International Journal of Humanities and Social Science Research
ISSN: 2455-2070; Impact Factor: RJIF 5.22
www.socialsciencejournal.in
Volume 3; Issue 5; May 2017; Page No. 04-10

Exchange rate volatility and trade balance: evidence from Nigeria

[*] Dada James Temitope, Olomola Philips Akani

Department of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract
This paper examines the effect of exchange rate volatility on trade balance in Nigeria using monthly data from 2000:1 to 2015:12. Generalized Autoregressive Conditional Heteroscedacity (GARCH 1, 1) was used to generate exchange rate volatility; and the result reveals the presence of exchange rate volatility. Applying Autoregressive Distributed Lag framework, the result shows that the model corrects its short run dis-equilibrium by 52% monthly. Furthermore, the results reveal that real exchange rate and exchange rate volatility has negative effect on trade balance both in short run and long run. Real domestic income has a positive but insignificant effect on trade balance both in the short run and long run.

Keywords: exchange rate, exchange rate volatility, trade balance, GARCH

1. Introduction

The inception of floating/ flexible exchange rate regime in 1973 has put many scholars to examine its effect on international trade. Both the theoretical and empirical models have been developed to examine the impact of exchange rate on trade. Exchange rate volatility is the risk associated with the unexpected movement in exchange rate [1]. Furthermore, it could be referred to as the persistent fluctuations or changes of exchange rate, which usually has effect on the home currency (depreciation or appreciation of domestic currency). Economic agents (individuals, government, firms and households) are exposed to a greater risk due to exchange rate volatility. This volatility can be anticipated or unanticipated for by economic agents. Unanticipated exchange rate volatility has much significant effect on economic agent than the anticipated ones, since the former determine the aggregate demand through export, import and demand for domestic currency. In an open economy like Nigeria, foreign exchange rate policy is among the most important macro-economic indicators because it affects the business world's investment decision. The main target of this research therefore is to examine the effect of exchange rate volatility on trade balance in Nigeria. The remainder of this paper is organized as follows: section 2 reviews the empirical literature on the subject matter. Section 3 contains data and methodology, section 4 presents empirical results while section 5 focuses on conclusion and policy recommendation.

2. Literature Review

Various scholars have examined the effect of exchange rate volatility on trade and it variant. The results from these empirical surveys are best characterized as mixed [1, 2]. The variation in these results could be attributed to the type of data (aggregate data, sectoral etc.), the choice of sample period (monthly, quarterly, yearly, etc.), model specification, proxies for measuring exchange rate (real or nominal), measure of exchange rate volatility (standard deviation. Moving average, ARCH/GARCH, etc.), estimation techniques and countries considered (developed, developing etc.).

[3] uses disaggregated data to examined the effect of real exchange rate risk on Iran's non-oil export to 13 other countries from 1985-2010. Their result indicates that exchange rate risk has a positive and significant effect on Iran's non-oil export in the short-run. [4] Applied ARDL method to examine the impact of exchange rate volatility on Iran's non-oil export to her major trading partners spanning from 1974 to 2011. The result showed that the real exchange rate volatility has a long run significant effect on Iran's real exports to Kuwait, Japan and Turkey, also there is short run effect between exchange rate volatility and Iran's real exports to Kuwait, Japan and Italy [5]. Examines the impact of exchange rate on trade balance and balance of trade position of 20 OECD countries from 1985-2008. The result showed that growth of trade taking place within industries makes the trade more sensitive to real exchange rate movement, while on the other hand, a higher degree of vertical specialization and more global supply chains acts to reduce the sensitivity. [6] Examines the relationship between the real exchange rate and trade balance in Malaysia from 1955 to 2006. Applying Unit Root Tests, Cointegration techniques, Engle-Granger test, Vector Error Correction Model (VECM), and impulse response analyses, the results from the findings revealed that long run relationship exists between trade balance and exchange rate [7]. Investigates the effect of exchange rate uncertainty on the Iran's import trade using TGARCH model from 1959-2009. The findings of the study indicated that negative shocks (bad news) had greater impact on volatility during the period, furthermore, the results showed significant and negative impact of exchange rate uncertainty on Iran's imports, and import demand is positively affected by real national income [8]. investigates the impact of real exchange rate volatility on the real bilateral export flows of New Zealand by using quarterly data over 1991:Q1-2007:Q1 period. Cointegration and Error-Correction models were employed to obtain the estimates of the long run equilibrium and the short-run dynamics, respectively. The study provided evidences that real exchange rate volatility has a significant negative effect on real exports in the long run, but a weak positive effect in the short run for New Zealand [9]. Examines

