Rethinking Nigeria's International Trade in the Post Economic Crisis Period: Application of the Gravity Model

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Abstract: *Given the volatile and unpredictable nature of global economic interactions as exemplify by the recent global economic crisis and the fact that no one nation is an island of its own, most economies are therefore at risk to global economic movements. There is, therefore, always the need for individual economies, especially those of the developing nations, to continually evaluate and reposition their global interactions, interrelations and interdependence. Applying Ordinary Least Squares (OLS) technique to the gravity model of trade, the work investigated the relationship between Nigeria's international trade and trade determinants to analyse trade flows between Nigeria and her trading partners (OECD Countries and SSA Countries) with the view to see whether Nigeria should operate a free trade with the advanced economies or with the developing ones. The results of the work conformed to the expected sign of GDP variable of the trade partners in the gravity equation; however, the sign of the own GDP and distance variables did not conform. Also, trade flows between Nigeria and trade partners responds more to the GDP of the OECD countries than it responds to the GDP of the SSA countries. The conclusion thus is that, Nigeria can benefit from free trade with the advanced economies as much as free trade with the developing economies. However, it is recommendations, among others, that Nigeria should seek for more trade with the developing economies to which she has more comparative advantage over.*

Keywords: distance, GDP, gravity model, international trade, Nigerian economy, OECD countries, SSA countries, trade flows

I. Introduction

The need for and understanding of the interdependence and interactions of the world economies have reached their peak with the emergence of globalization. Though, many theorists have in time past seen exchanges between countries as one of the means by which a country could

develop, the impact made by globalization of the world has more reaching effects. No one country has been spared from participating in this increasing globalizing exercise – be it socially, economically, politically, technologically, environmentally, etc.

International trade is one of the cardinal means of this globalization; where "free trade" is encouraged and emphasized between countries. The promoters of this, with the backing of theory and practical examples, assert that no economy can be or is in *autarky* but rather a component of the global or international economy; and that, there are growth and development prospects and potentials for all economies for participating in international trade. In the forefront of these promoters are the advanced economies, with well established market-driven institutions. No wonder, opinions of many third world scholars and analysts tend to suggest that the emphasized reasons advanced in favor of international trade are all but a mere strategy of the developed economies to hoodwink the developing economies into an arena of exploitation.

Whatever views expressed, it is pertinent that trade between national economies has long become an integral component of all economies, and vital for comparative analysis between economies and from which states can acquire the resources they lack for their growth and development, if they have the wherewithal. It is by these that the Nigerian economy, like others, engages in exchanges of good/services between other countries. As to whether the country has benefited from international trade has been subjected to debate of its own with different perspectives held by analysts and commentators. However, more arguments seemed to be tilting toward the pessimist view that, given the state of the Nigerian economy, its institutions and that of the adjoining social-political institutions, the country stands in a disadvantage position of drawing from whatever benefits international trade (and free trade for that matter) promises. The global crisis seemed to heighten this perspective, where the price and demand of Nigeria's major

trading commodity – crude oil – were said to be hit by the crisis, thereby adversely affecting the economy.

It is to this, so to say, disadvantaged position of the country that a two-stage trade has been recommended for the country – a "guided-free-trade" for trade with advanced economies and a "free trade" with its "equals". To what extents this can help improve foreign trade of the country is what this paper sought to provide an answer to. The study thus examined the prospects of trade between Nigeria and two groups of countries (Sub-Saharan Africa (SSA) countries and Organization of Economic Co-operation and Development (OECD) countries) with different levels of development. An evaluation was, therefore, done using the gravity model of international trade, to determine which of the groups Nigeria stands to benefit more from in free trade. The aim was to determine the rate response of Nigeria's foreign trade flows to the attributes of a trading group, such as economic growth and distance between the trading partners.

This analysis became necessary due to the volatile and unpredictable nature of global economic interactions, as have been witnessed by the recent global economic crisis, which have rocked the world economies hitting both the strong and the weak and in which the Nigerian economy equally suffered setback. And not only is the international arena full of uncertainty causing various economic mishaps, but Nigeria appears to be deficient in possessing those institutions that makes for full and effective participation in the international trade so as to derive optimal benefits. To these, works like this become relevant as policy guides.

II. Literature Review

II.I Nigeria's International Trade: An Overview

Nigeria's policy towards foreign trade has varied over time from restrictive to liberal. With the breeze of globalization, blown into Nigeria through the Structural Adjustment Programme (SAP) policy and its sub-policies of trade liberalization, privatization, and deregulation, government policies toward foreign trade have been liberal; emphasizing free trade with other economies. Efforts have shifted from trade restriction by import substitution to free trade and export promotion and attraction of foreign capital. By this, Nigerian government has administered various export incentive programmes such as tax concessions, export development funds, capital asset depreciation allowances, and foreign currency retention programs in addition to operating Free Trade Zones and Export Processing Zones (Ariyo, 1997). Though most concessions, waivers or exemptions have been stopped, the Nigerian Export Promotion Council has continued to implement the Export Expansion Grant scheme to improve non-oil export performance.

