# Is "Trade"[1] Openness Valid for Nigeria's Long-Run Growth: A Cointegration Approach?

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## Abstract

**This Working Paper should not be reported as representing the views of the AIAE nor that of the BPS Project or UNIFEM**.
The views expressed in this working Paper are those of the author(s) and do not necessarily represent AIAE, BPS Project or UNIFEM policy. Working Papers describe research in progress by the author(s) and are published to elicit comments and to further debate. All errors remain entirely that of the author(s).

As a prelude to tariff reduction, the government is currently assessing the implications of significantly reducing tariffs due, in part, to its 2001 agreement with Ghana to quickly implement the ECOWAS Trade Liberalization Scheme. The obvious questions are: Should Nigeria liberalize to all countries on all products or opt for a discriminatory approach through unilateral trade agreements? Where do we think Nigeria should be open, and on what issues should they be closed? What should Nigeria's trade policy be in the face of globalization's negative effects and increasing protectionism of developed countries? The paper reviews key issues regarding an appropriate design of trade policy reforms in Nigeria and its validity for Nigeria's long-run growth using the cointegration approach. The VAR approach was preferred because it overcomes the limitation and ambiguity associated with the regression results (Enders, 1995). Moreover, recent Monte Carlo evidence strongly favors the Johansen Maximum Likelihood method (JML) approach over the Engle-Granger's (Dejong, 1992) in this regard. Econometric results show that there is no significant relationship between openness and economic growth, and that unbridled openness could have deleterious implications for growth of local industries, the real sector and government revenue.

***World trade has the potential to act as a powerful motor for the reduction of poverty, as well as for economic growth, but that potential is being lost, because the rules that govern it are rigged in favour of the rich...***

## Introduction

The turbulence experienced in world markets since the mid-1970s had severe adverse effects on Africa. In sub-Saharan Africa, free-market religion has found far fewer converts. Despite tremendous pressure from donor governments and multilateral agencies, African policy makers have generally been more skeptical about the value of opening up their economies and reducing the role of government. Consequently, reforms have progressed rather gradually and have been full of interruptions and reversals. The contrast with Latin America, where governments have stuck with ambitious reforms even under severe macroeconomic difficulties--for example during the Mexican peso crisis of 1995--is quite striking.

The paradox presented by sub Saharan African growth experience is best exemplified by Nigeria. The economy has severally been described as a difficult environment for business. With a population growth of about 3%, it has been acknowledged that the current average output growth rate of less than 4% will see the country being poorer in the next decade. A major challenge facing policy makers in the country is subsumed in the questions concerning the place and effectiveness of complementary macroeconomic and trade measures needed to put the economy on the path of sustainable growth. Howbeit, globalization poses its own unique problems for the country. The need to be integrated into the main stream of world economic activities have been acknowledged by both policy makers and other observers of the nations' economic trends as central to the quest for economic rebirth by the country. However, the "how" of timing, sequencing of reforms and complementary measures to be adopted among other issues remain unresolved.

The unanimous agreement on the beneficial effects on growth and development of trade liberalization goes back to the emergence of the Washington Consensus in the early 1980s. The Consensus emerged in response to the economic crisis affecting most developing countries at the time, triggered by the debt crisis. Nonetheless, Long-term economic growth is generally seen as being dependent on openness to trade. But, literature on trade theory and policy has since the time of Adam Smith debated whether openness and trade liberalization provide the necessary ingredients for economic growth (Miller and Upadhya, 2000). Recent empirical research seems to suggest that the lack of openness mainly explains the dismal

growth experience of SSA[5] and other developing countries (Dollar, 1992; Sachs and Warner, 1997). A more recent survey by Rodrigues and Rodrik (1999) finds considerable weaknesses in the econometric literature and argue that the empirical evidence to date does not provide convincing evidence. They conclude that they find little evidence that openness to trade in the sense of lower tariff and removal of non-tariff barriers to trade are significantly associated with economic growth.

