

IMPACT OF TRADE OPENNESS ON THE OUTPUT GROWTH IN THE NIGERIAN ECONOMY.

ABSTRACT

In most less developed countries (LDCs), people are of the opinion that trade openness is an important determinant of economic growth. Consequently, the main objective of this study is to examine the relationship between trade openness and output growth in Nigeria. The ordinary least square method was used to test the objective. The variables used where gross domestic product (GDP) as the dependent variable, degree of openness, squared term of the degree of openness, real exchange rate, real interest rate and unemployment rate. Using the data from 1970-2010. The result shows that there is positive relationship between trade openness and output growth in Nigeria. The study also showed that output growth of the Nigerian economy is a function of two shocks which are; the internal shocks (interest rate and unemployment rate) and external shocks (trade openness and exchange rate). Its implication is that the Nigerian economy will grow more rapidly when she is opened to international competition. With this, it could be said that trade openness is very important and vital to the Nigerian economy. Policies that will make export more favourable should be adopted by the government.

Keywords: Trade openness, Output growth, Macro-economic variables, Gross domestic product, Nigeria.

Introduction and background to the study: With globalization and trade liberalisation, Economists have long been interested in factors which cause different countries to grow at different rates and achieve different levels of wealth. One of such factors is trade openness. One of the basic interests in development and international economics is to check if trade

openness promotes economic growth. With regards to globalization, two major trends are visible: first is the emergence of multinational firms with strong presence in different, strategically located markets; and the second is the convergence of consumer tastes for the most demanded products, not minding from which country they are produced. Considering the world as “one united community”, regioal integration becomes a way of not only improving the level of participation of countries in the sub-region in global trade, but also their integration into the world economy. (NEEDS, 2005).

As at 1950, the world trade was under the auspices of the General Agreement on Tariffs and trade (GATT), established in 1947, and currently under the auspices of the World Trade Organization (WTO) which replaced the GATT in 1993. By this development, Tariff levels in both developed and developing countries have reduced drastically, averaging approximately 4% and 20% in the respective cases. Furthermore, we noticed that non-tariff barriers to trade such as licenses, quota, etc, have also been reduced but at a slower pace when compared with tariffs.

Due to trade liberalisation, there has been a huge increase in growth of world trade compared to that of world output. While world output has expanded five folds, the volume of world trade has grown 16 times at an average compound rate of over 7% per annum. Thus, trade performance re-enforces the understanding of growth and development process of countries. (Thirlwall, 2000). He noted further that tariff rates have been reduced to 10% of the former rate since the end of the World War II, at the global level, international trade increased by 17 times, while global income increased by 4, and income per capita doubled. Furthermore, countries with high trade performance have recorded higher rates of GDP growth than others. Following from the above, it is obvious that trade is essential in promoting, improving and sustaining the growth and development of economies. This is why we need to examine the relationship between trade openness and output growth in Nigeria.

Today, as part of moving with the trend of globalization and trade liberalisation in the global economic system, Nigeria is a member of and signatory to many international and regional trade agreements such as international monetary fund (IMF), world trade organization (WTO), World Bank, economic community of West African States (ECOWAS), and others. The overriding objective of this economic partnership on international trade has been to create a free trade zones by removing the barriers on trade, lessen tariffs, and embark on outward-oriented trade policies. Despite Nigeria’s great attempt to meet up with the

demands to these economic partnerships, as reflected in the 2007 assessment of trade policy review, Nigeria's trade freedom was rated 56% making her the world's 131st freest economy while in 2009, it was ranked 117th freest economy, the country's GDP was also ranked 161st in the world in February, 2009. The economy has thrived to arouse growth through openness to trade; in reality, it seems that as the country put greater effort to boost her economic growth by opening up to trade with the global economy the more she becomes worse-off relative to her trading partners in terms of country output growth.

The broad objective of this research work is to study the relationship between trade openness and output growth in Nigeria. This broad objective is divided into the following sub-objectives: (i) to check the impact of trade openness on output growth in Nigeria and (ii) to identify other internal and external macroeconomic shocks that can determine output growth in Nigeria.

Research Questions

- 1 Does trade openness have any significant impact on output growth in Nigeria?
- 2 Are there any other macroeconomic variables that have significant impact on output growth in Nigeria?
- 3 Is there long run relationship between trade Openness and output growth in Nigeria?

Statement of the Research Hypotheses

In this research work, the following are the null hypothesis that will be tested:

- H₀:** There is no significant impact on output growth in Nigeria by trade openness.
- H₁:** There is significant impact on output growth in Nigeria by trade openness.
- H₀:** There are no other macroeconomic variables (internal or external) that have significant impact on output growth in Nigeria.
- H₁:** There are other macroeconomic variable (internal or external) that have significant impact on output growth in Nigeria.