the impact of real exchange rate volatility on South Africa export to the United State using monthly data from January 1995 to February 2007. GARCH approach was used to measure exchange rate volatility, and ARDL bounds testing was used to test the impact of real exchange rate volatility on South Africa export to the United States. The results revealed that there is long run co-integration among the variables involved in the two countries and real exchange rate volatility exerts a significant and negative impact on South Africa's export to the U.S. [10] examines the impact of currency volatility on the export demand within the SAARC region, covering Bangladesh, India, Pakistan and Sri Lanka from 1990:1-2010:12. Using GARCH to model exchange rate volatility and applying the bound testing approach on the standard trade model framework, the result showed that there exists evidence of significance long-run steady state equilibrium where foreign income, real exchange rate and exchange rate volatility does affects export decisions of producers in the region of SAARC. Thus, real exchange rate volatility was found to have a significant and negative impact on the export demand of most of the SAARC countries. [2] Investigate the effect of exchange rate volatility and sectoral export of eleven EU member countries (Austria, Belgium, Denmark, France, Finland, Italy, Portugal, Greece, Netherland, the UK and Sweden). The study focused on sectoral trade exports of two products belonging to the chemical sector during the period of 1973 – 2005. Exchange rate volatility was measured using standard deviation of the moving average of the logarithm of real exchange rate; their result suggested a mixed relationship of exchange rate volatility to trade.

[11] Examines the relationship between exchange rate volatility and aggregate export volumes for 12 industrialized economies using quarterly data from 1997:1 -2003:4. The authors result suggests that exchange rate volatility does not have significant impact on trade [12]. Analyses the impact of exchange rate volatility on agricultural and manufacturing trade flows in Mauritius. The authors employed yearly data for the period spanning from 1980-2011 and two measures of exchange rate volatility: the Z-score and the EGARCH were used. Using Z-score to measure exchange rate volatility, it was discovered that exchange rate volatility does not affect real agricultural exports and imports as well as real manufacturing exports [13]. Examines the impact of exchange rate volatility on manufactured exports in Brazil using quarterly data for the period 1986 to 2002. Two general measures of volatility were employed: the standard deviation of real effective exchange rate and the GARCH model. The empirical findings revealed that when the standard deviation was used, there was a significant dampening effect on Brazilian manufactured exports. However, when the GARCH model is employed, no statistically significant effect was found [14]. assess the effect of exchange rate volatility on export of emerging East Asian economies, Generalized Method of Moment (GMM) was applied to eighteen countries comprising five emerging East Asian countries and thirteen industrialized countries between 1982:Q1 to 2006:Q4. Panel unit root and co-integration test were used to verify the long run relationship among the variables. The results provided evidence that exchange rate volatility has a statistically significant negative impact on exports, and also, an increase in the price competitiveness of other emerging East Asian countries has a negative impact on a country's export to a destination markets, but the magnitude of the impact is relatively quite small.

In Nigeria, series of empirical studies have shown mixed effect of exchange rate volatility on trade. In a study conducted on the effect of exchange rate volatility on non-oil export in Nigeria from 1986-2014 using quarterly data, the result shows that exchange rate, exchange rate volatility and foreign income have significant positive effects on non-oil exports in the long run [15, 16]. 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 was considered as small open economy. The empirical study is based on a time series data over the period of 1970-2009. The results indicated significant effects of exchange rate volatility on trade flows and economic growth of Nigeria [17]. Investigates the link between exchange rate volatility and trade in Nigeria using annual data for the period of 1970-2009. Exchange rate volatility was measured using GARCH (1, 1) approach, the result of the study revealed an inverse and statistical insignificant relationship exists between aggregate trade and exchange rate volatility in Nigeria. Similarly [18], examines the impact of exchange rate volatility on macro-economic variables in Nigeria from 1980 - 2010. The macro-economic variables studied are GDP, FDI, inflation and trade openness. Applying correlation matrix, OLS and Granger causality test method, the result showed that exchange rate volatility has a positive influence on GDP, FDI and trade openness, but with negative influence on the inflationary rate in Nigeria. In the light of conflicting effect of exchange rate and its volatility on trade, there is the need to revisit the role of real exchange rate and its volatility on trade balance in Nigeria.

