim and Zarma, 1996). Subsequently, the currency was pegged against a basket of currencies (Dutch Mark, Swiss Francs, French Francs, Dutch Guilder, Japanese Yen and Canadian Dollar). The import-weighted basket approach was adopted in 1978. The weights were based on their relative shares of the countries whose currencies were included in the basket as per 1976 total imports. These currencies include U.S dollar, the pound sterling and those in the basket of currencies approach (Hashim and Zarma, 1996).

In 1985, following the complaint by the international monetary fund (IMF), that there were high incidence of Nigeria naira exchange rate quotation rising above the stipulated 2% limit, the currency intervention system was adopted. Following the adoption of this system the naira exchange rate was quoted against a single intervention currency (Dollar) reducing the degree of divergence and with a nil arbitrage position vis-à-vis the U.S dollar and the pound sterling (Hashim and Zarma, 1996).

The Flexible Exchange Rate

As a result of the economic crises which the Nigeria's economy is witnessing and which was characterized by dwindling foreign exchange earnings and a serious deficit in the nations balance of payment, with an observed overvaluation of the naira, in September 1986 the naira was allowed to

float; so as to overcome the problems affecting the economy.

The structural Adjustment programme (SAP) was recommended for the economy, which was characterized by deregulation of the economy including the foreign exchange market. The floating of the exchange rate referred to as the second tier foreign exchange market (SFEM) is operation using dual exchange rate regime; that is the first and the second tier exchange markets. The first tier foreign exchange market was applicable to debt service payments, embassy expenses, subscription to international organization and settlement of transitional or pre-SFEM transactions, while the second tier foreign exchange market is applicable to all transactions except those covered under the first – tier (Hashim and Zarma, 1996).

THEORETICAL REVIEW

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, considers 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 it 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 firms 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 Kohlhagen (1978), who reached the same conclusion of a clear negative relationship between exchange rate volatility and the level of trade.

However, this strong conclusion rests on a number of simplifying assumption first, it is assumed that there are no hedging possibilities either through the forward exchange market or through offsetting transactions. For advanced economies where there are well-developed forward markets, specific transactions can be easily hedged, thus reducing exposure to unforeseen movements in exchange rates. But it needs to be recognized that such markets do not exist for the currencies of most developing countries. Even in advanced economics the decision to continue to export or import would appear to reflect a series of transactions overtime where both the amount of foreign currency receipts and payments, as well are the forward rates are not known with certainty.

Other aspect of the relationship between trade and exchange rate volatility is the role of "sunk costs" (Clark et al, 2004). Much of international trade consists of differentiated manufactured goods that typically require significant investment by firms to adapt their products to foreign markets, to set up marketing and distribution networks, and to set up production facilities specifically designed for export market. These sunk costs would tend to make firm less responsive to short run movements in the exchange rate, as they would tend to adopt a "wait and see" approach and stay in the export market as long as they can recover their variable costs and wait for a turnaround in the exchange rate to recoup their sunk costs. Following the finance literature on real options McDonald and Segel (1986); Dixit (1989) and Krugman (1989) have explained the implications of sunk costs in the context of an "options" approach, which has been applied by Franke (1992). The key idea is that an exporting firm can be viewed as owning an option enter the foreign market in the future. The decision to enter or exit the export market involves considering explicit fixed and variable costs, but also the cost of exercising the option to enter or leave the market. The greater the volatility in exchange rates, the greater the value of keeping the option, and hence the greater the range of exchange rates within which the firm stays in the export market, or stays out if it has not yet entered. This suggests that increased exchange rate volatility would increase the inertia in entry and exit decisions.

EMPIRICAL REVIEW

According to Clark et al (2004) robust findings in early works may be caused by several reasons ranging from, first, theoretical consideration, that is, the theoretical background do not provide a clear support for the conventional assumption that exchange rate volatility has a negative impact on the level of trade. Second, the sample period over which exchange rate should signify variation was relatively short. And finally, the specification of the estimating equation was typically rather crude, consisting of a few macro variables from standard trade equations in use at the time. As viewed by Tenreyro (2006), there are several estimation problems in previous studies of the impact of nominal variability (and more generally, of exchange rate regimes) on trade that cast doubt on previous answers. As these studies have

typically been formed in the content of the "gravity equation" model for trade. The gravity equation model, simply states that exports from country "I" to "j" are proportional to the product of the two countries GDP and inversely proportional to their distance, and broadly construed to include all factors that might create trade resistance. And so importer and exporter specific effect are added to capture the multilateral resistance, also augmented to account for the resistance created by exchange rate variability.