However, much cannot be said to have been achieved from the external sector in terms of trade. There is negative net-export in the face of weak exchange rate. Oil and other minerals still accounts for a grater percent of the country's export. This is evident in Table 1. The values in the table 1 show that, while oil exports increased steadily over the period of 1970 to 2010, non-oil exports did not rise at the same rate. However, the opposite is the when considering imports. Non-oil imports rose faster than oil imports. More daunting is the net non-oil exports. They have remained negative throughout the period. This shows that the non-oil sector or the economy is a vent for leakages than injections. This has given rise to the over-reliance on the oil sector for its exports. According to The Library of Congress Country Studies (1991), oil has accounted for a greater proportion of the increases in exports even before the 1970s; increasing from 13 percent

in 1955 to 35 percent in 1965, to 93% in 1975, and then to 96 percent in 1985 and stood at 95% by 2011. The dependence on oil and a few other export commodities has made Nigeria particularly vulnerable to world price fluctuations as such being at risk of any external disturbance.

Table 1: Nigeria's Export and Imports (₦ million) 1970-2010

	Exports			Imports (₦ million)				
Year	**Oil**	**Non-Oil**	**Total**	**Oil**	**Non-Oil**	**Total**	**Differences in Totals**	**Differences in Non-Oil**
1970	510	375.4	885.4	52.2	704.2	756.4	129	-328.80
1975	4,563.1	362.4	4,925.5	118	3,603.5	3,721.5	1,204	-3,241.10
1980	13,632.3	554.4	14,186.7	227.4	8,868.2	9,095.6	5,091.1	-8,313.80
1985	11,223.7	497.1	11,720.8	51.8	7,010.8	7,062.6	4,658.2	-6,513.70
1990	106,626.5	3,259.6	109,886.1	6,073.1	39,644.8	45,717.9	64,168.2	-36,385.20
1995	927,565.3	23,076.1	950,641.4	155,825.9	599,301.8	755,127.7	195,513.7	-576,225.70
2000	1,920,900	24,822.9	1,945,723	220,817.7	764,204.7	985,022.4	960,700.9	-739,381.80
2005	6,266,097	105,955.8	6,372,052	182,754.8	2,296,567.7	2,479,322.5	3,892,730	-2,190,611.90
2010	10,639,417.4	396,377.2	11,035,794.5	2,073,579.0	5,931,795.2	8,005,374.2	3,030,420	-5,535,418.03

Source: Compiled from Central Bank Statistical Bulletin, various issues.

Figure 1 presents a graphical view of the behaviour of the variables in Table 1 for a more descriptive emphasis. This too depicts a clear picture of oil export (OILEX) rising faster and higher above non-oil exports (NOILEX). On the contrary, non-oil imports have a higher trend than oil imports. This still highlights the non-oil sector as vent for outflow of money.

On the other hand, there is heavy importation of non-oil goods/services. This has grown steadily exceeding oil imports over the years. This shows how highly dependent the Nigerian economy is on foreign good/services; and this has its negative consequences on the country in terms of foreign trade. It means then that the country is not competing effectively in the global market and cannot do so if this trend is maintained.