3. Methodology

3.1 Empirical Model for Estimation

The model used in this study relies on the international trade theory [7, 19]. The model is stated as:

$$TB = f(GDP, \frac{P^*}{P} e) \quad (1)$$

Where TB is trade balance, GDP is real gross domestic product, P^* is foreign price, P is domestic price and e is the exchange rate.

From equation 1,

$$REER = \frac{P^*}{P} e \quad (2)$$

Where REER is real exchange rate

Substituting equation 2 in 1

$$TB = f(GDP, REER) \quad (3)$$

3.2. Measuring Exchange Rate Volatility

Generalised Autoregressive Conditional Heteroscedacity (GARCH) model is used to estimate exchange rate volatility [20]. One of the major strength of this approach to measuring volatility is that volatility is based on conditioning the variance by allowing changing over time based on past error, ability to capture both volatility clustering and unconditional return distribution with heavy tail.

The ARCH (p) model can be parsimoniously reduced to GARCH (1,1) process as specified by the mean equation in equation 4 and variance equation in equation 5

$$Y_t = \alpha + \beta' X_t + \mu_t \quad (4)$$

$$\mu_t \sim iid\ N(0, h_t)$$

$$h_t = \partial_0 + \sum_{j=1}^{p} \delta_j u_{t-j}^2 \quad (5)$$

From equation 5 above, ARCH (p) model can be parsimoniously reduced to GARCH (1, 1)

$$h_t = \delta_0 + \psi_1 h_{t-1} + \psi_2 u_{t-1}^2 \quad (6)$$

$\delta_0 > 0$, $\Psi_1 > 0$, $\Psi_2 > 0$ and $\Psi_1 + \Psi_2 < 1$, so that the next period forecast of the variance is a combination of last period squared return and last period forecast [21, 22, 15].

Where h_t (real exchange rate volatility) is variance or current period volatility, h_{t-1} is previous year residual variance or volatility.

Incorporating exchange rate volatility (h) in equation 6 into trade balance model in equation 3 in order to capture exchange rate risk, then the model becomes

$$TB_t = f(GDP_t, REER_t, h_t) \quad (7)$$

To investigate this relationship in our model, equation 7 is transformed into linear form:

$$TB_t = \alpha + \beta GDP_t + \chi REER_t + \delta h_t + \varepsilon \quad (8)$$

Where e is the error term.

Therefore from equation 8, the specified Autoregressive Distributed model becomes:

$$\Delta TB_t = \alpha + \sum_{j=0}^{p} \beta_j \Delta GDP_{t-j} + \sum_{j=0}^{p} \chi_j \Delta REER_{t-j} + \sum_{j=0}^{p} \delta_j \Delta h_{t-j} + \sum_{j=1}^{p} \phi \Delta TB_{t-j} + \lambda_1 TB_{t-1} + \lambda_2 GDP_{t-1} + \lambda_3 REER_{t-1} + \lambda h_{t-1} + \varepsilon \quad (9)$$

Where Δ is difference operator, Σ is the short run model, p is the lag length and λ_j is the long run parameter.

3.2 Measurement of Variables

Trade balance (TB) is balance is defined as the different between export and import value [23, 24, 25, 19]. Gross domestic product (GDP) is used to represent domestic income in the economy. It is proxy by real gross domestic product [24]. Real exchange rate (REER) is calculated by multiplying nominal exchange rate by the relative price. The real exchange used is the parallel market exchange rate. Exchange rate volatility is generated from the exchange rate using GARCH (1, 1).