More careful attention to the specification of the estimation technique and the measure of volatility used in recent works in the literature revealed a success in obtaining a statistically significant relationship between volatility and trade. In the same vein Clark et al (2004) cites (the U.K Treasury 2003, De Grauwe 1987, Rose 2000, Dell' Ariccia 1997, Anderton and Skudenlny 2001, Arize 1998, and Fonutas and Aristoteleus, 1999, Fakhri (2010) finds a negative link, but the effects are not very large, complete elimination of volatility would raise trade by a movement of 15 percent compared to the consensus estimate of the effect as typically less than ten percent.

Employing the gravity approach and using a very large data set involving 186 countries for the five years 1970, 1975, 1980, 1985 and 1990. Rose (2000) with the main objective of measuring the effect of currency union on members trade, and also test for the effect of exchange rate volatility on trade. With the primary measure of volatility by the standard deviation of the first difference of the monthly logarithm of the bilateral nominal exchange rate, which is computed over the five years preceding the year of estimation. Using the pooled data, the findings revealed a small but significant negative effect, reducing volatility by one standard deviation (7 percent) around the mean (5 percent) would increase bilateral trade by about 13 percent, which is similar to the findings of Dell 'Ariccia. This, result is robust when using three alternative measures of volatility but not when the standard deviation over the previous five years of the level of the exchange rate is used. However, when random effects are incorporated in the estimation, the magnitude of the effect of volatility on trade is reduced to about a third of the benchmark estimate or roughly 4 percent.

Broda and Romalis (2003) looking at the effects of exchange rate volatility on dis-aggregated trade flows, finds that volatility decreases trade in differentiated product relative to trade in commodities, although the effect is rather small, eliminating all real exchange rate volatility would increase trade in manufactures by less than 5 percent and total trade by less than 3 percent. In conclusion they note that developing Countries would experience a more pronounced increased in trade due to the fact that they are more prime to volatile exchange rate. In the work of Koren and Szeidl (2003) using dis-aggregated data founds small effects, and eliminating exchange rate volatility would result in a change in export prices of only a few percentage points.

Bernardina (2004) investigates impacts of the real exchange rate, real non-oil GDP, and the world income on Russian non-oil export by using an Error Correction Model over the period 1994-2001. Author finds that there is a robust and negative long run co-integration relationship between the real exchange rate and Russian non-oil exports. Furthermore, the world income has positive effect on Russian non-oil export while real non-oil GDP causes a decline in non-oil export.

Another study relating to Iranian non-oil export comes from (Sabuhi and Piri 2008; Abolagba et. al, 2010) They explore the effects of exchange rate, export volume, domestic saffron production on price of saffron, Iran's major non-oil export good in the short- and long-run. Employing Autoregressive Distributed Lag (ARDL) model shows that appreciating exchange rate has statistically significant negative impact on export price of saffron while there is no significant relationship between export price and domestic production of Saffron in the long-run.

METHODOLOGY

There has been substantial literature on the effect of exchange rate volatility on trade volume. Most of these studies focus on the argument that exchange rate volatility increases the risk and uncertainty in international transactions and thus discourage trade. Focus shall be on the effect of exchange rate volatility on trade. The immediate task therefore is to develop the measurement of volatility and then trade model that will capture the effect of volatility on trade in Nigeria. The study will adopt the methodology employed by Cheong et al (2004), Clark et al (2004), and Adubi and Okunmadewa (1999).

Modelling Trade

Following Adubi and Okunmadewa, (1999), Clark et al (2004), and Cheong et al (2004), the trade equation is specified as:

$$Td_t = F(EX_t, Y_t, RP_t, H_t) \quad (1)$$

Where : Td_t = Aggregate trade, EX_t = Exchange rate

Y_t = Economic activities in the domestic economy or Real Income

RP_t = Relative price defined as the domestic CPI divided by the foreign CPI (United States of America CPI)

H_t = Volatility in exchange rate

E_t = Random error term

Method Of Estimation

To estimate the model, volatility was measured using the generalized autoregressive conditional heteroskedesticity (GARCH). The (GARCH) as introduced by Bollersleve (1986) will consider two distinct specifications, one for the conditional mean and one for the conditional variance.