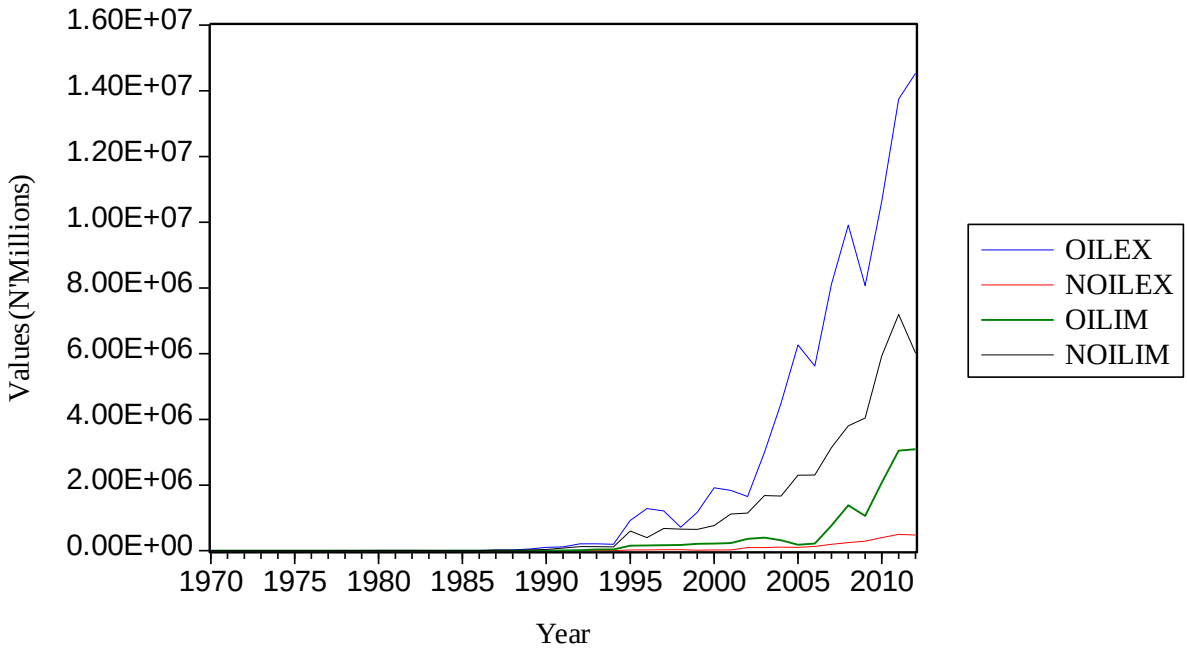

Fig. 1: Oil vs Non-Oil Exports and Imports (1970-2012)

According to The Library of Congress Country Studies (1991), this has reflected in the fact that, Nigeria's overall commodity terms of trade (price of exports divided by price of imports) fell substantially, from a base of 100 (1980) to 83.8 (1984) and 35.5 (1986), before rising to 42.6 (1987) and then falling to 34.6 (1988). Meanwhile, export purchasing power (quantity of exports multiplied by the commodity terms of trade) declined from 100 (1980) to 48.3 (1984), 23.0 (1986), 23.1 (1987), and 20.4 (1988), a 79.6 percent reduction in the purchasing power of exports in eight years.

According to Central Intelligence Agency (CIA) (2014) estimates, Nigeria's exports fell from $96.37 billion in 2011 to $95.68 billion 2012, which placed the country on the 40th position in comparison to the world exports. The chief exports commodities being petroleum and petroleum products (95%), cocoa and rubber. Nigeria's Imports, according to this source, equally fell from $61.65 billion in 2011 to $53.36 billion in 2012 and took the country to the 53rd

position in comparison to the world imports. Imports commodities by the country include machinery, chemicals, transport equipment, manufactured goods, food and live animals

Akeem (2011), confirmed the weak performance of the external sector from his study that export, import, and exchanged rate are all negatively related to real output, thus showing the less or no impact of foreign trade on economic growth.

The Balance of Payments (BOP) has equally not been favourable. Over the years this statement of account has been negative, portraying the excess of imports over exports and the poor terms of trade. This goes thus to further depict the ineffectiveness of fiscal policy to achieve the macroeconomic objective of favourable balance of payments by influencing foreign trade through exports and imports.

Another feature of Nigeria's international trade is that it has been dominated by trading with the advanced nations than the developing nations. A clear picture is that depicted by Tables 2 and 3. In 2006, 2007, and 2008 this dominance clearly showed with USA, France, Belgium, Spain, UK, Netherlands, and Germany from the advanced economies with Brazil, China, and India from the developing economies.

Table 2: Top 5 Countries Importing from Nigeria

All values in US$ Billion						
Rank	Importers	Exported value in 2006	Importers	Exported value in 2007	Importers	Exported value in 2008
-	World	59.22	World	53.96	World	81.82
1	USA	26.66	USA	25.16	USA	34.76
2	India	5.51	Belgium	4.51	India	7.87
3	Spain	4.73	India	4.40	Brazil	5.31
4	France	3.35	Brazil	3.46	France	3.37
5	Brazil	2.50	France	1.97	Netherlands	3.30

Source: *UN database in Focus Africa [Online].Available at:* http://focusafrica.gov.in/Nigeria_international_trade.html (2011).

Out of the total value of Nigeria's imports were US$59.22b, US$53.96b, US$81.82b in 2006, 2007, and 2008 respectively, USA alone accounted for US$26.66b, US$25.16b and US$34.76b in the respective periods. On the other hand, a developing country like India could only import to Nigeria US$5.51b, US$4.40b and US$7.87b of goods/services in the respective years (see Table 2). However, in terms of importation, Nigeria imported more from China to a volume of US$3.16b in 2006, US$4.89, and US$4.29b. Imports from USA amounted to US$3.59b, US$4.89b and US$2.31b in the respective periods (see Table 2).