3.3 Sources of Data

Monthly data on real import, real export, real gross domestic product and exchange rate from 2000:1 to 2015:12 are collected from Central Bank of Nigeria (CBN) statistical bulletin of various editions 2015 edition.

4 Empirical Result

4.1 Exchange Rate Volatility Result

Figure 1 shows the real exchange rate volatility series of Nigeria from 2000:1- 2015:12. The real exchange rate volatility series data over this period exhibit three particular time-series characteristics: changes in real exchange rate are persistent; the series have volatility clusters and can be model as some form of ARCH series; and high/low levels of real exchange rate are associated with relatively high/low variance and uncertainty. Furthermore, the estimated equation of the GARCH (1,1) is based on an autoregressive model of order p (AR [p]) stated in section three of this work. It should be noted from Table 2 that the values of the standard error of the mean and variance equation are greater than half of their coefficient, showing that the coefficients are statistically significant. Also making use of the probability level, the coefficients are significant ($p < 0.05$). However, it has been noted in the literature [26] that statistics such as R^2 might not be used in GARCH model. From Table 2, the addition of the coefficients of variance equation is less than one ($0.94 < 1$). This result ensures that the conditional variance is strictly positive, thus satisfying the necessary conditions of exchange rate volatility being persistent.

The diagnostic statistics for the respective GARCH(1,1) model are also presented in the lower part of Table 2. The Box-Ljung (Q) statistic of the residual at 36 lags reveals no evidence of autocorrelation ($p > 0.05$), indicating that all mean equations are correctly specified. In addition, the result from Q^2 tests shows no autocorrelation ($p > 0.05$) up to order 36 for standardized residuals squared in all models, indicating that all variance equation are correctly specified. Lastly, Lagrange Multiplier (LM) test for the presence of ARCH disturbances is also presented. The LM test shows that the null hypothesis for no ARCH errors is accepted ($p > 0.05$), indicating that there should be no ARCH error left in the standardized residuals. Therefore, it is concluded that the fitted GARCH (1,1) model is reasonably well specified.

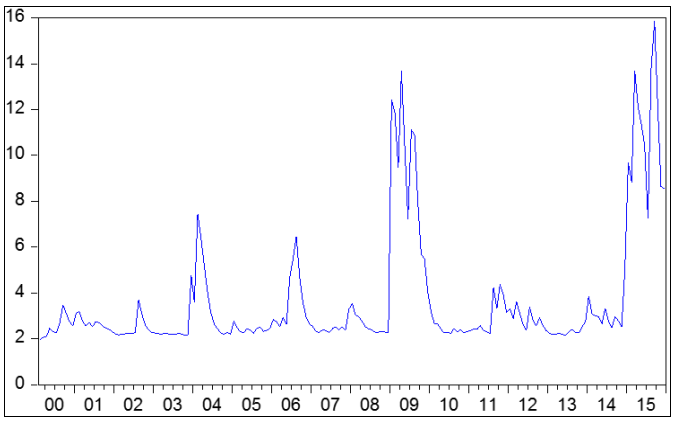

Fig 1

Table 2: Estimation Result of ARCH/GARCH model for Real Exchange rate and Diagnostic Statistics

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Mean Equation				
C	3.329860	1.406573	2.367356	0.0179
REER(-1)	0.979792	0.010221	95.85966	0.0000
Variance Equation				
C	2.419419	0.601741	4.020700	0.0001
RESID(-1)^2	0.482902	0.164692	2.932154	0.0034
GARCH(-1)	0.463802	0.107924	4.297503	0.0000
R-squared 0.972065 Durbin-Watson stat 1.424045 Adjusted R-squared 0.971917 AIC 5.178775 SIC 5.263913				
Diagnostic Test				
Test Statistic	Coefficient	Prob.		
LM	0.000654	0.9796		
$Q^2(36)$	6.7708	1.000		
Q(36)	23.673	0.943		

4.2 Unit Root Test

Non-stationary time series data posed some challenges in regression result; it is importance to check the properties of time series data before analyzing the relationship that exist among the variables. It has been well established in the literature that regression analysis produces spurious results while using data that are not stationary (has unit root). To avoid spurious regression result, unit root test is performed on all the variables used in this study in order to know their properties. It was observed from Table 3 that trade balance (TB) is stationary at level (I(0)), while other variables: real exchange rate (RER), exchange rate volatility (H) and real gross domestic product (GDP) are stationary at first difference I(1) using Augmented Dickey-Fuller test.