Justification of the Study

Nigeria is presently going through a cycle of change in almost all sector of the economy, including the external sector. Of recent, we have seen several existing literature on the topical issue that trade openness has impact on output growth in Nigeria. Some believe there is a positive correlation between trade openness and economic growth; and the

implication being that government should reduce or remove trade barriers. The central point of this research work is to recognize the short comings and benefits of this argument as well as check the validity of this mainstream axiom in Nigeria in the existence of various internal and external shocks. This research work will further serve as a guide and provide insight for future research on this topic and related field for researchers who are willing to improve it. This research work compromise of five parts. Part one constitutes the introduction, part two deals with the theoretical framework and the empirical reviewed. Part three focuses on the research methodology, while part four deals with the data interpretation and analysis. And finally, part five gives a summary, conclusion and policy recommendations.

Empirical Review and Theoretical Framework

Empirical Review

Trade openness measures the international competitiveness of a country in the global market. To measure trade openness, we use the addition of imports and exports over GDP. Increased openness facilitates greater integration into global markets. Trade openness is interpreted to include import, export taxes, exchange-rate policies, domestic taxes and subsidies, competition and other regulatory policies, education policies, the nature of the legal system, the form of government, and the general nature of institution and culture (Baldwin, 2002).

The relationship between trade openness and growth is a highly debated topic in the growth and development literature, yet this issue is far from being resolved. Some studies, include Rodriguez and Rodrik (1999), which critically argued that trade policy variables are mostly uncorrelated with growth, while the trade shares can correlate with income levels and growth rates. Theoretical growth studies suggest very complex and different relationships between openness and growth and the empirical evidence is ambiguous. The growth theory supposes that “a country’s openness to world trade improves domestic technology, and hence an open economy grows faster than a closed economy through its impact on technological enhancement” (Harrison (1996). He stressed further that openness to trade provides access to imported inputs, which embody new technology, increases the size of the market faced by the domestic producers, which raises the return to innovation, and facilitates a country’s specialization in research intensive production.

Rodriguez and Rodrik (1999) argued that much of the work to correlate trade openness and economic growth has been plagued with subjective and collinear measures of openness that, though positively related with economic growth, arrive at their conclusion

through problematic econometric methodologies. Harrison (1996) show that the various measure of trade openness tends to be only weakly correlated and are often of the wrong sign.

The weak empirical evidence on the link-between trade liberalisation and growth can also be due to problems of misspecification. In particular, the effects of trade liberalisation may materialize only with a lag. In the short run, liberalisation may have negative effects, especially by undermining domestic production because of competitive import, retarding growth (Mukhopadhyay 1999).

Another explanation relates to the structure of trade. Whether a country benefits from trade liberalisation or not in terms of growth depends on the composition of trade. Mukhopadhyay (1999) hypothesized that the composition of trade determines the strength of the engine of growth.” Dollar and Kraay (2001) brought an important contribution to the trade and growth debate. The authors defined openness as the combination of two diversions: (i) a low level of protection, hence of trade distortions and (ii) a stable real exchange rate so that incentives remain constant over time. From the above definition, follow two measures of openness: a trade distortion index, and a real exchange rate variability index. The distortion index measures the deviation from the law of one price after controlling for the impact of non-tradable. The variability index captures the variance of the real exchange rate. The author considers a sample of 95 countries over the period 1976 -1985 and regresses average per capital growth upon his openness indexes and the average investment rate. Both the distortion index and the variability index are significantly negatively correlated with growth and the investment rate comes out with a significantly positive coefficient.

Dowrick and Jane (2004) tests whether trade openness affects output growth and /or investment. He considers a sample of 74 countries over the period 1960-1990. As openness indicator, the author considers the residuals of an OLS cross-country regression of the average trade intensity upon a constant and average population. In a second stage, the author runs cross-country OLS regressions of average per capita GDP growth upon the average investment rate, the initial GDP level and his openness indicator. The coefficient on openness is significant and positive. Moreover, dropping the investment rate considerably lowers the overall fit of the model but enhance the coefficient on openness, which according to the author “suggests that openness works partly through increased investment rates”.

In a third stage, the author computes decade averages for his variables and turns to panel data techniques, gauging that such techniques “enable some control for time invariant

country-specific factors such as institutional arrangements that might be correlated with the explanatory variables”. The author uses labour productivity growth as dependent variable and estimated both fixed-effects and random-effects models. He reported that the coefficient on openness is still significant and positive, but its point estimate is much lower than in the OLS specification. In a fourth set of regressions, the author also considers growth in openness instead of openness itself.

Edwards (1998) explained that after taking into account the roles of all other factors including capital accumulation, growth in labour force including differences in level of technology, countries with lower degrees of protectionism, on the average tend to grow at a much faster pace than countries with higher trade restrictions. In a data set spanning 100 countries, Dollar and Kraay (2001) found that changes in growth rates are highly correlated with changes in trade volumes. In fact, there have been a number of attempts to relate trade policy variables to growth rates.

Shafaeddin (1994) stressed that least developed countries particularly in Africa, have been increasingly marginalized in international trade mainly due to their high dependence on the production and export of primary commodities. The study found no clear systematic association between exchange rate devaluation on the one hand, and growth and diversification of exports on the other hand since the early 1980s. His paper attributed success or failure of GDP and industrial growth, inter alia, to the volume of investment and the availability of imports.