The GARCH (1, 1) model is specified thus:

$$EX_t = \eta_0 + \eta_1 EX_{t-1} + E_t \quad E_t/\eta_{t-1} \text{ --- } N(O, h_t^2) \quad (2)$$

$$H_t^2 = \rho_o + \rho_1 E_{t-1}^2 + \rho_2 h^2_{t-1} \quad (3)$$

Equation (2) is the mean equation and is written as a function of exogenous variables with an error term h^2_t is the one period ahead forecast variable based on past information and used to proxy volatility, it is called the conditional variance. ρ_1 is the coefficient of ARCH and ρ_2 is the coefficient of the GARCH. The addition must be positive and less than one to satisfy the necessary condition of equation (3). And when it is very close to one it indicates that volatility shocks are quite persistent. This equation (3) is the measure of volatility, which will be used to verity the relationship between volatility and Trade. This method of measuring volatility is one of the best measures because it is useful in capturing non-constant, clustered time varying variance in higher moments, which represents stochastic process by which risk terms are generated (Bollersleve et al 1992). According to Clark et al (2004) when hedging instrument are available, the predicted part of exchange rate volatility can be hedged away and hence may not have much effect on trade. This suggests that the appropriate measure of risks should be related to deviations between actual and predicted exchange rates. And hence, GARCH process is more appropriate because the underlying idea is that part of the volatility can be forecasted based on past values of the exchange rate and also allows both a long memory and a more flexible lag structure without having to impose a priori of any fixed lag pattern.

The next step is to check the stationarity property of the time series data. This issue of stationarity and non-stationarity of time series in econometric modeling has become a major concern beginning from the 1980's. Non-stationarity of time series data has often been regarded as a problem in empirical analysis. Working with non-stationarity variables lead to spurious regression results from which further inference is meaningless. The first is therefore to test for the stationarity of the variables. There are different test for checking stationarity, the Dickey Fuller (DF) and Augmented Dickey – Fuller (ADF) Statistics. The DF – test is a test of the null hypothesis that is more negativity, when the coefficient of the lagged variables is significantly negative. The coefficient is compared with the critical value from the DF-table. If the coefficient is more negative than the value from the DF-table at the chosen level of significance, then the null hypothesis is rejected and accepts the alternative hypothesis that it is significantly different from zero. And then conclude, that it is stationary. If the null hypothesis cannot be rejected, then, it is differenced.

The ADF is estimated by adding lagged left hand side variable as additional explanatory variable. This is to make the error time white noise. If the unit root test revealed that the variables are integrated of order zero, then there will be no need to check whether they are cointegrated or not, else, if they are not, the cointegration test is carried out. Differencing of variables to achieve stationarity leads to loss of long-run properties. The concept of cointegration implies that if there is a long-run relationship between two or more non-stationary variables, deviation from the long-run path are stationary. Cointegration test help to determine the stationarity of the residual generated from running a static regression in level of one or more of the regressor on the regressed.

According to Charemza and Deadman (1997) the D.F is given as

$$\Delta Td_t = a_0 + a_1 Td_{t-1} + U_t \quad (4)$$

Where Δ is a difference operator and U_t is the stochastic error term "a" is Alfa and it is the coefficient that is compared to the critical value in the DF – table.

H_0: a = 0 null hypothesis

H_1: a < 0 alternative hypothesis

The corresponding ADF is given as

$$\Delta Td_t = a_0 + a_1 Td_{t-1} + \Sigma \alpha \Delta Td_{t-1} + U_t \quad (5)$$

This test will be applied to other variables and if they are found to be integrated at levels or order zero, the model will be estimated using the ordinary least squares (OLS) method. But if they are found to be integrated of order higher than zero, the linear combination of the variables will be tested for stationarity, which is the cointegration test. Method of testing cointegration include the Engle – Granger procedure by (Engle and Granger, 1987) and Johansen procedure by (Johansen; 1985, 1995) and (Johansen and Juselius, 1990). The Engle-Granger will be employed in this work.

Engle and Granger (1987) method, is a test to determine if there's a cointegration relationship between the independent and dependent variables, this is done by running a regression of the static model. The residual are tested for stationarity using the DF and ADF tests. If the residual were found to be stationary of order zero then the variables are cointegrated. This will motivate the development of error correction model.