Table 3: Top 5 Countries Exporting to Nigeria

All values in US$ Billion						
	Year 2006		Year 2007		Year 2008	
Rank	Exporters	Imported value in 2006	Exporters	Imported value in 2007	Exporters	Imported value in 2008
-	World	22.9	World	32.36	World	28.19
1	USA	3.59	China	4.91	China	4.29
2	China	3.16	USA	4.89	USA	2.31
3	UK	2.70	Belgium	3.96	Belize	2.00
4	Germany	1.28	UK	1.72	Germany	1.91
5	Belgium	1.17	Germany	1.58	Belgium	1.59

Source: *UN database in Focus Africa [Online].Available at:* http://focusafrica.gov.in/Nigeria_international_trade.html (2011).

It is glaring from the above that no developing countries of the Sub-Saharan Africa (SSA) made to the 5 top countries in trade with Nigeria. And this has been so. For instance, according to CIA (2014) in 2012, the major importers from Nigeria, were US with 16.8% of total value of exports, India with 11.5% of the value, Netherlands had 8.6% of export value, Spain 7.8%, Brazil 7.6%, UK 5.1%, Germany 4.9%, Japan 4.1%, and France 4.1% of the value of export. However, the country, in the same year, (according to CIA, 2014) imported majorly from China 18.3%, US 10.1%, India 5.5%. This constitution of trade partners highlights the disadvantaged position of Nigeria in foreign trade since she cannot have maximum control of the market like the advanced nations.

II.II Why should Nigeria bother about Trading Partners?

The form of international trade endorsed by the promoters of globalization is a *free trade* – simply referred to as trade between nations without any form of artificial restrictions. This is as opposed to restricted (or a regulated or guided) trade. This, as globalization wants it, should be practiced by all economies, their state of development notwithstanding. With this then emerged the theory and policy of *Trade Liberalization* which was, and still is, promulgated to lure and persuade countries hitherto practicing restricted or guided trade to embrace free trade and open up their borders to trade in all goods/services and with all economies not minding their levels of development.

The risen dust of globalization had not settled when global village was engulfed in a financial turmoil that ended up as another global economic crisis. This, being a global crisis and coming at a time when countries had not long embraced globalization with all its policies, affected almost all economies though with different magnitude. The developed economies of United States of America and Britain are numbered top on the worst-hit list. Sheinis (2010) also identified Russia as one of the economies on top of this list. The effects of this crisis, which most economies are still battling with, have brought renewed thinking. By this, those economies that had close trade ties to these advanced economies contacted this tsunami more than those with less ties to the advanced economies. With this experience, a cautious selection of trading partners becomes necessary.

That decline in demand and supply caused by the global economic crisis, according to Baldwin and Taglioni (2009), has rapidly improved global imbalances, since the gap between exports and imports ineluctably falls at the same pace as the underlying export and import flows.

As import and export growth resume, large global imbalances will return unless both surplus and deficit economies undergo structural changes, they had warned.

The very over dominance of Nigeria's foreign trade by the developed nations (as exemplified above) with more advanced market institutions which puts Nigeria at the receiving end of any trade policy, trading act, etc., equally requires that the country should rethink who she should trade with.

Also, as noted by the World Trade Organization – WTO (1998) steps towards macroeconomic stabilization and trade and investment liberalization must be supported by credible structural reforms if Nigeria is to regain international confidence and improve the standards of living of the population. According to WTO (1998) report on Nigeria's trade policies and practices states that political and institutional uncertainty persist in Nigeria and that the weakening of the rule of law has discouraged foreign direct investment and trade flows outside the oil export sector. In terms of trade policies and trade partners, the report concludes that Nigeria is currently at a crossroads in its economic and trade policies. While steps have been taken toward trade and investment liberalization and macroeconomic stabilization, policy priorities remain divided between dependence on the public sector and import substitution strategies on the one hand, and greater reliance on the private sector and market-based reform on the other.

Also, given the saturated nature of the advanced markets, which has necessitated in the first their outward looking approach that brings about international trade, it becomes wise for Nigeria to watch carefully who she trade with, if the aim of the trade is to bring benefit to the country.

It thus become imperative for Nigeria rethinking her foreign trade in terms of who she should trade with, and also the extent and nature to which to do this.