Theoretical Framework

Trade theories, either in closed or opened economy, have to an extent explained the debate of whether trade openness affects output growth or not. There have been arguments as discussed by Edwards (1998) thus: Argument one: Economies will grow faster if they protect domestic industry from import competition. This is a general statement of the infant-industry hypothesis”, which states that manufacturing sectors in underdeveloped economics must be sheltered from competition in order to have the incentive to invest capital, learn how to produce goods efficiently, take advantage of scale economies through large scale production, and develop innovative or distinctive products that can be sold on world markets. The broadest application of the infant-industry argument for isolation from global markets emerged in the widespread use of import substitution policies in developing countries.

183 However, the question to be asked is does such policies have limited growth. What we
184 gathered so far is that such countries do not perform well in technological advancement, they
185 also lag behind in new product innovation, have unproductive and vague agricultural and
186 manufacturing sectors, and have also not been able to build up human capital formation,
187 physical capital, and basic infrastructures. Thus, these sources of growth have likely been
188 limited in countries pursuing ISI program.

189 **Argument two: Countries will grow faster if they are open to international competition.**

190 This is the basic believe underlying trade-reform programmes that involve extensive
191 liberalisation of trade and investment barriers, unification of tariff rates and domestic tax rate,
192 removal of consumption and production subsidies, and deregulation of industry and
193 privatization of state owned enterprises. It is the essential philosophy behind World Bank
194 loans to facilitate restructuring and IMF lending packages that require microeconomic
195 structural reforms. It is also a very old idea (going back to Adam Smith and David Ricardo
196 period) but its modern translation into trade liberalisation largely began with the reforms in
197 Chile in the 1970s advocated by the “Chicago School” of economists (e.g. Milton Friedman,
198 George Stigler, etc.).

199 A somewhat different version of this approach is the export promotion, which is the
200 policy followed largely by East Asian and Western countries. These approaches are not
201 necessarily liberal in the sense of free competition. There are many examples of sheltered and
202 subsidized domestic firms or industrial groupings; much of this protection was designed to
203 encourage infant industries to mature and export. However, the key component of export
204 promotion programs is not to discourage exports, as is done under ISI programs. The basic
205 policies under export promotion include to Properly valued exchange rates, meaning
206 exchange rates that do not discriminate between imports and exports; and to rely on some
207 active forms of export promotion in manufacturing and high-tech sector, such as favourable
208 allocation of loans and subsidies and rebates of import tariff paid on imported industrial
209 inputs. Although, most international bodies (WTO, IMF World Bank etc) strongly support
210 the case for trade openness and financial liberalisation when setting up programmes for
211 developing countries or when multilateral meetings occur.

212 **Other trade theories include: Heckscher–Ohlin Trade Theory**

213 The heckscher-ohlin model (H-O model) is a general equilibrium mathematical model of
214 international trade, developed by Eli Heckscher and Bertil Ohlin at the Stockholm School of

Economics. It builds on David Ricardo's theory of comparative advantage by predicting patterns of commerce and production based on the factor endowments of trading region.

Theory of Customs Unions and Free Trade Areas: Free trade area is a form of economic union in which all members of the group remove tariffs on each other's products, while at the same time each member retain its independence in establishing trading policies with non-members (De Melo, Panagariya and Rodick,1993).

Models of Export –Led Growth: The three main models of export-led growth. They include, the neo classical supply –side model, the balance of payments constrained model which is also branded as the Hicks super-multiplier model, and the virtuous circle model.

The Neo-Classical Supply Side Model: Neo-classical or supply side economics is a micro economic-based approach to macro-economic analysis and policy development. It assumes that markets clear quickly and efficiently, and that producers respond logically to after-tax rewards (Iret, 2004).

Balance of Payments Constrained Growth Model:

The balance of payment is defined as a systematic record of all economic transactions between the residents of the country and residents of foreign countries during a certain period of time. (Afaha, 2012). A country's balance of payments equilibrium growth rate can be modelled by stating the balance of payments equilibrium condition specifying multiplicative (constant elasticity) import and export demand functions in which imports and exports are a function of domestic and foreign income, respectively, and of relative prices, and substituting these functions in the equilibrium conditions (Thirlwall, 2012).

Virtuous Circle Models of Export-Led Growth

These models provide a challenge to both orthodox growth theory and trade theory which predict the long run convergence of living standards across the world. In neoclassical growth theory, capital is assumed to be subject to diminishing returns so that rich countries should grow slower than poor countries for the same amount of investment undertaken. Neoclassical trade theory predicts convergence through the assumption of factor price equalization (Thirlwall's, 2000).

From the foregoing, we can conclude that trade liberalisation does not necessarily imply faster export growth, but in practical terms, the two appear to be highly correlated. The

relative importance of the precise mechanisms by which export growth impacts on economic growth are not always easy to qualify.

Research Methodology: This study employed econometric method as the research technique. The choice of method is necessitated by the nature of the study which in this case is an analysis of relationship among variables.

