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TRADE AND FINANCIAL OPENNESS, AND OUTPUT GROWTH VOLATILITY: EVIDENCE FROM NIGERIA

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ABSTRACT

This study investigates the effect of trade openness and financial openness on output growth volatility in Nigeria using annual time series data that span the period from 1970 to 2015. Output growth volatility is generated using an EGARCH (1,1) process, and this was regressed on indices or measures of trade openness, financial openness (using the Chinn-Ito index), oil price, financial development and exchange rate. The autoregressive distributed lag (ARDL) approach to cointegration and error correction modeling was employed for the analysis. The empirical evidence indicates that trade openness and financial openness exacerbate output growth volatility in Nigeria in the long run. Favourable crude oil price is found to play significant role in stabilizing output growth in the long run. However, the short run effect of trade openness on growth volatility is negative, implying that in the short run trade openness plays some role in reducing output growth volatility. The short run effect of financial openness on output growth volatility is also negative, but not statistically significant. Further evidence from the study is that financial development and currency depreciation also reduce growth volatility in the short run. Based on the empirical evidence, the paper recommends, as measures to reduce output growth volatility (or stabilize output growth) in Nigeria, cautious liberalization of the nation's economy, efforts by the government to develop the nation's financial system to expand its credit extension/provision capacity, and prevention (by the monetary authority) using *appropriate policy actions, of undue appreciation of the domestic currency (the naira).*

Keywords: Trade Openness, Financial Openness, Output Growth Volatility

INTRODUCTION

The endogenous growth theories establish positive relationship between trade and financial openness and economic growth: the more open an economy is, the more rapid it will grow (Baldwin and Forslid, 2000; Keho and Wang, 2017). The policy prescription of this theorized relationship for developing countries is the relaxation of barriers to trade and capital flows to accelerate their development. Trade and capital flows constitute the main components of economic globalization with multinational corporations and the multilateral institutions such as the World Bank and the International Monetary Fund (IMF) being the main drivers and proponent, offering globalization as the panacea to the development challenges of the less developed countries, LDCs (Mussa, 2000; Dulupçu and Isparta, 2005; Orga, 2012). However, anti-globalisation economists or

the opponents of globalization argue that globalisation benefits the rich and highly developed countries to the detriment of the poor countries as the later are ill-prepared for the challenges it poses (Mubangizi, 2009; Crockett, 2011). A major reason advance for their arguments is that the integration of global economies has increased the import dependence rate of many LDCs, turning them to dumping ground for imported commodities and hampering the growth of their industrial sectors (Martin, 2001; Tverberg, 2013).

Ramey and Ramey (1995) empirically established an inverse relationship between output volatility and growth. The empirical relationship is now regarded as conventional wisdom (Kose, Prasad and Terrones, 2004) as numerous empirical studies also found same relationship between volatility and growth (Martin and Rogers, 2000; Hnatkovska and Loayza, 2003; Fatas, 2003). The relationship implies that the higher the growth rate of an economy, the less volatile will its output be, or the higher the volatility of output, the lower will be the growth rate of the economy. All things being equal, openness stimulates growth, and growth in turn engenders reduction in output volatility. This conclusion may not always hold as the *ceteris paribus* assumption does not always hold. The implication of this is that the effect of trade and financial openness on economic growth and on growth volatility depends on country conditions.

Volatility of macroeconomic variables in capital-poor developing countries could be lowered by financial integration which, in theory, enhances access to capital required to diversify the production base of their economies (Kose, Prasad and Terrones, 2004). However, there is no guarantee that capital inflows will always engender economic diversification, as it could also engender concentration if foreign capital is concentrated in a few sectors of the economy. Where this transpires, the economy will be easily affected by exogenous shocks to the sector (s) wherein the foreign capital is concentrated, and this may engender volatility in output. Moreover, sudden change in the direction of capital flows and sudden stops in inflow of capital could induce boom-bust cycles in developing countries majority of which do not have well developed financial sectors to withstand the effect of volatile capital flows (Kose, *et al*, 2004).

The effect of trade openness on growth also depends on country specific conditions (Zahonogo, 2016). Trade openness may encourage economic diversification or economic concentration in different countries. The classical theories of trade (the Absolute Advantage and the Comparative Advantage theories of trade) encourage specialization in production of goods for which countries have absolute advantage or comparative advantage. The Hecksher-Ohlin theory of trade encourages countries to specialize in production of goods intensive in the resource(s) of their relative factor abundance. Specialisation constitutes the foundation for economic concentration which in turn implies export concentration. Where openness is characterized by greater export concentration, this may engender volatility in output growth (Čede, *et al*, 2016; Haddad, *et al.* (2013). However, where exports are diversified (especially vertically and geographically), trade openness may engender stability in output growth, as diversification provides the economy some buffer against the effect of exogenous shocks (Busch, 2011; Ali, 2016).
Recent studies show that output volatility has been quite high in developing countries

(Hakura, 2009; Dabušinskas, Kulikov and Randveer, 2012) and this has been closely associated with lower growth as a result of its adverse effect on physical investment and investment in human capital (Onyimadu, 2016; Loayza *et al.*, 2017). High frequency of currency and financial crisis has also been associated with higher macroeconomic volatility (Center for Global Development, 2018).