Economic policy in the last two decades had one dominating theme[6] –. As an integral element of the structural adjustment package (SAP), trade liberalization was espoused on the argument that it enhances the welfare of consumers and reduces poverty as it offers wider platform for choice from among wider variety of quality goods and cheaper imports. There are two fundamental reasons for this potential of welfare improvement: First, the nation would have access to many goods at relatively cheaper prices than in the domestic market; they also find more profitable markets in which to sell the products of her industries. Second, production of goods in which the country has a comparative advantage expands, while those sectors displaying comparative disadvantage shrink[7]. It is against this backdrop that many developing countries liberalized their imports, reduced average tariffs and dismantled significant number of NTBs.

Nigeria, being fully integrated into the global economic system, is a member and signatory to many multilateral and regional trade agreements. The policy response of such economic partnership agreements on trade policy has been to remove trade barriers, reduce tariffs and embark on outward oriented trade policies. Expectations are that following Nigeria's obligations and commitments in these trade agreements, that tariffs will reduce drastically as required by the WTO protocols and in compliance with regional trade agreements. Illustratively, as in the ECOWAS Common External tariff, where member nations are gearing to latch on to the UEMOA rates of four bands – 0, 5, 10, 20% -, Nigeria was required to reduce tariffs by as high as 84% since "Nigeria has 9% of its tariffs same with UEMOA, 7% of tariff lines lower than UEMOA, while 84% of tariff lines higher than UEMOA rates"[8] Table 1 shows that Nigeria's imports fall mostly in the range of tariffs between 0% and 20%.

[5] Sub Saharan Africa
[6] Liberalization and regional integration or the drastic lowering or removal of barriers to almost all international transactions in markets for goods and services and movements of capital.
[7]Since this is a reallocation of productive factors from less efficient sectors to more efficient sectors, overall real GNP rises.
[8](Soludo, Oji & Agu, 2003: 6).

**Table 1: Nigeria's Imports by Tariff Bands**

| Tariff Range | | Share of Imports (2000) % |
|---|---|---|
| **0** | **5** | **18.6** |
| **5.1** | **10** | **23.2** |
| **10.1** | **15** | **22.6** |
| **15.1** | **20** | **12.0** |
| **20.1** | **25** | **8.0** |
| **25.1** | **30** | **6.9** |
| **30.1** | **50** | **4.8** |
| **50.1** | **100** | **3.6** |
| **100/1** | **150** | **0.3** |

Source: DFID, Programme report on Promoting Pro-Poor Opportunities through Commodity and Service Markets, July 2003.

The existing literature supports the axiom that openness is directly correlated to greater economic growth with the main operational implication being that governments should dismantle the barriers to trade. There are some good arguments suggesting that trade liberalization may improve resource allocation in the short term or raise growth rates permanently (and thus be beneficial to the poor), there are a number of other arguments suggesting the opposite (Jayme, 2001:13). The philosophy behind extensive support for trade liberalization is premised on the assumption that openness has unambiguous positive consequences for growth.[9] (Krueger, 1998: 1519). Harrison (1996) and Pritchett (1996) show that the various measures of trade openness tend to be only weakly correlated and are often of the wrong sign. In general, empirical studies suffer from a number of shortcomings, and as a result they have not resolved the questions surrounding the correlation between openness and growth.

Hence, considering the production structure of Nigeria, the bold questions to be answered in the trade-reform blue print are:

- *Should tariff policy support greater openness for Nigeria?*
- *What should trade policy be in the face of globalization's negative effects and increasing protectionism of developed countries?*

[9] It supports the axiom that countries whose economies are subjected to high levels of trade barriers "do seem to fall behind in production techniques, quality, and other attributes of production associated with knowledge and new goods"

This research empirically investigates the long-run relationship between trade liberalization and economic growth for Nigeria, using co-integration analysis

***Review of Relevant Literature:***

***Dynamic Gains from Openness:***

Trade openness may generate significant gains that enhance economic transformation. Under greater openness to trade, allocation of productive resources tends towards activities with comparatively greater efficiency. Trade liberalization may improve domestic productivity and economic growth by increasing knowledge spillovers from more advanced trading partners (Agenor, 2002). In the long run, trade openness may generate dynamic gains by way of facilitating the acquisition of new inputs, less expensive or higher-quality intermediate goods, and improved technologies, which enhance the overall productivity of the economy. Thus, access to a variety of foreign inputs at a lower cost (or the role of the international diffusion and adoption of new technologies or new goods) shifts the economy-wide production possibility frontier outward, thereby raising productivity (Romer, 1994; Jayme, 2001).