II.III Theoretical Framework – The Gravity Model of International Trade

The gravity model is a widely used model. For over decades the gravity model has been successfully applied to flows of the most widely varying types, such as migration, buyers distributed across shopping centers, recreational traffic, commuting, patient flows to hospitals and interregional as well as international trade (Ferwerda, Kattenberg, Chang, Unger, Groot and Bikker, 2011). Bikker (2009), had also affirmed that the traditional gravity model has been applied many times to international trade flows, especially in order to analyze trade creation and trade diversion. The name of the model is analogous to that Newton's law of gravity. According to Krugman, Obstfeld and Melitz (2012) "just as the gravitational attraction between any two objects is proportional to the product of their masses and diminishes with distance, the trade between any two countries is, other things equal, proportional to the product of their GDPs and diminishes with distance." This is expressed algebraically as:

$$T_{ij} = (A \cdot Y_i \cdot Y_j)/D_{ij} \quad (1)$$

where A is a constant term, T_{ij} is the value of trade between country i and country j (otherwise known as trade flows), Y_i is country i's *GDP*, Y_j is country j's GDP, and D_{ij} is the distance between the two countries. That is, the value of trade between any two countries is proportional, other things equal, to the product of the two countries' GDPs, and diminishes with the distance between the two countries (Krugman *et al*, 2012).

In its more general form, the gravity model can be stated as follow:

$$T_{ij} = (A \cdot Y_i^a \cdot Y_j^b)/D^c{}_{ij} \quad (2)$$

By this (Krugman *et al*, 2012), there are three variables that determine the volume of trade between two countries – the size of the two countries' GDPs and the distance between the countries, without specifically assuming that trade is proportional to the product of the two GDPs and inversely proportional to distance. Instead, *a*, *b* and *c* are chosen to fit the actual data as closely as possible. If *a*, *b* and *c* were all equal to 1, (2) would be the same as (1).

Ignoring the level of proportionality between bilateral trade flow and its determining variable, Josic (2008) specifies the gravity model in the following functional relationship:

$$E_{ij} = A \cdot GDP_i^{\beta 1} \cdot GDP_j^{\beta 2} \cdot D_{ij}^{\beta 3} \quad (3)$$

where *A* is a constant term, *E* is exports from country *i* to country *j* (as the trade flows), GDP is gross domestic product (the economic strength of a country), *D* is the distance between the countries (i.e. geographical proximity) and the β_s are the elasticities.

However, (Josic, 2008) a better understanding of the gravity equation in terms of elasticity is achieved using log-linear structure (logarithmic values of all variables) in Equation 4:

$$logE_{ij} = \alpha_{ij} + \beta_1 logGDP_i + \beta_2 logGDP_j + \beta_3 logD_{ij} \quad (4)$$

where β_1, β_2 and β_3 parameters are interpreted as coefficients of elasticity of exports in respect to changes in independent variables (GDP and distance). This change of dependent variable is not in absolute terms, it is rather relative change due to interpretation of log structure and percentage changes that persist in β_i coefficients.

It is possible to extend (4) using other variables that could possibly measure economic strength of a country better, such as Population (POP), *GDP per capita* (GDP/POP) or

combination of all mentioned. Furthermore, the extended gravity equation can also be written in the following form:

$$logE_{ij} = \alpha_{ij} + \beta_1 logGDP_i + \beta_2 logGDP_j + \beta_3 logPOP_i + \beta_4 logPOP_j + \beta_5 log\left(\frac{GDP_i}{POP_i}\right) + \beta_6 log\left(\frac{GDP_j}{POP_j}\right) + \beta_7 logD_{ij} \quad (5)$$

Theoretically, it is expected that the signs of β_1, β_2 and β_6 coefficients of GDP variables, using regression analysis, should comply with the signs in Table 4 below:

Table 4. Expected Signs of β_i Coefficients

β_i	Expected sign of β_i
β_1	+
β_2	+
B_6	-

Positive signs in Table 4 arise from the positive impact of higher income on imports of country's trade partner under constant marginal propensity to import. As Krugman *et al* (2012) rightly pointed out; large economies tend to spend large amounts on imports because they have large incomes. They also tend to attract large shares of other countries' spending because they produce a wide range of products. So, other things equal, the trade between any two economies is larger, the larger is either economy.

An impact of geographical proximity on trade is negative, and suggests that distance affects trade in the opposite way ($\frac{\partial E_{ij}}{\partial D_{ij}} < 0$) due to transport costs. Hence, the expected sign of parameter β_3 for variable Distance is negative (β_3<0).

How to measure distance has been a key question in setting gravity model properly. According to Josic (2008) one way is to use great circle distance between capital cities of trade

partners (country *i* and country *j*). The other way is to use auxiliary variables that represent changes in prices that occur in process of trade between countries *i* and *j*. These can be measured either using real exchange rate or the price of oil. Due to the inclusion of transport costs, it is impossible to hold Heckscher-Ohlin's assumption that international trade will equalize prices of all tradeable goods in countries that participate in trade. Transport costs inhibit trade and discriminate prices in both trade partners as well.

Parameter α_{ij} is taken to account for all other unobservable variables that are not explained directly through gravity equation and includes cultural, historical, political and language differences among countries.