Nigeria's economy is a small open developing economy. Her export basket is highly concentrated in oil which accounts for over 90% of total export earnings and over 70% of government revenue (CBN, 2016). The oil sector also attracts the largest share of FDI inflows to the country. Hence foreign direct investment (which constitute the most sizeable portion of foreign capital in the country) is concentrated in a few sectors of the economy. In view of the concentration of export and FDI in a few sectors of the economy, this paper has the objective of investigating the effects of trade openness and financial openness on the volatility of output growth in Nigeria.

LITERATURE REVIEW

Trade Openness and Growth Volatility

Bejan (2006) examines the effect of trade openness on output volatility in developed and developing countries in the period from 1950 to 2000. The study finds that trade openness generally increased output volatility, though the effect was stronger during the 1950-1975 period than 1975-2000 period. However, when the countries are split into developed and developing countries, it is found that greater openness to trade engenders more output volatility in developing countries, whereas it plays some role in smoothing output volatility in developed countries. Further evidence from the study is that government size measured as government expenditure engenders greater output volatility.in developing countries.

Giovanni and Levchenko (2008) use an unbalanced panel of 61 countries 28 manufacturing sectors a period of 30 years (1970-2009) to examine the mechanism through which output volatility is affected by trade openness using industry-level panel dataset of trade and manufacturing production. The study finds that outputs of sectors that are more open to international trade are more volatile than those less open; trade is accompanied by increase specialization resulting from concentration; and more opened sectors are less correlated with the rest of the economy. The overall implication of the results according to the researchers is that greater openness of the economy to trade exacerbates output volatility.

Using a panel dataset spanning the period from 1980 to 2009 for 33 countries and measuring output volatility as the standard deviation of quarterly GDP over a 5-year period, Abubakar (2015) employs ordinary least squares estimation technique to investigate the effect of trade openness on output volatility and how this effect may be affected by the level of development of the country. Controlling for country and period effects, the study finds that trade openness is positively related to output volatility, that is, trade openness increases output volatility. It also finds that the degree of volatility of output engendered by trade openness is less in developed countries.

Mireku, Agyei and Domeher (2017) investigate the impact of trade openness on economic growth volatility in Ghana in the period from 1970 to 2013uisng the methodology of cointegration and error correction. The

study finds that trade openness positively impacts economic growth volatility in both short- and long-run. It also finds that volatility in domestic credit to the private sector, post-economic liberalization shock, and financial openness mitigate volatility in economic growth.

Balavac and Pugh (2016) investigate the impact of trade openness, export diversification and institutions on output volatility in a sample of 25 transition countries over the period from 1996 to 2010. The study shows that the effect of trade openness on output volatility may not be attenuated by diversification for countries that are already at medium or higher level of export diversification. However, the output volatility effect of diversification is attenuated by export diversification in countries with low level of diversification. Further evidence from the study is that inflation and conflict increase output volatility, while better political institutions contribute to output stability in transition countries.

In a study to investigate the effect of trade liberalisation on output volatility in Central and Eastern European (CEE) countries, Kartalciklar (2015) matches highly disaggregated export data with aggregate and industry-level production data of the CEE countries that joined the European Union (EU) in 2004. The openness-volatility link is revisited focusing particularly on the extensive margin of exports. The analysis indicates that trade liberalization engenders growth of the extensive margin of exports which in turn consistently and significantly abates per capita output and sector output volatility. Further evidence from the study is that geographical diversification of exports reduces volatility more significantly than product diversification of exports.

Karras (2006) investigates the effect of trade openness and economic size on macroeconomic volatility such as volatility in output, consumption and investment using two datasets: one comprising 56 countries over the period from 1951-1998, and the other comprising 105 countries for the period from 1960-1997. The simple bivariate models estimated shows that both trade openness and economic size exert sizeable, negative and statistically significant effect on output volatility, implying that these variables significantly reduce volatility in output, consumption and investment. These findings are robust to the two datasets and alternative detrending methods.

Briguglio and Vella (2016) investigates the effect of trade openness, economic governance and political governance on the volatility of growth rate of GDP using a panel data set of 172 countries for the period 2010 to 2014 using the fixed effect estimator. In the study, GDP growth rate volatility is measured as the standard deviation of GDP growth rates using window size of previous 10 years, trade openness is measured as the ratio of average of export and import to GDP, economic governance is measured as the average of debt as a ratio of GDP and current account imbalance as a ratio of GDP, political governance is measured by the rule of law indicator. The analysis indicate that trade openness exacerbates GDP growth volatility, while improvements in economic and political governance abates volatility in GDP growth.

Calderón and Schmidt-Hebbel (2008) investigate the effect of trade and financial openness on growth volatility using panel dataset on a sample of 82 countries in the period from 1975-2005. The study finds that growth volatility is mitigated by trade openness in

countries with well diversified economic structures; growth volatility is abated by financial openness in countries with low debt -equity ratios; the adverse effect of financial openness on growth volatility in countries with high debt-equity ratio is smoothened out by domestic financial depth; countries with higher trade openness are less prone to decline in output; and more financially opened countries are more prone to experience sharp decline in real output if their external liabilities comprises more of debt than equity.

Buch, Döpke and Strotmann (2006) examine the effect of trade openness on firm-level volatility in Germany. The study finds that smaller firms and fast growing firms are more volatile, and that increased trade openness tends to lower volatility.

The mechanism by which trade openness affects output growth volatility is examined in Haddad, Lim, Pancaro and Saborowski (2013). The study finds that export diversification plays a strong role in conditioning the effect of trade on growth volatility. Specifically, trade openness significantly abates volatility of output growth in countries with relatively diversified export baskets.