	ADF		
Variables	**Level**	**1st Difference**	**Status**
TB	-3.5330 (0.0081)*	-	I(0)
RER	1.8686 (0.9998)	-6.2947 (0.0000)*	I(1)
H	-2.7706 (0.0645)	-9.0747 (0.0000)*	I(1)
GDP	-1.5240 (0.5193)	-2.9338 (0.0435)*	I(1)

Table 3: Unit Root Test

Test critical values:	**1% level**	**-3.467205**
	5% level	-2.877636
	10% level	-2.575430

Note '' means significance at 5% level, "()" are the probability values, ADF= Augmented Dickey-Fuller test. The automatic maximum lag length based on Schwarz information criterion was used.*

4.3 Estimation Result and Discussion

Since the unit root properties of the variables has been identified using Augmented Dickey-Fuller test, this study proceeds to establish the short run and long run equilibrium relationship among the variables in the model using Autoregressive Distributed Lag Model (ARDL). From Table 4, real exchange rate (REER) has a negative but significant effect on trade balance, at 5% level of significance in the short run. Furthermore, the empirical interpretation of this result is that a unit change in real exchange rate worsens the trade balance in Nigeria by 7% in the short run. Similarly, exchange rate volatility (H) has negative and significant effect on trade balance in the short run. This result shows that a unit increase in the volatility of exchange rate worsen trade balance by 2.5%. Depreciation of exchange rate has it multiplier effect on exchange rate volatility which latter has adverse effect on long run dynamics of trade balance [27]. Income proxy by gross domestic product (GDP) has positive but insignificant effect on trade balance in Nigeria. Specifically, a unit increase in income improves the trade balance by 0.2%. The coefficient of the speed of adjustment (ECT) is -0.52 implying that the model corrects its short run disequilibrium by 52% monthly in order to return to long run equilibrium. The long run estimate in Table 4 reveals that real exchange rate has negative and significant effect on trade balance indicating that trade balance worsens with the depreciation on the domestic economy. Exchange rate volatility has negative effect on trade balance in the long run. The result indicates that a unit change in exchange rate volatility worsens trade balance by 4.9%. On the contrary, income has positive but insignificant effect on trade balance in the long run. The Cumulative sum graph in Figure 4.2 shows that the model is stable.

Table 3: Short Run Parsimonious Regression Relationship between Trade balance and Exchange Rate Volatility Dependent Variable: D (TB) ARDL (1, 1, 1, 0)

Variable	Coefficient	Std. Error	Prob.
D(GDP)	0.002339 (1.225594)	0.001909	0.2219
D(REER)	-0.077257 (-1.369127)	0.056428	0.1726
D(H)	-0.025639* (-3.008677)	0.008522	0.0030
CointEq(-1)	-0.521999* (-8.173485)	0.063865	0.0000
R-squared	0.734097	DW	1.97589
Adjusted R-squared	0.615836	F-stat Prob	7.1236 0.0000

Note: the values in parentheses represent the t-stats. * 5% significant levels

Table 4: Long Run Relationship between Trade Balance and Exchange Rate Volatility

Variable	Coefficient	Std. Error	Prob.
GDP	0.001370 (1.59241)	0.000860	0.1130
REER	-0.075911* (-3.01708)	0.025160	0.0029
H	-0.049117* (-3.14969)	0.015594	0.0019
C	-4.128759 (-1.03814)	3.977079	0.3006