The cointegration regression for trade is specified as:

$$Td_t = a_o + a_1 EX_t + a_2 Y_t + a_3 RP_t + a_4 H^2_t + E_t \quad (6)$$

And the residual is given as

$$E_t = Td_t - a_0 - a_1 EX_t - a_2 Y_t - a_3 RP_t - a_4 H^2_t \quad (7)$$

If cointegration exists, then we proceed to specify the dynamic form of the trade equation model to include the error correction term as written below

$$Td_t = a_o + a_1EX_t + a_2Y_t + a_3RP_t + a_4H^2_t + a_5ECM + E_t \quad (8)$$

Where:

Td_t = Aggregate Trade, EX_t = Exchange Rate

Y_t = Income in domestic economy

RP_t = Relative Price in the domestic economy

H^2_t = Volatility in exchange rate

ECM = Error Correction Mechanism

DATA REQUIREMENTS AND SOURCE

To investigate empirically the effect of exchange rate volatility on trade in Nigeria, the study will seek data on exchange rate, trade aggregate, Gross national or domestic product and relative prices, this will cover the sample period 1970 – 2009. The real values of all the data will be used. All the data for the variables were extracted from the International Financial Statistics (IFS) of the International Monetary Fund (IMF) and the Central Bank of Nigeria Statistical bulletin and annual reports

RESULT PRESENTATION AND ANALYSIS

The result of data analysis and estimation were obtained as follow:

The Measurement Of Exchange Rate Volatility

The estimated equation of the GARCH (1, 1) is based on an autoregressive model of order one (AR(1)) of the exchange rate in equation (2)

Table 4.0

Variable	Coefficient	STD. Error	Z-Statistic
C	2.8946581	18.76759	0.154237
EX_{t-1}	1.062735	0.189077	5.620640
VARIANCE EQUATION			
C	108.7425	151.1810	0.719287
E^2_{t-1}	-0.048911	-0.060027	-0.814821
h^2_{t-1}	0.581317	0.544461	1.067693

R^2 = 0.91 Adjusted R^2 = 0.90 D.W = 1.943162 F-statistic = 75.28630

It should be noted that the values of the standard errors are greater than half of their coefficient, showing that they are statistically significant. However, statistics such as the R^2 might be meaningless in the GARCH model (Bollersleve, Chou and Kroner, 1992). The coefficient of $\rho_1 + \rho_2 = 0.532406 < 1$. This result ensure that the conditional variance is strictly positive, thus satisfying the necessary conditions of exchange rate volatility being persistent as seen in equation (3). As noted by Clark et al (2004), the appropriate measure of risks should be related to deviations between actual and predicted exchange rate, so therefore the standard deviation of the conditional variance will be used for the analysis in later part of this work.

Table 4.1: Unit Root Test Result

VARIABLE	**ADF At Level**	**ADF At 1st Diff.**	**ADF At 2nd Diff.**	**Order of Intergration**
TD	-1.595608	- 11.98115	-	1
EX	0.571185	-3.724323	-	1
Y_t	3.950529	- 1.966847	- 7.936073	2
RP	1.627758	- 1.624784	- 4.872329	2
H_t^2	- 3.099523	-	-	0
ECM	- 5.875546	-	-	0

Critical value 1% = -3.6496 5% = - 2.9558 10% = - 2.6164

Among all the variables tested for stationarity in table 4.1, only the volatility variable (H_t^2) was integrated of order zero I(0). The trade aggregate (TD) and the exchange rate (EX_t) were integrated at their first difference and the income in the domestic economy (Y_t) and relative price in the domestic economy (RP_t) were integrated at their second difference. Since not all the variables are integrated at levels, then we are justified to find the cointegration test of the residuals of the static regression. The residual (ECM) was found to be stationary of order zero I(0). This suggests that the Error correction mechanism can be incorporated to analyse the model, this was done and the result presented below.

Table 4.2: Estimation Result For The Aggregate Trade Equation

Explanatory Variable	**Coefficient**	**Std. Error**	**T-Statistic**
EX_t	681.5594	1012.924	0.672863
$D(EX_t(-1))$	9340.269	1099.110	8.498032
Y_t	112.6347	32.20318	3.497626
$D(Y_t(-1))$	289.4541	42.23505	6.853409
RP_t	- 503850.6	138940.0	- 3.626390
$D(RP_t(-1))$	1901362.0	323295.2	5.881196
H_t^2	- 55.39774	963.1341	- 0.057518
ECM (-1)	- 0.440317	0.110277	- 3.992814