Financial Openness and Growth Volatility

The effect of equality market liberalization and capital account openness on real consumption growth volatility is examined in Bakaert, Harvey and Lundblad (2006). The study finds that financial liberalization is associated with lower volatility in consumption growth. More financially open countries experience greater reduction in growth volatility following equity market opening.

Mekonnen and Dogruel (2017) investigate the effect of financial openness and trade openness on growth volatility in a sample of 29 sub-Saharan African countries in the period from 1981 to 2010 using the system GMM. The results show that both trade and financial openness lower growth volatility in the countries, though the effect of financial openness is not robust for alternative specifications. Decomposing trade openness into trade in manufactured goods and trade in non-manufactured goods, the study finds that trade in manufactured goods significantly reduces growth volatility more than trade in non-manufactured goods. However, when financial openness is decomposed to FDI and portfolio flows, no significant effect on growth volatility is observed for each component.

The study by Meller (2011) on the two-sided effect of financial globalization on output volatility shows that the effect of financial globalization on output volatility depends on country's specific financial risk measured as its ability to pay its commercial, trade and official debt. Using panel dataset for the period from 1980 to 2007 on a sample of 62 countries for estimation of a threshold model, the study finds that finds that financial openness increases volatility in countries with more financial risk, and reduces volatility in countries with less financial risk.

van Bezooijen and Bikker (2017) investigate the effect of financial structure (financial diversification and financial integration) on output and investment volatility in a sample of 55 countries over the period from 1975 to 2014 using instrumental variables (IV) estimation techniques accounting for fixed effects. The study finds no evidence of significant effect of market-based financial structures on output and investment volatility. However, increase in stock market size relative to banking sector size is found to exert

significant positive effect on volatility of investment.

Fan, Mohtadi and Neumann (2014) estimate a dynamic panel model to investigate the effect of financial integration on macroeconomic volatility (output growth volatility and consumption growth volatility) in a sample of 114 countries in the period from 1975 to 2010. The study finds that higher level of external asset is associates with less volatility, while higher level of external liabilities is associated with more volatility in output and consumption. External debt is also found to positively affect volatility.

Ahmed and Suardi (2009) examine the effect of trade and financial liberalization on volatility of real output and consumption in Africa. The results from the study suggest that trade liberalization is associated with greater volatility of output and consumption, while financial liberalization stabilizes income and consumption growth. Financial deepening and quality institution operate jointly with trade and financial liberalization to reduce volatility in output and consumption growth.

Chen and Wang (2009) investigate the impact of financial openness on output growth volatility in a sample of 35 industrial and developing countries over the period from 1970 to 2003 using panel volatility models. In doing this, capital flows is disaggregated into capital inflow and capital outflow and the effects of these on growth volatility is estimated. The result suggests that capital inflows increase output growth volatility particularly in developing countries, while capital outflow mitigates consumption volatility.

Mujahid and Alam (2013) investigate the effect of trade openness and financial openness on macroeconomic volatility, precisely output volatility and investment volatility in Pakistan over the period from 1970 to 2010 using the ARDL approach to cointegration and error correction. The results indicate that trade openness abates volatility in output in the short – and long –run while financial openness only significantly, exacerbates output volatility in the long run. Its short run effect on output volatility is not statistically significant. Further evidence from the study is that trade openness and financial openness exert no significant long run effect on consumption volatility, but they serve to lower consumption volatility in the short run.

Mirdala, Svrčeková and Semančíková (2015) investigates the effect of international financial integration on total output volatility in a large sample of developing and developed countries over a 40-year period from 1970 to 2009. The results indicate that financial integration significantly contributes to output fluctuations in particularly in developing countries.

Chakraborty and Boasson (2012) examine the effects of capital flows (degree of financial openness) and degree of openness on macroeconomic volatility in a large sample of 208 countries over the period from 1966 to 2009, focusing on volatility of GDP growth measured as the five-year standard deviation of real GDP. The KOF globalization index is used as proxy for openness, and the system GMM estimator is employed to estimate a dynamic panel regression model specified for the investigation. The results suggest that financial openness reduces the impact of capital flows on macroeconomic volatility.

Our search of the literature reveals that though the effects of trade openness and

financial openness on output growth volatility has been investigated in different countries and regions (in panel data settings), this has not yet been done with a focus on Nigeria. An obvious gap therefore exists in the literature and this study intends to fill this gap.

METHODOLOGY

Theoretical / Analytical Framework

Output growth volatility is measured as the conditional variance of growth rate of real GDP per capita using the exponential generalized autoregressive conditional heteroskedastic (EGARCH) modeling approach developed by Nelson (1991). Following the theoretical models developed in Giovanni and Levchenco (2009) and Mireku *et al* (2017) with some modifications, growth volatility is regressed on variables affecting it such as trade openness, financial openness, inflation, financial development and exchange rate. Thus the stochastic long run regression model for our study is specified as:

$$GRVOL_t = \beta_0 + \beta_1 TOPN_t + \beta_2 KAOPEN_t + \beta_3 OILPR_t + \beta_4 FD_t + \beta_5 EXRT_t + \mu_t \ldots\ldots [1]$$

Where GRVOL = growth volatility. OILPR = Crude oil price per barrel. This is included in the model in view of the relevance of crude oil to Nigeria's economy. FD = Financial development measured as domestic credit to the private sector by the financial system as a percentage of GDP. TOPEN = trade openness measured as the ratio of total trade (export plus import) to GDP. KAOPEN = financial openness represented with Chinn-Ito financial openness index initially introduced by Chinn and Ito (2006). The index measures a country's degree of capital account openness. It is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). It takes on values between -2.5 and +2.5, with higher values indicating higher degree of financial openness. EXRT = nominal official ₦/US$ exchange rate. The *a priori* expectations are: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 < 0$, $\beta_5 < 0$.