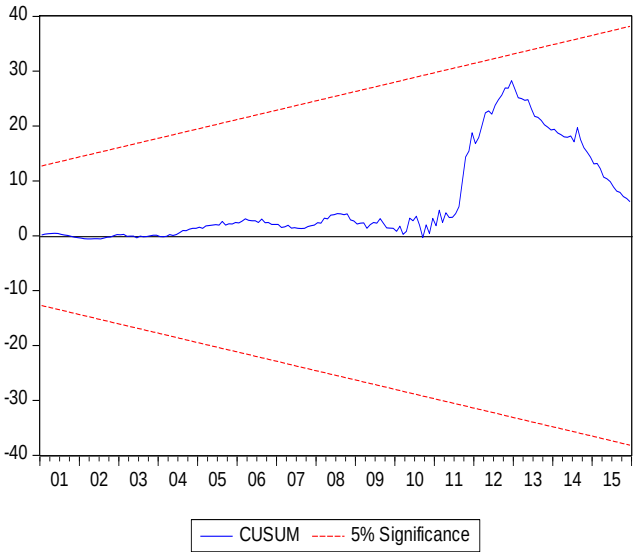

Fig 2

4.4 Examination of the Dynamic Interaction among the Variable

Figure 3 presents the impulse response function of the variables in an endogenous setting, using the horizon of 40 periods. This allows us to address particular issues concerning the dynamic interaction among trade balance, income, real exchange rate and exchange rate volatility. As in standard VECM model analysis, the way the variables entered the model is extremely important for the interpretation of result [30]. The ordering of the variable used are trade balance, gross domestic income, real exchange rate and exchange rate volatility. From Figure 3, the response of trade balance to one standard deviation shock to income innovation is positive both in the short run and long run, but this response is not statistically different from zero. The response of trade balance to real exchange rate and exchange rate volatility is negative both in the short and long run periods. These buttress the results obtained from the ARDL estimates. The results further show the evidence of reverse causation among the variables.