Model Specification: The functional form of this model can be specified as follows:

MODEL 1: $RGDP_T = F(OPN_T, OPN_T^2, RER_T, RIR_T, UNEMPLOY_T) \dots \dots \dots (1)$

The mathematical expression is as follows;

Model I: $RGDP_t: \alpha_0 + \alpha_1 OPN_t + \alpha_2 OPN_t^2 + \alpha_3 RER_t + \alpha_4 RIR_t + \alpha_5 UNEMPLOY_t \dots \dots (2)$

In order to allow for the inexact relationship among the variables as in the case of most economic variable, stochastic error term ' μ_t ' is added to the equation. Thus we can express the econometrics form of the model as:

Model 1: $RGDP_T = \alpha_0 + \alpha_1 OPN_T + \alpha_2 OPN_T^2 + \alpha_3 RER_T + \alpha_4 RIR_T + \alpha_5 UNEMPLOY_T + \mu_{1t} \dots \dots (3)$. **Where;** RGDP = real gross domestic product; OPN = the degree of openness measured as trade – GDP ratio i.e. (import + export)/ GDP ; OPN^2 = the squared term of the degree of openness; RER = the exchange rate ; RIR = Real interest rate ; UNEMPLOY = Unemployment rate. μ = the stochastic error term.

In order to properly estimate the parameters of the postulated model, we rescale the dependent variable by logging it, thus, transforming it into a log-line model as follows:

Model I: $LOG (RGDP_t) = \alpha_0 + \alpha_1 OPN_t + \alpha_2 OPN_t^2 + \alpha_3 RER_t + \alpha_4 RIR_t + \alpha_5 UNEMPLOY_t + \mu_{it} \dots \dots \dots (4)$

Also, in order to avoid a spurious regression, we subjected each of the variables used to unit root (or stationarity) test so as to determine their orders of integration, since unit root problem is a common feature of most time-series data.

Test of Stationarity: The test is specified thus:

$\Delta Y_t = \alpha + \alpha \Delta Y_{t-1} + \mu_t$ Where Δ = difference operator

Y_t = Time series ; μ_t = Pure white noise.

272 Under the null hypothesis that $\alpha = 1$ for stationarity, we use the PP test statistics to verify the
273 presence of unit root in the series.

274 **Test of Co-integration:** We employed the Johansen co-integration test in exploring the long
275 run relationship between the variables.

276 **Estimation Techniques**

277 The research work adopted the econometric techniques of the Non-Monotonic modelling. In
278 building this model, the Ordinary Least Square (OLS) is used as the estimation technique.
279 One basic short coming of the OLS method is the fact that some of its assumptions are
280 unrealistic (such as no autocorrelation and homoscedasticity). Hence, we have to apply
281 individual initiative along side with the empirical rules and tests so as to obtain tenable and
282 robust results. Thus, an econometric modelling is said to be more of an art than a science.

283 **Evaluation Procedure: Economic Test (A Priori Expectation)**

284 Tests was conducted to determine the a priori expectations which observed the magnitude
285 and signs of the parameter estimates. The evaluation was guided by economic theory..

286 **Presentation and Analysis of Data**

287 **Table 1: Regression Result**

VARIABLE	CO-EFFICIENT	STD. ERROR	T-STATISTIC	PROB.
C	10.48390	0.334255	31.36501	0.0000
OPN	0.474081	0.055722	8.507995	0.0000
OPN2	0.010854	0.001789	-6.068287	0.0000
RER	0.005253	0.005059	1.038357	0.3090
RIR	0.078101	0.011638	6.710835	0.0000
UNEMPLOY	-0.057210	0.028941	-1.977008	0.0592

R-squared	0.982931	Mean dependent var	13.92186
Adjusted R-squared	0.979517	S.D. dependent var	2.261664
S.E. of regression	0.323686	Akaike info criterion	0.753898
Sum squared resid	2.619310	Schwarz criterion	1.031443
Log likelihood	-5.685411	Hannan-Quinn criter.	0.844371
F-statistic	287.9279	Durbin-Watson stat	2.238449
Prob(F-statistic)	0.000000		

288 Source: Computed by the Author

289 where;

290 C = Constant, OPN = Degree of Openness, OPN^2 = Squared Term of the Degree of
 291 Openness, RER = Real Exchange Rate, RIR = Real Interest Rate, $UNEMPLOY$ =
 292 Unemployment Rate. $RGDP_t$ is real gross domestic product which represents the real
 293 output of the economy. PN_t is the degree of trade openness in an economy. It measures
 294 the international competitiveness of an economy in the global market.

295 OPN_t^2 is the squared term of the degree of trade openness. It shows the structural pattern of
 296 openness relative to output growth. Since the structural pattern could be of any type, it can be
 297 positive or negative.

298 RER_t is the real exchange rate. It is the rate at which the domestic currency is being
 299 exchanged for the foreign currency with adjustment for relative price index.

300 RIR_t is the real interest rate. It is the real cost of borrowing fund in the financial market. It is
 301 an internal shock. It is expected to be negative.