Volatility in real per capita output growth is generated from the exponential generalised autoregressive conditional heteroscedasticity (EGARCH) process. This study opts for this approach to volatility modeling because it explains leverage effects which are easily observable in financial time series which other prior GARCH processes fail to explain. The EGARCH model which consists of two equations namely the mean equation and the conditional variance equation is specified as:

Mean equation:

$$RGDPPCg = C + \varphi RGDPPCg(-1) + \xi_t \ldots\ldots [2]$$

Where:
RGDPPCg = Annual growth rate of real GDP per capita
C = Constant intercept
RGDPPCg(-1) = One-period lag values of annual growth rate of real GDP per capita
ξ_t = error term

The mean equation is a first order auto-regressive process. The residuals (ξ) generated from this equation is used for modeling the conditional variance equation.

Conditional variance equation:

$$log(\delta_t)^2 = w + \alpha \left| \frac{\epsilon_{t-1}}{\delta_{t-1}} - \sqrt{\frac{2}{\pi}} \right| + \gamma \left| \frac{\epsilon_{t-1}}{\delta_{t-1}} \right| + \beta log(\delta_{t-1}^2) \dots\dots\dots [3]$$

Where δ represents the conditional variance (or volatility) of real per capita output growth, and w α, β and g are the volatility parameters.

g, which is usually negatively signed, captures the leverage effect, which is the asymmetric effect of past shock. The negative sign on g implies that all things being equal, positive shocks generate less volatility than negative shock (Longmore and Robinson, 2004). β measures the degree of persistence of volatility. α is used to determine the presence or otherwise of volatility clustering. Statistically significant α indicates presence of volatility clustering. Conditional volatility in models with statistically significant α tends to rise (fall) when the absolute value of the standardized residuals is larger (smaller). Where α is statistically not significant, the model is inconclusive on the presence or otherwise of volatility clustering.

Considering that Nigeria is a developing country with highly concentrated exports, high financial risk and high intensity of cross border capital flows, trade and financial openness are expected *a priori* to be positively related to output growth volatility. High oil prices are expected to help stabilize output growth or reduce growth volatility as this translates into enhanced income for the country. The development of the financial system is expected to stabilize output growth as this would ensure efficient allocation of credits to various sectors of the economy, raise the level of their output and enhance their contribution to the nation's export basket. Depreciation of the domestic currency will enhance the competitiveness of the country's export items in foreign markets, all things being equal.

The error correction representation of short run effects of the explanatory variables on growth volatility is specified as:

$$\Delta GRVOL_t = a_0 + a_1 \Delta GRVOL_{t-1} + \sum_{h=0}^{l} (\lambda_h \Delta LTOPEN_{t-i}) + \sum_{i=0}^{m} (\theta_i \Delta KAOPEN_{t-i}) + \sum_{j=0}^{n} (\chi_j \Delta OILPR_{t-j}) + \sum_{k=0}^{p} (\partial_k \Delta FD_{t-k}) + \sum_{v=0}^{r} (\pi_v \Delta LEXRT_{t-v}) + \Omega ECT_{t-1} + \mu_{2t} \dots\dots [4]$$

The variables are as previously defined. Δ is the first-order difference operator, ECT is the error correction term included in the models to reconcile the short-run dynamics with the long-run relationship. The coefficient of the error correction terms in the

equations (Ω) is expected to be negatively signed and statistically significant to play the role of error correction in the models. μ_{2t} is the error (residual) terms of ECM model.

STUDY DATA

Data on the variables are obtained from various sources. Data on RGDPPCg, EXRT, FD and TOPEN are obtained the World Bank's World Development Indicators (2016). Data on KAOPEN are obtained from the Chinn and Ito (2006) Financial Openness Index. Data on OILPR are obtained from the OPEC Database. Annual time series data on relevant variables spanning the period from 1970-2015 are utilized for this study.

Estimation Technique and Procedure

The ARDL distributed lag approach also known as the bounds test approach to cointegration and error correction was employed for estimation of the error correction model. The choice of the methodology was informed by the fact that it is applicable in cases of mixed order of integration of variables and also corrects for the problem endogeneity or reversed causality peculiar with cointegrated variables to yield efficient and consistent long run parameter estimates.

The variables were first tested for unit root to ascertain their order of integration and to ensure that all variables entering the model to be estimated are integrated of either order 1 or 0. In other words the test is performed to ensure that none of the variables is integrated of order 2 as this would adversely affect the reliability of the result. The Augmented Dickey Fuller (ADF) unit root test and the DF-GLS unit root test which corrects the ADF test for autocorrelation were employed for this purpose.