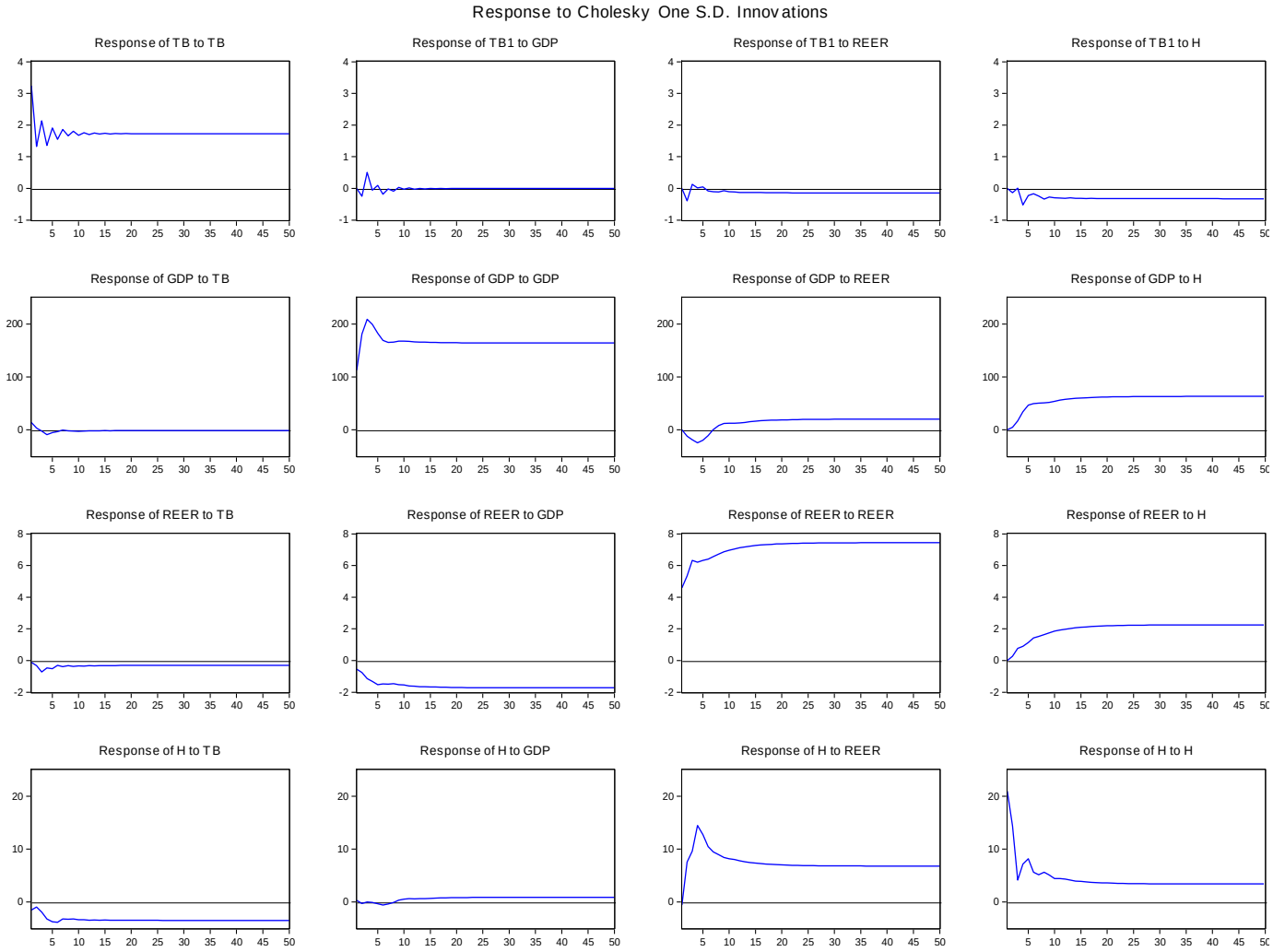

Fig 3: Impulse Response Graph

5 Conclusion and Policy Recommendation

This study examined the effect of real exchange rate and exchange rate volatility on trade balance in Nigeria using monthly data from 2000:1 to 2015:12. Generalized Autoregressive Conditional Heteroscedacity (GARCH) was used to generate real exchange rate volatility; Johansen cointegration test framework was used as the analytical tool. GARCH econometric result reveals that GARCH (1, 1) model was the right model for modeling exchange rate volatility in Nigeria. The result of the co-integration test shows that there exists a long run relationship among the variables. The results of the study conform to a priori expectation and the theory. Real domestic income has positive effect on trade balance, while it was found that real exchange rate and its volatility have adverse effect on trade balance.

Based on the empirical result of the study, the following policies are suggested:

1. Policy makers should consider both the existence and the degree of exchange rate volatility while implementing trade and exchange rate policies for the growth of exports demand.
2. Macroeconomic policies such as foreign trade policy that is in tune with the change realities of the world economic activity should be formulated.
3. Finally, sustainable and suitable fiscal and monetary policies should be formulated in developing countries especially Nigeria in order to reduce exchange rate risk/fluctuation.