302 $UNEMPLOY_t$ is the unemployment rate in the economy. It is expected to be negative.

303 **Test of Stationarity:** In order not run a spurious regression, we subjected the variables of
 304 the above model to unit root test.

305 **Critical Values:**

306 **1%** critical value – 3.6228

307 **5%** critical value – 2.9446

308 From the test it was observed that the variables were not stationary at levels except $rgdp$.
 309 They were stationary at first (1st) difference. That is they were all integrated by other one.
 310 This means that the mean variance of each series was constant overtime after difference at the
 311 chosen critical level.

312 **Test of Co-integration:** Even though individual series in the models seems not to be
 313 stationary at level form, it is possible that their linear combination may be stationary at level
 314 form. Hence, they could be co-integrated. That is to say, there exist a long run relationship
 315 between the dependent variable and the independent variables. In order to verify this

hypothesis, we use the johansen co-integration test. The result showed that there existed, at least 2 cointegrating equations at 1% level of significance and at least 3 cointegrating equations at the 5% level of significance.

Interpretation and Analysis of Result:

(1) Evaluation Based on Statistical Criteria

The hypothesis is:

$H_0: \beta_1 = 0$ (the estimated parameter is statistically insignificant)

$H_1: \beta_1 \neq 0$ (the estimated parameter is statistically significant)

The test statistic is given as:

$$T = \frac{\hat{\beta}}{se\hat{\beta}}$$

$$t_{\frac{\alpha}{2}}(n-k)df$$

The critical value was obtained from the student table at $t_{\frac{\alpha}{2}}$ level of significance and (n-k) degree of freedom.

Decision rule: reject H_0 if T calculated is greater than the critical value. Do not reject if reverse is the case.

At $\alpha 0.05$ $n= 40$ $k = 6$

$$t_{\frac{\alpha}{2}}(n-k)df = t_{0.0025(34)} = 2.042$$

The calculated T is represented below:

T-TEST

VARIABLES	T-STATISTIC	CRITICAL	DECISION	CONCLUSION
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		VALUE	RULE	
C	31.36501	2.042	REJECT H_0	STATISTICALLY SIGNIFICANT
OPN	8.507995	2.042	REJECT H_0	STATISTICALLY SIGNIFICANT
RER	1.038357	2.042	ACCEPT H_0	STATISTICALLY INSIGNIFICANT
RIR	6.710835	2.042	REJECT H_0	STATISTICALLY SIGNIFICANT
OPN ²	-6.068287	2.042	ACCEPT H_0	STATISTICALLY SIGNIFICANT
UNEMPLOY	-1.977008	2.042	ACCEPT H_0	STATISTICALLY INSIGNIFICANT

339 SOURCE: COMPUTED BY AUTHOR

340 From the above table, we could see that the constant, openness squared term of openness and
341 real interest rate were statistically significant at 5% level of significance.

342 F- Test

343 The F-value provides a test of the null hypothesis that the true slope coefficients are
344 simultaneously zero. That is:

345 $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$ (the model is statistically insignificant)

346 $H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq 0$ (the model is statically significant)

347 The test statistic was given as:

348
$$F = \frac{ESS / (K-1)}{RSS / (N-K)}$$

349 $F \alpha (K-1)(N-K)$

350 Where ESS=estimated sum of square

351 RSS = Residual sum of square

352 The critical value is obtained from the F-distribution table at α level of significance and (k-
353 1)(n-k) degree of freedom.

354 **Decision rule:** Reject H_0 if f-statistics calculated is greater than the critical (tabulated) value.
355 Do not reject if reverse is the case.

356 From the regression, f-statistic is 237.9279

357 Where $\alpha = 0.05$, $n = 40$, $k = 6$

358 $F_{\alpha}(k-1, n-k) = F_{0.05}(5, 34) = 2.53$

359 **Conclusion:** Since the F-statistic (287.9279) is greater than the critical (tabulated) value
360 (2.53) we thereby reject H_0 and concluded by saying that it was statistically significant.

361 (i) R^2 Coefficient of Determination

362 From the regression result the R^2 is 0.982931. This means that the model explain about 98%
363 of the total variation in real GDP (output growth). The high R^2 could not be said to be
364 statistically significant for the true goodness of fit in a model unless subjected to test. The
365 hypothesis to be verified here is:

366 $H_0: R^2 = 0$ (statistically insignificant)

367 $H_1: R^2 \neq 0$ (statistically significant)

368 The test statistic for the critical R^2 is given as

$$369 \quad R^2 = \frac{(k-1)f}{(k-1)f + (n-k)}$$

370 Where f is the critical-f value at α level of significance, k is the number of parameters in the
371 model and n is the number of observations.

372 **Decision Rule:** Reject H_0 if observed R^2 is greater than the critical R^2 . Do not reject if reverse
373 is the case. H_0 : From the regression result;

374 Observed R^2 is 0.982931. At $\alpha = 0.05$, $k=6$, $n=40$. $R^2 = 0.319$.

375 **Conclusion:** Since observed $R^2 = 0.982931$ and is greater than the critical (tabulated) R^2
 376 which is $= 0.319$, we reject H_0 and concluded that the coefficient of determination (R^2) is
 377 statistically significant and a true goodness of fit for the model.