According to Ferwerda, *et al* (2011), the empirical results obtained with the model have always been judged as very good. The model is sensible, intuitive and hard to avoid as a reduced theoretical model to explain bilateral trade. However, the gravity model equally has some imperfections. These include the absence of a cogent derivation of the model, based on economic theory and it cannot describe substitutions between flows and (Bikker, 2009; Ferwerda, *et al*, 2011).

III. Methodology

Adopting a simple gravity model of Josic (2008) type, longitudinal data about the variables were obtained from the World Bank (2011) and time-series data from the CBN (2011). The longitudinal data were for the gross domestic product (GDP) of the Organization for Economic Co-operation and Development (OECD) countries and Sub-Saharan African (SSA) countries. The time series is on the exchange rate which was used as a proxy for distance between Nigeria and her trading partners. Both kinds of data were drawn for a period of 26 years (i.e., 1986-

2011). The ordinary least squares (OLS) estimation technique of regression analysis was used to perform the test on the following models.

$$logTFNIG = \alpha_{NIG,OECD} + \beta_1 logGDP_{NIG} + \beta_2 logGDP_{OECD} + \beta_3 logD_{NIG,OECD} \quad (6)$$

$$logTFNIG = \theta_{NIG,SSA} + \gamma_1 logGDP_{NIG} + \gamma_2 logGDP_{SSA} + \gamma_3 logD_{NIG,SSA} \quad (7)$$

where;

TF_{NIG} = trade flows to Nigeria for the trading zones (Organization for Economic Co-operation and Development OECD countries and Sub-Saharan African SSA countries),[1]

GDP_{NIG} = GDP of Nigeria,

GDP_{OECD} = GDP of the OECD countries,

GDP_{SSA} = GDP of Sub-Saharan African countries,

$D_{NIG,OECD}$ = Distance between Nigeria and OECD countries proxied by exchange rate,

$D_{NIG,SSA}$ = Distance between Nigeria and SSA countries proxied by exchange rate, and

α, θ, β_i and γ_i = the parameters.

The parameters β_1, β_2, γ_1, and γ_2 are expected to be positive (i.e. $\beta_1 > 0$, $\beta_2 > 0$, $\gamma_1 > 0$, and $\gamma_2 > 0$), while β_3, and γ_3 should be negative (i.e. $\beta_3 < 0$, and $\gamma_3 < 0$). This is as explained above.

[1] Computed as the arithmetic mean of exports (E_t) from and imports (M_t) to Nigeria. That is, $TF = \frac{(Et+Mt)}{2}$.

IV. Result

Table 5: ADF Unit Root Test

Variables	ADF statistic	Test Critical Values 5%	Order of integration
TF	-3.625682	-3.248592	1(0)
GDP_{NIG}	-3.515296	-1.955681	1(0)
GDP_{OECD}	-4.116235	-2.998064	1(0)
GDP_{SSA}	-4.296810	-3.612199	1(0)
D	-4.743836	-2.991878	1(0)

Source: Author's Computed, 2014 (Eviews 6.0)

The result of Table 5 above shows that all the variables were stationary at level. Though GDP_{NIG}, GDP_{OECD}, and D were stationary with a trend and intercept while the other were stationary with only a trend. The attainment of stationarity is, however, consistent with the fundamental assumptions of the OLS; as such formed the basis for use of OLS to test the model.

The empirical results based on the gravity model and variables used are as presented below.

Table 6: Correlation Matrix (With LOGGDPOECD Variable)

	LOGTF	$LOGGDP_{NIG}$	$LOGGDP_{OECD}$	LOGD
LOGTF	1.000000	0.872937	0.980029	0.952556
$LOGGDP_{NIG}$	0.872937	1.000000	0.926976	0.818691
$LOGGDP_{OECD}$	0.980029	0.926976	1.000000	0.927925
LOGD	0.952556	0.818691	0.927925	1.000000

Source: Author's Computation, 2014 (Eviews 6.0)

Table 7: Correlation Matrix (With LOGGDPSSA Variable)

	LOGTF	$LOGGDP_{NIG}$	$LOGGDP_{SSA}$	LOGD
LOGTF	1.000000	0.872937	0.825896	0.952556
$LOGGDP_{NIG}$	0.872937	1.000000	0.976486	0.818691
$LOGGDP_{SSA}$	0.825896	0.976486	1.000000	0.739002
LOGD	0.952556	0.818691	0.739002	1.000000

Source: Author's Computation, 2014 (Eviews 6.0)

From Tables 6 and 7 it is clear that there is a strong positive linear correlation between OECD's GDP and trade flows (TF) to Nigeria ($\rho_{LOGTF,LOGGDPOECD} = 0.980029$) and between

SSA's GDP and TF ($\rho_{LOGTF,LOGGDPSSA} = 0.825896$). Trade flows to Nigeria are almost perfectly correlated with the changes in OECD's GDP and ASS's GDP.