Following the unit root or stationarity test is the test for cointegration for which we employed the Bounds test for cointegration. The test involves specifying a unrestricted error correction model (UECM) in the form:

$$\Delta GRVOLt = a0 + \lambda_1 GRVOL_{t-1} + \lambda_2 TOPEN_{t-1} + \lambda_3 KAOPEN_{t-1} + \lambda_4 OILPR_{t-1} + \lambda_5 FD_{t-1} + \lambda_6 EXRT_{t-1} + \sum_{j=0}^{n1}\left(\phi_j \Delta TOPEN_{t-j}\right) + \sum_{i=0}^{m1}\left(\theta_i \Delta KAOPEN_{t-i}\right) + \sum_{x=0}^{P1}\left(\text{Ч}_x \Delta OILPR_{t-x}\right) + \sum_{r=0}^{q1}\left(\partial_r \Delta FD_{t-r}\right) + \sum_{w=0}^{v1}\left(\Pi_w \Delta EXRT_{t-w}\right) + \boldsymbol{e}$$

Where □ is white noise error term. The model was estimated with the OLS estimation technique to test for the joint significance of the coefficients of the lagged levels of variables using the F-statistic test. Thus the null hypothesis: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6$ is tested against the alternative hypothesis: $\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6$

The computed F-statistic is then compared with two critical values (lower bound and upper bound critical values) at a chosen level of statistical significance. If the F-statistic is greater than the upper bound critical value at a chosen significance level, then it can be inferred that a level (or long run) relationship exists between the dependent variable and

the explanatory variables. The variables can be said to be cointegrated. On the other hand, if the F-statistic is less than the lower bound critical value, no long run relationship exists between the dependent variable and the explanatory variables. F-statistic value between the lower bound and the upper bound critical values is inconclusive.

RESULTS AND DISCUSSION

Unit Root Test

We begin the analysis by presenting the unit root test results. These are presented in Table 1.

Table 1. Unit Root Test Results

ADF Unit Root Test							
Variables	**Levels**			**First Difference**			**Integration Order**
	ADF Test Stat.	Critical Values (5%)	Inference	ADF Test Stat.	Critical Values (5%)	Inference	
GRVOL	-4.72	-2.93	S	-	-	-	0
TOPEN	-2.44	-2.93	NS	-8.95	-2.93	S	1
KAOPEN	-1.49	-2.93	NS	-6.12	-2.93	S	1
OILPR	-1.97	-3.51	NS	-4.84	-3.51	S	1
FD	-2.27	-3.51	NS	-5.48	-3.52	S	1
EXRT	-1.53	-3.51	NS	-6.19	-3.51	S	1
DF-GLS Unit Root Test							
Variables	**Levels**			**First Difference**			**Integration Order**
	DF-GLS Test Stat.	Critical Values (5%)	Inference	DF-GLS Test Stat.	Critical Values (5%)	Inference	
GRVOL	-4.7	-1.95	S	-	-	-	0
TOPEN	-2.11	-3.19	NS	-9.46	-3.19	S	1
KAOPEN	-1.51	-1.95	NS	-6.19	-1.95	S	1
OILPR	-2.06	-3.19	NS	-4.65	-3.19	S	1
FD	-2.22	-3.19	NS	-5.50	-3.19	S	1
EXRT	-1.26	-3.19	NS	-6.19	-3.19	S	1

NS = Nonstationary, S = Stationary
Source: Authors' Results using EVIEWS 9.5.

The ADF and the DF-GLS unit root test indicate that all the variables are stationary at first difference, except growth volatility which is stationary at levels. Hence the variables are of mixed order of integration. The fact that the variables are of mixed order of integration necessitates the use of the ARDL (Bounds) test for cointegration.

Cointegration Test

The result of the bounds test for cointegration is presented in Table 2.

Table 2. ARDL (Bounds) Test for Cointegration Result

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistics	Value	Signif.	I(0)	I(1)
F-statistic	6.90	10%	2.26	3.35
K	5	5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

k = number of explanatory variables
Source: Authors' Results using EVIEWS 9.5.

The cointegration test result presented in Table 2 shows that the variables are cointegrated as the computed F-statistic is greater than upper bound I(1) critical value even at the 1% level. Thus there is a significant long run relationship between growth volatility and the hypothesized eterminants.

Model Estimation Results

The estimated long run model based on the estimated ARDL model shown in the Appendix is presented in Table 3.

Table 3. Long Run Model

Dependent Variable is GRVOL			
Variable	**Coefficient**	**t-stat.**	**Prob.**
TOPEN	5.62	1.69	0.10
KAOPEN	276.77	2.14	0.04
OILPR	-5.97	-2.44	0.02
FD	-0.92	-0.27	0.77
EXRT	0.29	0.21	0.83

Source: Authors' Results using EVIEWS 9.5.

The estimated long run model shows that growth volatility is affected significantly by trade openness, financial openness and crude oil price. The long run effect of trade openness on growth volatility is positive, but significant at 10% level. This corroborates the empirical evidence from Mujahid and Alam (2013). The positive long run association of trade openness with output growth volatility in Nigeria may not be unconnected

with the concentration of the country's export in crude oil as studies have shown that trade openness reduces volatility when export is diversified (Haddad, *et al.* 2013). The long run effect of financial openness on growth volatility is also positive, but more significant than the effect of trade openness as the coefficient passes the test of significance at the 5% level. This is consistent with the empirical evidence from Mirdala, *et al*. (2015). The positive association of financial openness with output growth volatility in Nigeria could be attributed to the nation's high financial risk as high financial risk described in this context as the ability of a country to pay its official, trade and commercial debt is a significant determinant of the effect of financial openness on output growth volatility as observed in Meller (2012). It could also be attributed to the high intensity of cross border capital flow in the country. Hence, in the long run, trade openness and financial openness are associated with larger output growth volatility.