378 **(iii) Adjusted R^2 :** Adjusted R^2 is a modification of R^2 that adjusts for the number of
 379 explanatory terms in a model. Unlike R^2 , the adjusted R^2 increase only if the new term
 380 improves the model more than would be expected by chance. The adjusted R^2 will always be
 381 less or equal to R^2 . It is observed from the results that given the value of the adjusted R^2 , the
 382 variable in the model significantly explains changes in the gross domestic product position of
 383 Nigeria as about 98% (0.979517) of changes in the gross domestic product of the country are
 384 attributed to the independent variable.

385 **(iv) Durbin-Watson Statistic:** The Durbin Watson test serial of autocorrelation shows
 386 the absence of autocorrelation in the study. The calculated Durbin-Watson was (2.238449)
 387 while the tabulated is (1.175). Since the calculated is greater than the tabulated, it shows that
 388 there is absence of serial autocorrelation.

389 (2) Evaluation Based on Econometric Test

390 **(i) Test of Heteroscedasticity:** The heteroscedasticity test is carried out in order to
 391 verify whether the disturbances μ_i actually exhibit the equal variance (homoscedasticity)
 392 assumption. We used the white heteroscedasticity test because it does not rely on the
 393 normality assumption and it is easy to implement.

394 The auxiliary model is as follows:

$$395 \mu_i = \alpha_0 + \alpha_1 \text{OPN} + \alpha_2 \text{OPN}^2 + \alpha_3 (\text{OPN}^2)^2 + \alpha_4 \text{RER}^2 + \alpha_5 \text{RER}^2 + \alpha_6 \text{RIR} + \alpha_7 \text{RIR}^2 + \alpha_8 \text{UNEMPLOY} \\ 396 + \alpha_9 \text{UNEMPLOY}^2 + V_i$$

397 Where V_i = pure white noise error

398 This model is run and auxiliary R^2 is obtained. The hypothesis tested was:

399 $H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = \alpha_7 = \alpha_8 = \alpha_9 = 0$ (homoscedasticity)

400 $H_1: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq \alpha_8 \neq \alpha_9 \neq 0$ (heteroscedasticity)

401 Under this hypothesis, it has been shown that the sample size (n) times the R^2 obtained from
 402 the auxiliary regression asymptotically, follow the chi-square distribution with degree of

freedom equal to the number of regressors (excluding constant term) in the auxiliary regression. That is: $n.R^2 \sim X^2 df$

Decision Rule: Reject H_0 if X^2 calculated is greater than X^2 critical (tabulated). Do not reject if reverse is the case. From the result obtained: Cal. $X^2 = 24.52482$, and Critical $X^2_{0.05 (9)} = 16.9190$

Conclusion: Since calculated X^2 is greater than critical (tabulated) X^2 , we therefore reject H_0 .

(ii) Test of Autocorrelation: For our model, we generated AR (2) for the residual. The auxiliary model tested was;

$$\mu_t = \beta_0 + \beta_1 OPN + \beta_2 OPN^2 + \beta_3 RER + \beta_4 RIR + \beta_5 UNEMPLOY + p_1 \mu_{t-1} + p_2 \mu_{t-2} + e_t.$$

The hypothesis to be tested is $H_0: p_1 = p_2 = 0$ (No autocorrelation)

$H_1: p_1 \neq p_2 \neq 0$ (autocorrelation). The test statistic is given as; $(n-p)R^2 \sim \chi^2(p) df$

Where n = number of observation; p = the order of the autoregressive scheme of μ_t

$R^2 = R^2$ from auxiliary regression

Decision Rule: Reject H_0 if χ^2 and $>\chi^2_{(2)}$ critical at 5% level of significance; otherwise do not reject H_0 .

From the result obtained, Calculated $X^2 = 0.484962$, and While, critical $\chi^2_{(2)} = 5.99147$

Conclusion: Since calculated χ^2 is less than critical (tabulated) $\chi^2 = 5.99147$, we do not reject the null hypothesis of no autocorrelation and therefore concluded that the error terms in the model are not serially correlated.

(iii) Constant: In the model, the constant coefficient of 10.48390 represent the value of log of RGDP at the beginning of the study period i.e. $LOG(RGDP) = 10.48390$. By taking the antilog, we obtain that the value of real GDP at the beginning of the study period 35,735.504million ($=e^{10.48390}$), other factors held constant.

(iv) Degree of Openness (OPN): The degree of openness is 0.474081 which has a positive sign. This conforms to the standard economic theory which postulates that trade openness enhance economic growth. The coefficient of 0.474081 implies that over the study

430 period, on average, a one percentage (1%) increase in the degree of trade openness leads to
431 approximately 47.40% ($0.474081 \times 100\%$) increase in output growth. This early stage
432 increase in output growth as a result of openness to trade may be due to internal vibrancy of
433 government objectives, development of infrastructure and, indeed, the oil boom of the
434 1970's.