References

1. Ozturk, Ihan. Exchange Rate Volatility and Trade: A Literature Survey, International Journal of Applied Econometrics and Quantitative Studies, 2006, 3-1.
2. Serenis D, Serenis P. Exchange Rate Volatility, the E.U. and Sectoral Exports: New Empirical Evidence from the Chemical Sector (1973-2005), Research in World Economy. 2010, 1(1).
3. Nouri M, Navidi H. The Exchange Rate Risk and Non-Oil Export in Iran, www.SID.ir, 2013.
4. Ranjbar H, Mahmoudi E. The Impact of Exchange Rate Volatility on Iran's Non-Oil Exports To The Major Trading Partners, Arabian Journal of Business and Management Review, 2014; 3(10):2014.
5. Kharroubi Enisse The trade balance and the real exchange rate. BIS Quarterly Review, September 2011.
6. Yuen-Ling Ng, HarWai-Mun, Tan Geoi-Mei. Real Exchange Rate and Trade Balance Relationship: An Empirical Study on Malaysia, International Journal of Business and Management, 3, (8).Aguirre, A., Ferreira, A. and Notini, H. (2007). The Impact of Exchange Rate Volatility on Brazilian Manufactured Exports, *Económica*, La Plata, 2008, 53.
7. Mohammadi T, Taghavi M. and Bandidarian A. The Effect of Exchange Rate Uncertainty on Import: TARCH Approach, Int. Journal Management Business Resources. 2011; 1(4):211-220.
8. Zhao J. Does Exchange Rate Volatility Depress Trade Flows In A Small Open Economy? Evidence From New Zealand, Paper presented to New Zealand Association of Economist Conference, 2010
9. Sekatis L. The Impact of Real Exchange Rate Volatility on South African Exports to the United States (U.S.): A Bounds Test Approach, 2008.
10. Chee-Wooi H, Chee-Keong C. Export Demand within SAARC Members: Does Exchange Rate Volatility Matter, Int. Journal of Economics and Management, 2010; 4(2):373-390,
11. Hondroyiannis G, Swamy P, Tavlas G, Ulan M. Some Further Evidence on Exchange Rate Volatility and Export, Review of World Economics, 2005; 144:151-280.
12. Polodoo V, Seetanah B, Sanassee RV. An Analysis of Exchange Rate Volatility and Trade in Mauritius. ICITI 2013, ISSN: 16941225
13. Aguirre A, Ferreira A, Notini H. The Impact of Exchange Rate Volatility on Brazilian Manufactured Exports, Económica, La Plata, 2007, 53.
14. Chit, Myint Moe and Rizov, Marian and Willenbockel, Dirk. Exchange rate volatility and exports: new empirical evidence from the emerging East Asian economies. World Economy, 2010; 33(2):239-263. ISSN 0378-5920 http://dx.doi.org/10.1111/j.1467-9701.2009.01230.x
15. Akinlo AE, Adejumo VA. Exchange Rate Volatility and Non-oil Exports in Nigeria: 1986-2008. International Business and Management, 2014; 9(2):70-79.
16. Shehu A. Abubakar, Youtang Zhang, Exchange Rate Volatility, Trade flows and Economic Growth in a Small Open Economy, International Review of Business Research Papers, 2012; 8(2)118-131.
17. Ibikunle JA, Isaac A. An Empirical Investigation of the Link between Exchange Rate Volatility and Trade in Nigeria. Journal of Emerging Trends in Economics and Management Sciences, 2011; 2(3):175-183.
18. Insah B. Modelling Real Exchange Rate Volatility in a Developing Country, Journal of Economics and Sustainable Development, 2013, 4(6).
19. Danmola RA. The Impact of Exchange Rate Volatility on the Macro Economic Variables in Nigeria, European Scientific Journal, 2013, 9(7).
20. Akbostanci E. Dynamics of the Trade Balance: The Turkish J-Curve, Emerging marketFinance and Trade, 2004; 40(5):57-73
21. Bollerslev T. Generalized Autoregressive Conditional Heteroskedasticity, Journal of Econometrics, 1986; 31:307-327.
22. Insah B. Modelling Real Exchange Rate Volatility in a Developing Country, Journal of Economics and Sustainable Development, 2013, 4(6).
23. Ndung'u NS, Liberalization of the foreign exchange market and short-term capital flows problem.AERC Research Papers 109 Nairobi. 2001.
24. Sulaiman S, Abdul-Rahim AS. J-Curve Effect and Thailand's Trade in Forest Products: ARDL Bounds Testing, World Applied Sciences Journal 2014; 29(1): 150-155.
25. Pave P, Gligorie M. Exchange Rate and Trade Balance, J- curve Effect, *Panoeconomics*, 2010; 1:23-41.
26. Kassim Lanre Trade Liberalisation and the Balance of Payments in Sub-Saharan Africa: A Pooled Mean Group Approach. Seminar paper. 2013.

27. Bollersleve T, Chou R, Kroner K. ARCH Modelling in Finance, Journal of Econometrics, 1992; 52:5-59.
28. Bakhromov N. The Exchange Rate Volatility and the Trade Balance: Case of Uzbekistan, Journal of Applied Economics and Business Research (JAEBR), 2011; 1(3):149-161.
29. Yinusa DO, Akinlo AE. Exchange rate volatility and the extent of currency substitution in Nigeria. Indian Economic Review, 2008; 32(2):161-181.