Oil price is negatively and significantly related to growth volatility. This implies that in the long run, increase in oil price will engender reduction in output growth volatility. This suggests that higher (favourable) oil prices play significantly role in stabilizing the long run growth of Nigeria's economy. Other variables of the model such as financial development and exchange rate exert no significant effect on output volatility in the long run.

Table 4 shows the result of the estimated error correction model. Being an error correction model, the estimated parameters indicate short run effects of the explanatory variables on the dependent variable.

Table 4. Error Correction Model

Dependent Variable is D(GRVOL)

Selected Model: ARDL (1, 2, 1, 0, 2, 2)

Variable	Coefficient	t-stat	Prob.
C	313.92	6.18	0.00
D(TOPEN)	-7.10	-2.83	0.01
D(TOPEN(-1))	-12.28	-4.96	0.00
D(KAOPEN)	-174.96	-1.52	0.14
D(FD)	-1.43	-0.44	0.66
D(FD(-1))	-11.37	-3.53	0.00
D(EXRT)	-5.72	-2.80	0.01
D(EXRT(-1))	-4.96	-2.21	0.03
CointEq(-1)	-0.77	-6.95	0.00
R-squared = 0.66 Adj. R-squared = 0.57 F-stat = 8.64, p (F-stat.) = 0.00, Durbin-Watson stat. = 2.18			

Source: Authors' Results using EVIEWS 9.5.

It can be observed from the error correction model that all the explanatory variables except financial openness (KAOPEN) significantly reduce growth volatility in the short run. Greater openness of the economy to international trade and exchange rate depreciation will engender short run stabilization of economic growth contemporaneously. In other words these policy actions will reduce growth volatility in the short run. Financial development will also engender reduction in growth volatility, but this transpires after a one-year lag. This is in sync with the result from Cermeno, Garcia and Gonzalez-Vega (2012).

The coefficient of the error correction term has the expected negative sign, and it is also highly significant even at the 1% level. The absolute value indicates high speed of adjustment as 77% of short run deviation of the model from equilibrium position is corrected annually to restore equilibrium in the system.

The model has fairly high goodness of fit as indicated by the coefficient of determination (R-squared) which indicates that 66% of the systematic variation in the dependent variable is explained by the regressors. The F-statistic of 8.64 which easily passes the test of statistical significance at the 1% level indicates that the explanatory variables are jointly significant in the determination of per capita output growth volatility. The Durbin-Watson statistic of 2.18 indicates absence of the problem of autocorrelation in the model. In view of these diagnostic statistics, the estimated model can be safely relied upon and deployed for pursuance of policy.

CONCLUSION AND RECOMMENDATIONS

This study empirically investigated the effects of trade openness and financial openness on the volatility of real per capita output in Nigeria, while controlling for the effects of other relevant variables such as financial development, per barrel crude oil price and exchange rate. The study finds that trade openness is associated with low volatility in real per capita output growth in Nigeria in the short, while financial openness has no significant short run relationship with volatility of per capita output growth in the country. Financial development and exchange rate depreciation are associated with lowering of output growth volatility in Nigeria, while capital account openness exerts no significant effect on output growth.

However, the long run results suggest that trade and financial openness are associated with larger volatility of output growth. The long run effect of financial openness is more significant than that of trade openness. Favourable oil prices are also associated with greater stability in long run growth. The long run effects of financial development and exchange rate of growth volatility are not statistically significant.

In view of the observations that trade openness and financial openness only serve to reduce volatility of output growth in the short run, but exacerbate it in the long run in Nigeria, there is need for the country to be more cautious in liberalizing her economy. Conscious and deliberate effort must be made to develop the nation's financial system so as to expand its credit extension/ provision capacity, and the monetary authority must guide against undue appreciation of the domestic currency (the naira) to enhance the competitiveness of the country's exports

(especially the nonoil export commodities), which may engender diversification of its export basket to provide some buffers against the effects of external shocks and also boost its export earnings.

REFERENCES

Abubakar, R. 2015. The asymmetric impact of trade openness on output volatility. *Empirical Economics, 49*(3), 881-887.

Ahmed, A. D., Suardi, S. 2009. Macroeconomic Volatility, Trade and Financial Liberalization in Africa. *World Development, 37*(10), October, 1623-1636.

Ali, S. S. 2016. Growth Volatility and Export Diversity in OIC Countries. *Islamic Research and Training Institute (IRTI) Research Seminar, January 19.*

Bakaert, G., Harvey, C. R., Lundblad, C. 2006. Growth Volatility and Financial Liberalization. *Journal of International Money and Finance 25*, 370-403.

Balavac, M., Pugh, G. 2016. The Link between Trade Openness, Export Diversification, Institutions and Output Volatility in Transition Countries. *Economic Systems, 40* (2), 273-287.

Baldwin, R. E., Forslid, R. 2000. Trade Liberalisation and Endogenous Growth: A Q-theory Approach. Journal of International Economics, 50(2), 497-517.

Bejan, M. 2006. Trade Openness and Output Volatility. *MPRA Paper No. 2759*.

Briguglio, L., Vella, M. 2016. *Trade Openness and Volatility*. Paper presented at the 54th Annual Conference of the Philippine Economic Society held in Manila on 8th November 2016.

Buch, C. M., Döpke, J., Strotmann, H. (2006). Does Trade Openness Increase Firm -Level

Volatility? *Deutsche Bundesbank Discussion Paper Series 1: Economic Studies No 40/2006*.