435 **(v) Squared Term of Degree of Openness (OPN^2):** The coefficient of the squared OPN^2
436 is negative which conforms to the economic theory. This implies that as an economy continue
437 to open its border to external trade over a longer time, output growth begins to decrease at an
438 approximate rate of 1.08% ($= -0.010854 \times 100\%$).

439 **(vi) Real Exchange Rate (RER):** The sign of the real exchange rate coefficient is
440 positive. This does not conform to the theoretical postulation which stressed that as foreign
441 currency say (dollar) appreciate (negative) against the domestic currency (say Naira), exports
442 will become cheaper while imports will be more expensive, hence, greater net export which
443 in turn means increase in GDP (output). Thus there should be a negative relationship between
444 RER and RGDP. The coefficient of 0.005253 means that over the period of study, a 1%
445 increase in real exchange rate, on average, leads to approximately 0.52% ($= 0.005253$
446 $\times 100\%$) decrease in the output growth (RGDP). Although the economic impact of RER on
447 RGDP in Nigeria is very small, it is also statistically insignificant. But in the case of Nigeria,
448 we have a positive relationship and this can be attributed to some factors like monetary
449 instability, high inflation rate, etc.

450 **(vii) The Interest Rate (RIR):** The coefficient of the interest is also positive (0.078101).
451 This does not conform to a priori expectation that an increase in rate of interest leads to rise
452 in cost of borrowing which discourages investors from borrowing for investment purpose,
453 thus, reducing investment level; hence, reducing productivity and output. The result shows
454 that an increase in interest rate will also lead to an increase in borrowing 7.8% ($= 0.078101 \times$
455 100%). But this result is statistically significant. In Nigeria, most businessmen look at the
456 marginal rate of efficiency when collecting loans not the high rate of interest. This is one of
457 the reasons why there is a positive relationship between GDP and inflation.

458 **(viii) Unemployment Rate (UNEMPLOY):** The coefficient of the unemployment rate is
459 negative, which conforms with the economic theory that states that a rise in unemployment
460 rate will lead to decreased productivity which will reduce total output. The unemployment
461 rate coefficient of -0.057216 indicates that a 1% increase in unemployment rate, on average,

leads to approximately 5.72% decrease ($= -0.057216 \times 100\%$) in real GDP. One of the arguments in favour of openness to trade is that new technologies and skills in the production process may require more of capital and little labour.

Summary, Recommendation and Conclusion.

This study was conducted to test the relationship between trade openness and economic growth in Nigeria. Many people have done several works on this topic but have gotten different results. Thus using the econometric test, we noticed that there exist a positive relationship between trade openness and economic growth. The model used was the non-monotonic model. Six variables were used in the research work, namely, gross domestics 'product (regressand), degree of openness, squared term of the degree of openness, exchange rate, interest rate and unemployment (regressors). Secondary data was used. The data was gotten from the central bank statistical bulletin 2010 and the Nigerian bureau of statistics. We used E-views 7 to carry out the econometric analysis.

From the regression results, it shows that there is a reversed U-shaped quadratic relationship between trade openness and economic growth in Nigeria, due to the negative squared term of the degree of openness. It also shows that the macro-economic (internal and external) variables in the model were statistically significant at 10%. Also, there exists long-run and short run relationships.

Policy Recommendations:

Diversification of the economy: Since the Oil boom in 1970's, the Nigerian Economy has concentrated only on the exportation of crude oil. Due to the high dependence on oil, Nigeria has been affected by the different international shocks such as inflation, recession etc. It is recommended that the government should focus on the other sectors in Nigeria such as the agricultural and manufacturing sectors.

Provision of adequate infrastructural facilities: Inadequate infrastructural facilities have a negative impact on the output because of the high costs of transportation, low electricity generation and other costs. The revenue generated from the export of crude oil can be used to develop the basic infrastructural facilities and essential social amenities needed in the country.

Import liberalisation: The government should promote import liberalisation through the reduction of tariffs, the removal of non-tariffs barrier and also the banning of certain goods.

The import of consumable and intermediate goods should be reduced and the local industries should be encouraged to produce such goods.

Check on illegal trades: Smuggling, bunkering, child trafficking, drug trafficking, etc are the underground activities which need to be checked in Nigeria. The government needs to reduce import tariffs in order to prevent or discourage smuggling activities.

Granting of tax relief or subsidy in the various sectors in the agriculture and manufacturing. It should also re-orient its policies towards the external sector and ensure that the sector contributes optimally to output growth.

Conclusion

It has been established that there is a positive relationship between trade openness and output growth in Nigeria which follows the apriori expectation. If government can follow the policy recommendations, there will be improvement in trading activities in Nigeria, which will in turn lead to increase in output growth. We recommended that further studies be genuinely carried out using different and more sophisticated methodologies and choice variables in order to harmonise the structural relationship between trade openness and output growth in Nigeria.