Results of regression analysis based on Equations 6 and 7 are presented in Table 8:

Table 8: Regression Analysis on LOGTF Variable with OECD

Dependent Variable: LOGTF
Method: Least Squares
Date: 05/05/13 Time: 17:53
Sample: 1986 2011
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-57.59254	8.272372	-6.962034	0.0000
$LOGGDP_{NIG}$	-0.446747	0.224221	-1.992441	0.0589
$LOGGDP_{OECD}$	5.042350	0.760720	6.628390	0.0000
LOGD	0.395793	0.136730	2.894711	0.0084

R-squared	0.977859	Mean dependent var	5.860055
Adjusted R-squared	0.974840	S.D. dependent var	0.907285
S.E. of regression	0.143914	Akaike info criterion	-0.898570
Sum squared resid	0.455645	Schwarz criterion	-0.705016
Log likelihood	15.68140	F-statistic	323.8760
Durbin-Watson stat	1.128605	Prob(F-statistic)	0.000000

Source: Author's Computation, 2014 (Eviews 6.0)

Table 9: Regression Analysis on $LOGTF_{NIG}$ Variable with SSA

Dependent Variable: $LOGTF_{NIG}$
Method: Least Squares
Date: 05/05/13 Time: 17:56
Sample: 1986 2011
Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-12.05130	5.317173	-2.266487	0.0336
$LOGGDP_{NIG}$	-0.662177	0.811472	-0.816019	0.4232
$LOGGDP_{SSA}$	1.981067	1.121028	1.767188	0.0911
LOGD	1.242674	0.157350	7.897528	0.0000
R-squared	0.941890	Mean dependent var		5.860055
Adjusted R-squared	0.933966	S.D. dependent var		0.907285
S.E. of regression	0.233145	Akaike info criterion		0.066326
Sum squared resid	1.195846	Schwarz criterion		0.259880
Log likelihood	3.137756	F-statistic		118.8650
Durbin-Watson stat	0.833217	Prob(F-statistic)		0.000000

Source: Author's Computation, 2014 (Eviews 6.0)

With the results, (6) and (7) becomes:

$$logTF_{NIG} = -57.59254 - 0.446747logGDP_{NIG} + 5.042350logGDP_{OECD} + 0.395793logD_{NIG,OECD} \quad (6')$$

$$logTF_{NIG} = -12.05130 - 0.662177logGDP_{NIG} + 1.981067logGDP_{SSA} + 1.242674logD_{NIG,SSA} \quad (7')$$

V. Discussion of Results

The results in Tables 8 and 9, and as expressed in (6′) and (7′), show a positive relationship between the TF_{NIG} and the GDP of and distance between trading countries; while a negative relationship exists between TF_{NIG} and own GDP. This implies that, a $1 rise in GDP (i.e., economic strength) of OECD and SSA countries will lead to a corresponding $5.04 and $1.98 increase in TF_{NIG} respectively. The negative intercepts indicates that, without the impact of the explanatory, TF_{NIG} will decline. By these only one of the expected signs from for the two equations (β_2 and γ_2, respectively) conform to the *a priori* expectation, as was suggested in Table

4. It should be noted, however, that, the interpretation of the coefficients (β_i and γ_i) in log-linear form is in terms of elasticity due to log values used.

The t-test was conducted with it results in Tables 8 and 9. From the results of this statistic, based on the (6), all the other explanatory variables, except $LOGGDP_{NIG}$ (i.e. the country's own GDP), were significant in explaining variations in TF under 5% significance level. This is consistent with the fact that OECD's demand (measured by GDP) for Nigeria's goods is positively correlated, i.e. $(\frac{\partial TFNIG}{\partial GDP_{OECD}} > 0)$. However, with reference to (7), the t-tests show that only variable LOGD is significant in explaining variable TF under 5% significance level. This is, however, not consistent with the expectation that trade with SSA countries should have significant impact on the trade flows to Nigeria. The ρ-values equally support the t statistics for all equations.

The distance (D), as a variable, does not conform to the gravity model expectations and parameter's negative sign. This, as in the case of Josic (2008), can be explained by the usage of a proxy variable (exchange rate) instead of physical distance between Nigeria and her trading partners. This gave the respective estimates of the parameters β_3 and γ_3 (i.e. 0.395793 and 1.242674) to be greater than zero. These can be interpreted as percentage change of Nigeria's trade flows due to changes in distance between Nigeria and her trading partners. Due to the low values of these estimates, it could be that distance does not impact significantly on trade flows to Nigeria. The value for SSA is a higher and can be taken to mean the lack of a common regional currency which causes exchange rate problems between Nigeria and other SSA countries.