Busch, C. J. 2011. Does Export Concentration Cause Volatility? *KOF Working Paper No. 11-292.*

Calderón, C., Schmidt-Hebbel, K. 2008. Openness and Growth Volatility. *Central Bank of Chile Working Papers* N° 483 September 2008.

CBN 2016. *Statistical Bulletin*, Abuja: Central Bank of Nigeria.

Čede, U., Chiriacescu, B., Harasztosi, P., Lalinsky, T., Meriküll, J. 2016. Export Characteristics and Output Volatility: Comparative Firm-Level Evidence for CEE Countries. *Národná banka Slovenska Working Paper No. 3/2016, May*.

Cermeno, R., Garcia, M. R. and Gonzalez-Vega, C. 2012. Financial Development and Growth Volatility; Time Series Evidence for Mexico and The United States. *CIDE Working Paper, No. 544.*

CGD 2018. *Causes and Consequences of High Volatility in Developing Countries*. Retrieved from https://www.cgdev.org/doc/books/Beyond_Lending/01_Beyond_Lending-Ch1.pdf on May 19, 2018.

Chakraborty, D., Boasson, V 2012. Capital Flows, Degree of Openness and Macroeconomic Volatility. *Indian Journal of Economics & Business, 12*(1), 1-12.

Chen, S. and Wang, C. 2009. *Financial Openness and Macroeconomic Volatility: An Empirical Investigation*. Retrieved from http://grid.ntu.edu.tw/projects/pro103/pro103.pdf on May 15, 2018.

Chinn, M. D., Ito, H. 2006. What Matters for Financial Development? Capital Controls, Institutions, and Interactions. *Journal of Development Economics 81*, 163 – 192.

Crockett, S. (2011). 'Has Globalization Spread Democracy around the World?' Retrieved from https://www.e-ir.info/2011/08/27/has-globalization-spread-democracy-around-the-world/ on September 21, 2018.

Dabušinskas, A., Kulikov, D., Randveer, M. 2012. The Impact of Volatility on Economic Growth. *Eesti Pank Working Paper Series, No. 7/2012.*

Dulupçu, M. A., Isparta, O. D. (2005). *Globalization and Internationalization*, Brussels: European Commission.

Fan, P., Mohtadi, H., Neumann, R. (2014). *Financial Integration, Macroeconomic Volatility, and the Directions of Capital Flows*. Retrieved from https://cpb-us-w2.wpmucdn.com/people.uwm.edu/dist/0/252/files/2016/07/Financial-Integration-and-Economic-Volatility_11_15_2014-1bc9rdt.pdf from May 14, 2018.

Fatás, A. 2001. *The Effects of Business Cycles on Growth*. Paper presented at the 5th annual conference of the Central Bank of Chile, November 29-30, 2001

Giovanni, J., Levchenko, A. A. 2008. Trade Openness and Volatility. *IMF Working Paper, No. WP/08/146.*

Haddad, M., Lim, J. J., Pancaro, C., Saborowski, C, 2013. Trade Openness Reduces Growth Volatility When Countries Are Well Diversified. *Canadian Journal of Economics, 46* (2), 765-790.

Hakura, D. 2009. Output in Emerging Market and Developing Countries: What Explains the "Great Moderation" of 1970–2003? *Czech Journal of Economics and Finance, 59*(3), 229-254.

Hnatkovska, V., d Loayza, N. 2003. *Volatility and Growth*, Washington D. C: The World Bank

Karras, G. 2006. Trade Openness, Economic Size, and Macroeconomic Volatility: Theory and Empirical Evidence. *Journal of Economic Integration 21*(2), June, 254-272.

Kartalciklar, B. 2015. Export Diversification and Output Volatility - Empirical Evidence from Central and Eastern European Countries. *Job Market Paper*: November 2015. Retrieved from https://dornsife.usc.edu/assets/sites/524/docs/job_market_cand_2015_2016/B.Kartalciklar_JobMarketPaper.pdf on May 10, 2018.

Keho, Y., Wang, M. G. 2017. The Impact of Trade Openness on Economic Growth: The Case of Cote d'Ivoire. *Cogent Economics & Finance, 5*(1), 1-14

Kose, A. H., Prasad, E. S., Terrones, M. E. 2004. *How Do Trade and Financial Integration Affect the Relationship between Growth and Volatility?* Washington D. C: IMF.

Kose, M. A., Prasad, E. S., Terrones, M

E. 2004. "Volatility and Comovement in a Globalized World Economy: An Exploration", in Horst Siebert ed., *Macroeconomic Policies in the World Economy*, Verlag: Springer.

Loayza, N. V., Rancière, R., Servén, L., Ventura, J. 2017. Macroeconomic Volatility and Welfare in Developing Countries: An Introduction. *The World Bank Economic Review 21*(3), 343-357.

Longmore, R., W. Robinson. 2004. Modelling and Forecasting Exchange Rate Dynamics: An Application of Asymmetric Volatility Models. *Bank of Jamaica, Working Paper WP2004/03.*

Martin, P., Rogers, C.A. 2000. Long-term Growth and Short-term Economic Instability", *European Economic Review, 44*, 359-381.
Martin, W. 2001. *Trade Policies, Developing Countries, and Globalization*, Washington DC: World Bank.

Mekonnen, J. L., Dogruel, A. S. 2017. Growth Volatility and Openness in Sub-Saharan Africa. *Marmara Journal of Economics, 1*(2), 209-228.