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APPENDIX 1

YEAR	RGDP	OPN	OPN2	RER	RIR	UNEMPLOY
1970	5281.10	0.3892	0.1515	0.7143	8.00	4.1
1971	6650.9	0.5031	0.2531	0.6955	10.00	4.6
1972	7187.50	0.4955	0.2455	0.6579	10.00	5
1973	8630.50	0.6597	0.4353	0.6579	10.00	5
1974	18823.10	0.4731	0.2239	0.6299	10.00	5.1
1975	21475.24	0.3182	0.1013	0.6159	9.00	4.8
1976	26655.78	0.4083	0.1667	0.6265	10.00	4.9
1977	31520.34	0.4671	0.2182	0.6466	6.00	5
1978	34540.10	0.4887	0.2388	0.6060	11.00	5.6
1979	41974.70	0.6114	0.3738	0.5957	11.00	6
1980	49632.32	0.738	0.5447	0.5464	9.50	6.4
1981	47619.66	0.1163	0.0135	0.6100	10.00	7.2
1982	49069.28	0.095	0.009	0.6729	11.75	8.7
1983	53107.38	0.0884	0.0078	0.7241	11.50	10.2
1984	59622.53	0.0886	0.0079	0.7649	13.00	7.9
1985	67908.55	0.0934	0.0087	0.8938	11.75	6.1
1986	69146.99	0.0724	0.0052	2.0206	12.00	5.3
1987	105222.84	0.2355	0.0554	4.0179	19.20	7
1988	139085.30	0.2394	0.0573	4.5367	17.60	5.1
1989	216797.54	0.3752	0.1408	7.3916	24.60	4.5
1990	267549.99	0.5816	0.3382	8.0378	27.70	3.5
1991	312139.74	0.7952	0.6323	9.9095	20.80	3.1
1992	532613.83	1.2852	1.6518	17.2984	31.20	3.5
1993	683869.79	1.3987	1.9563	22.0511	36.09	3.4
1994	899863.22	1.3391	1.7931	21.8861	21.00	3.2
1995	1933211.55	6.0616	36.743	21.8861	20.79	1.9
1996	2702719.13	6.3734	40.621	21.8861	20.86	2.8
1997	2801972.58	6.9113	47.767	21.8861	23.32	3.4
1998	2708430.86	5.112	26.133	21.8861	21.34	3.5
1999	3194014.97	6.5714	43.183	92.6934	27.19	17.5
2000	4582127.29	8.9032	79.267	102.1052083	21.55	13.1
2001	4725086.00	9.0369	81.666	111.943325	21.34	13.7
2002	6912381.25	7.5181	56.522	120.9701667	30.19	12.2
2003	8487031.57	10.823	117.13	129.3565333	22.88	14.8
2004	11411066.91	12.491	156.02	133.5004	20.82	13.4
2005	14572239.12	17.88	319.7	132.147	19.49	11.9
2006	18564594.73	17.511	306.62	128.6516	18.70	12.3
2007	20657317.67	19.27	371.31	125.8331	18.36	12.7
2008	24296329.29	22.837	521.54	118.5669167	18.70	14.9
2009	24794238.66	18.72	350.42	148.9017417	22.90	19.7
2010	29205782.96	24.553	602.83	150.298025	22.51	21.1

565 Source: computed by author

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APPENDIX 2

Dependent Variable: LOG(NGDP)
 Method: Least Squares
 Date: 05/18/13 Time: 13:45
 Sample (adjusted): 11 41
 Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.48390	0.334255	31.36501	0.0000
OPN	0.474081	0.055722	8.507995	0.0000
OPN2	-0.010854	0.001789	-6.068287	0.0000
RER	0.005253	0.005059	1.038357	0.3090
RIR	0.078101	0.011638	6.710835	0.0000
UNEMPLOY	-0.057216	0.028941	-1.977008	0.0592
R-squared	0.982931	Mean dependent var		13.92186
Adjusted R-squared	0.979517	S.D. dependent var		2.261664
S.E. of regression	0.323686	Akaike info criterion		0.753898
Sum squared resid	2.619310	Schwarz criterion		1.031443
Log likelihood	-5.685411	Hannan-Quinn criter.		0.844371
F-statistic	287.9279	Durbin-Watson stat		2.238449
Prob(F-statistic)	0.000000			

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570 CORRELATION TEST

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	RGDP	OPN	OPN2	RER	RIR	UNEMPLOY
RGDP	1.000000	0.968358	0.980951	0.863517	0.284138	0.787923
OPN	0.968358	1.000000	0.955766	0.915868	0.353511	0.778610
OPN2	0.980951	0.955766	1.000000	0.806495	0.228328	0.747524
RER	0.863517	0.915868	0.806495	1.000000	0.469202	0.865984
RIR	0.284138	0.353511	0.228328	0.469202	1.000000	0.229644
UNEMPLOY	0.787923	0.778610	0.747524	0.865984	0.229644	1.000000

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573 HETEROSCEDASTICITY TEST

F-statistic	2.192771	Prob. F(19,11)	0.0918
Obs*R-squared	24.52482	Prob. Chi-Square(19)	0.1768
Scaled explained SS	44.83315	Prob. Chi-Square(19)	0.0007

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