The intercepts, α and θ, are negative to prove that without the mentioned variable, trade flows to Nigeria will decline. It can be generalised from here that, international trade has the potentials of adding to a country's growth.

Considering the R-squared values, As Josic (2008) had noted, the fitness or suitability of gravity model in explaining trade pattern is justified due to high R-squared values, which express goodness of fit between observed and predicted values. The R-squared values of 0.977859 and 0.941890 suggest that, about 98% and 94% of the TF to Nigeria are explained by GDP of the trading partners, GDP of the country, and distance – in terms of exchange rate – between Nigeria and her trading partners; while the remaining percentages are accounted for by variables not considered by the gravity model. These show that the gravity equations posses the explanatory power to explain changes in trade flows to Nigeria.

The F-test for the two equations shows that, with the degree of freedom V_1=3 and V_2=26, equals $F_{0.05}$= 2.98. Empirical values from Tables 8 and 9 (F-statistics = 323.8760 and F-statistics = 118.8650) are higher than critical value. This further supports the strength of the model that the R-square is significant at α = .05. That is to say, at least one variable is significant in explaining the behaviour of the dependent variable, $TF_{NIG,}$ in the model, under 5% significance level.

From the results, it is clear that Nigeria's trade flows depend on depends on the economic strength of her trading partners. Changes in the purchasing power of the partners, especially the advanced partners, accounts for the flow of trade benefits to Nigeria. This is seen where, a $1 rise in GDP of OECD countries leads to $5.04 increase in trade flows as against $1.98 rise for a $1 rise in purchasing power (GDP) of SSA countries. This means that, as the country stands to benefit more from trade with the advanced economies with high GDP growth rate than the economies of the developing nations, ceteris paribus. However, this positive relationship could

be disastrous if there is fall in the purchasing power of these advanced economies. It means that, under situations of economic crisis, Nigeria will lose more in trade with the advanced economies than developing economies. This implies further that, a conscious effort of balancing of the flow of trade benefits from the two group of trading partners will be more beneficial.

The same scenario occurs with regards to distance. Though the signs of the estimates (i.e. 0.395793 and 1.242674) do not come out as expected, it can be seen that the impact of distance (proxy exchange rate instead of physical distance between Nigeria and her trading partners) between Nigeria and the advanced partners yield negligible impacts. This can be taken to mean that distance does not affect trade between Nigeria and the advanced economies. This can be as a result ease of trade due to an easily exchange medium – the Dollar. As such, distance between Nigeria and the advances economies does not impact significantly on trade flows to Nigeria. This, however, still differ with respect to the developing countries with a positive coefficient of 1.242674, making trade with the advanced nations more beneficial. As explained earlier, this relatively higher value can be taken to mean the lack of a common regional currency which causes exchange rate problems between Nigeria and other SSA countries.

VI. Conclusion and Recommendation

The need for the work, as has stated above, was born out of the desire to assess the effect of economic strength and distance on trade flows to Nigeria necessary for trade policy reform in Nigeria. The gravity model was then adopted due to its strength in assessing the flow of trade benefits between countries. This has been proven by the fitness of the estimated models. The results show positive impacts of trading partners' GDP on trade flows to Nigeria. That is, Nigeria's exports grow as the economies of her trading partners grow. The growth in exports is,

however, higher with growth in the economies of OECD than the SSA. This means that, the trade flows to Nigeria are more influenced by the economic performance of the OECD countries than that of the SSA countries. Led by the results, it is convincing to conclude that changes in purchasing power of the advanced countries (as exemplified by the OECD countries) account for the flow of trade benefits to Nigeria more that of 'equal economies' – the SSA countries.

This suffices then to say that, the freely opening of the Nigerian economy to foreign trade has benefit to the country. But with the significant impact of the advanced economies on Nigeria's external trade, the negative down turns in these economies can be equally transmitted to Nigeria via changes in trade flow. This will not be same with the SSA developing economies. This then explains the rate of transmission and the quantum of the impact of the last global economic crisis – which had its origin in the advanced economies – on Nigerian trade benefits and the entire economy.

Given the above, as it may be, it will be wise for Nigeria foreign trade policies should be reformed to seek more open trade with the developing economies to which she has more comparative advantage over. On the other hand, a more guided trade policy should be instituted for trade between Nigeria and the advanced economies. This kind of policy design will increase Nigeria's trade gains and at the same time save the country in time of any global turmoil that result from the advanced economies with better structures and institutions that make readjustment possible and easy.

African regional organisations (like ECOWAS, AU, etc) should intensify efforts at encouraging regional trade. This can be done through instituting a common currency that will enhance transactions and exchange rate between African states, the removal of trade barriers between member states, among others.

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