Meller, B. 2011. The Two-sided Effect of Financial Globalization on Output Volatility. *Deutsche Bundesbank Eurosystem Discussion Paper,* Series 2: Banking and Financial Studies No 07/2011.

Mirdala, R., Svrčeková, A., Semančíková, J. 2015. On the Relationship between Financial Integration, Financial Liberalization and Macroeconomic Volatility. *Journal of Applied Economic Sciences, 10*(2), 552-570.

Mireku, K., Agyei, E. A., Domeher, D. 2017. Trade Openness and Economic Growth

Volatility: An Empirical Investigation. *Cogent Economics and Finance, 5*(1), 10-21.

Mubangizi, J. C. 2009, March. Democracy and Development in the Age of Globalization: Tensions and Contradictions in the Context of Specific African Challenges. Paper presented at the Asian Association of Global Studies (AAGS) Conference on Globalization Human Rights in the Developing World, University of Calgary Canada

Mujahid, H., Alam, S. 2013. The impact of financial openness, trade openness on macroeconomic volatility in Pakistan: ARDL Co Integration approach. *E3 Journal of Business Management and Economics, 5*(1). January, 1-8.

Mussa, M. 2000. *Factors Driving Global Economic Integration*, Washing DC: IMF.

Onyimadu, C. 2016. Macroeconomic Volatility and Economic Growth: Evidence from Selected African Countries. *MPRA Paper No. 77200*

OPEC 2016. *OPEC Basket Price*, Vienna: Organisation of Petroleum Exporting Countries.

Orga, J. I 2012. Globalisation: The Nigerian Experience. *Review of Public Administration & Management, 1*(2), 154-179.

Ramey, G., Ramey, V. A. 1995. Cross-Country Evidence on the Link Between Volatility and Growth. *The American Economic Review,* 85(5), 1138–1151.

Tverberg, G. 2013. *12 Negative Aspects of Globalization*, NewYork: OilPrice.com

U**.S. Department of Commerce** 2016. *Nigeria - Executive Summary*, Washington: U.S. Department of Commerce.

van Bezooijen, E. F. S., Bikker, J. A. 2017. Financial Structure and Macroeconomic Volatility: a Panel Data Analysis. *Utrecht University School of Economics Tjalling C. Koopmans Research Institute Discussion Paper Series 17-13.*

World Bank 2016. *World Development Indicators*, Washington D. C: World Bank.

Zahonogo, P. 2016. Trade and economic growth in developing countries: Evidence from sub-Saharan Africa. *Journal of African Trade, 3*(1-2), 41-56.

APPENDIX

Table A1. Estimated EGARCH(1, 1) Model for growth volatility (GRVOL)

Dependent Variable: RGDPPCG
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)
Date: 05/19/18 Time: 22:04
Sample (adjusted): 1971 2015
Included observations: 45 after adjustments
Convergence achieved after 24 iterations
Coefficient covariance computed using outer product of gradients
Presample variance: backcast (parameter = 0.7)
LOG(GARCH) = C(3) + C(4)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(5)
*RESID(-1)/@SQRT(GARCH(-1)) + C(6)*LOG(GARCH(-1))

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.690878	0.562306	3.007040	0.0026
RGDPPCG(-1)	0.427571	0.081936	5.218323	0.0000
Variance Equation				
C(3)	0.227415	0.682436	0.333240	0.7390
C(4)	1.266982	0.609413	2.079020	0.0376
C(5)	1.008345	0.347661	2.900370	0.0037
C(6)	0.677117	0.168108	4.027875	0.0001

Source: Authors' Estimation Output from EGARCH 9.5.

Table A2. Estimated ARDL Model

Dependent Variable: GRVOL
Method: ML ARCH - (BFGS / Marquardt steps)
Date: 05/19/18 Time: 22:09
Sample (adjusted): 1972 2015
Included observations: 44 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): TOPN KAOPEN OILPR FD EXRT
Fixed regressors: C
Number of models evalulated: 486
Selected Model: ARDL(1, 2, 1, 0, 2, 2)
Note: final equation sample is larger than selection sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GRVOL(-1)	0.231042	0.137662	1.678325	0.1037
TOPN	-7.095523	3.039590	-2.334368	0.0265
TOPN(-1)	-0.864724	3.179739	-0.271948	0.7875
TOPN(-2)	12.27912	3.139512	3.911154	0.0005
KAOPEN	-174.9641	133.0724	-1.314804	0.1985
KAOPEN(-1)	387.7934	144.4936	2.683811	0.0117
OILPR	-4.587494	1.758559	-2.608667	0.0140
FD	-1.430733	3.921938	-0.364802	0.7178
FD(-1)	-10.65260	5.225606	-2.038538	0.0504
FD(-2)	11.37368	3.780452	3.008549	0.0053
EXRT	-5.718670	2.336790	-2.447233	0.0205
EXRT(-1)	0.985931	3.281619	0.300441	0.7659
EXRT(-2)	4.955625	2.646522	1.872505	0.0709
C	313.9216	146.5459	2.142138	0.0404

R-squared	0.532830	Mean dependent var	94.19555
Adjusted R-squared	0.330390	S.D. dependent var	199.8286
S.E. of regression	163.5192	Akaike info criterion	13.28511
Sum squared resid	802155.5	Schwarz criterion	13.85281
Log likelihood	-278.2724	Hannan-Quinn criter.	13.49564
F-statistic	2.632034	Durbin-Watson stat	2.180054
Prob(F-statistic)	0.014082		

Source: Authors' Estimation Output from EGARCH 9.5.

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