R – Squared = 0.968172

Adjusted R-Squared = 0.959260

Durbin-Watson Stat = 1.904626

F-Statistics = 108.6377

Akaike info. Criterion = 25.17125

Schwarz criterion = 25.53404

From the estimated equation in table 4.2, it shows that almost all the coefficients are statistically significant except exchange rate of the current period (EX_t) and volatility in exchange rate (H_t^2). The failure of these variables to meet the standard statistical criteria may be caused by the direct application of conventional test statistics with the generated regressor of volatility. The exchange rate (EX_t) and the difference exchange rate lagged for one period are positively related to trade. Though, the current exchange rate is not significant whereas the differenced exchange rate lagged for one period is statistically significant; meaning that the past period exchange rate affect current trade positively, that is a

rise in previous exchange rate will lead to an increase in current trade. This is contrary to what is obtainable in a priori condition that a rise in real exchange rate whether it is due to either a variation in the nominal exchange rate or a different rate of inflation between two countries should negatively affects trade. The reason for this may be due to fluctuation and or regime change in the exchange rate in Nigeria.

A positive relationship was revealed between the real income of current period and the differenced real income lagged for one period and trade. It is expected that an increase in real income have a positive effect on trade. The result conforms to this expectation and was also statistically significant. The current relative price (RP_t) was inversely related to trade and statistically significant. This means that an increase in relative price will reduce trade. The differenced relative price $D(RP_t(-1))$ lagged for one period is positively related to trade and statistically significant; showing that increase in past period relative price will also boost the level of aggregate trade in Nigeria in the current period. However, the variable of major concern exchange rate volatility (H_t^2) is negatively related to trade and was not statistically significant. Meaning that, though exchange rate volatility has a negative relationship with aggregate trade in Nigeria, but has an insignificant effect on trade. This result conforms to most other studies results that have been carried out before. However, the effect of exchange rate volatility being ambiguous depends on traders' attitude to risk. If traders are risk-neutral, uncertainty in exchange rates may be an additional opportunity to increase profits and thereby boosts overall trade flows. On the other hand, if traders are risk-averse, the risk due to exchange rate uncertainty is an additional cost, which will tend to depress overall trade volume. Hence increase in exchange rate volatility will reduce aggregate trade in Nigeria meaning that traders in Nigeria are risk-averse. The measured feedback coefficient, -0.44 has an expected sign with statistical significance, but indicates a slow adjustment to the past dis-equilibrium in aggregate trade. The R^2 of about 97 percent indicates a good fit and the adjusted R^2 of 96 per cent also confirms this. The F-statistics of 108.6377 confirms the overall significance of the model while the D.W of 1.90 shows that it is white noise both the Akaike and Schwarz criteria proves the model selection good.

CONCLUSION AND RECOMMENDATIONS

In this study we have investigated the effect of exchange rate volatility on the Nigeria trade flow for the period of 1970 – 2009. For statistically valid inferences with a generated volatility variable, we discussed a special case where a GARCH class model is used to measure uncertainty in the real exchange rate. Specifically, we demonstrated that there exists an orthogonal condition between the measured volatility and error terms for the consistent of OLS estimators of a structural equation.

The empirical results applied in this approach indicates that both the current and lagged value of exchange rate has positive effects on trade in Nigeria and that only the lagged value was found to be significant explaining the trade flow in Nigeria. Results also revealed that income has a great role to play on trade flow in the Country while the exchange rate volatility which is the main variable in the model have a negative effect on the trade flow. Hence, a proper management of exchange rate to forestall costly distortions constitutes an important pillar in determining trade flow to Nigeria and other Sub-Sahara African countries.

Therefore, to ensure that the economy is free from the shaky empirical evidence regarding what economists are so sure exist between the exchange rate volatility and trade flow, the study recommends that monetary authorities should ensure transparency in determining exchange rate process such that various economic distortions associated with exchange rate may be minimized and that a strict monetary policy should be pursued which will ensure that money in circulation are not in excess. Also, government should try to ensure stability in the exchange rate so as to stop the variability in the exchange rates since it does not bring any positive effects on trade, this can be achieved by diversifying the economic base of the Country to produce both manufacturing and agricultural products, that will sustain the economy and stop the Country from importing more than exporting. Fiscal discipline should also be enforced.

Finally, the Central Bank should ensure effective management of the foreign exchange market to watch the activities of dealers in the market, by ensuring that dealers are not involve in round-tripping and foreign exchange are used for the purpose of which they are meant for.

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