The mechanism through which increased productivity and growth rates occur as economies become open to international trade is not limited to the adoption of more specialized intermediate inputs and machinery available from trading partners; there are many types of useful knowledge that are not embodied in material inputs (such as production engineering and information about changing product patterns)[10]. Recent models of endogenous growth have used these ideas to study the effects that trade can have on the long-run rate of growth (Rivera-Batiz and Romer, 1990; Romer, 1992; Feenstra, 1990). Trade openness may foster greater possibilities of exploitation of economies of scale and location effects, as efficient producers expand their market share, which further reduces costs (Tybout, 1992; Baldwin, 1992, 1997; Schiff and Winters, 1998, Drabek and Laird, 2001). New endogenous growth models generate results, which show that openness "can also yield permanently reduced rates of growth, as when trade pushes an economy to speculate in sectors with no dynamic scale or other benefits" (Rodrik, 1999). Indeed, exports of many developing countries continue to consist of agricultural products and relatively low-technology manufactured goods (such as textiles). Even though openness to trade (and capital flows) may help these countries to assimilate technologies and production techniques

[10]but can also be transferred as a result of trade with more advanced countries.

over time (thereby enabling them to shift eventually toward the production of goods and services that are characterized by dynamic gains) there may again be a transition period during which globalization may have only a limited effect on growth and poverty.

***Measurement and Empirics of the openness-growth nexus: Evidences and Controversies***

In consonance with potential dynamic gains of trade openness, most early empirical studies have examined a set of trade openness measures and their correlation with each other and with economic growth and found a clear positive link. For example, Harrison (1996) looked at a number of openness indicators that turned out to have a positive 'association' with economic growth and produced evidence in support of bi-directional causality between openness (trade share) and economic growth. Recent research, however, has questioned the robustness of the relationship. For instance, Harrison and Hanson (1999) show that the often quoted Sachs and Warner (1995) findings do not provide evidence for an openness and growth link as claimed. Rodriguez and Rodrik (1999) confirm the Harrison-Hanson critique and 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 conclusions through problematic econometric methodologies.

Harrison (1996) and Pritchett (1996) show that the various measures of trade openness tend to be only weakly correlated and are often of the wrong sign. In general, empirical studies suffer from a number of shortcomings, and as a result they have not resolved the questions surrounding the correlation between openness and growth. Baldwin (2000) offers explanations for the differences among researchers of the openness-growth nexus. According to him, while econometric analyses based on quantitative data are limited by the scope and comparability of available quantitative data, differences in what investigators regard as appropriate econometric models and tests for sensitivity of the results to alternative specifications that may be based in part on the personal policy predilections of authors and can also result in significant differences in the conclusions reached under such quantitative approaches[11]. If these studies used measures that were even slightly correlated, then the

[11]As a result, when statements are made about the links between openness and prices, growth, and development, it is important to clarify which measures were used and whether the statements validity depends on the choice of openness measure.

empirical literature together could be taken as proof of a positive relation between openness and growth.

**Table 2: Measures of Openness**

| Measure | Definition |
|---|---|
| Trade Dependency Ratio | The ratio of exports and imports to GDP |
| Growth Rate of Exports | The growth rate of exports over the specified period |
| Tariff Averages | A simple or trade-weighted average of tariff levels |
| Collected Tariff Ratios | The ratio of Tariff revenues to imports |
| Coverage of Quantitative Restrictions | The percentage of goods covered by quantitative restrictions |
| Black Market Premium | The black market premium for foreign exchange, a proxy for the overall degree of external sector distortions |
| Trade Bias Index | The extent to which policy increases the ratio of importable goods' prices relative to exportable goods prices compared to the same ratio in world markets. |
| Sachs and Warner Index | A composite index that uses several trade-related indicators; tariffs, quota coverage, black market premia, social organization and the existence of export marketing boards |
| Leamer's openness index | An index that estimates the difference between the actual trade flows and those that was expected from a theoretical trade model |

[Rodriguez and Rodrik, 2000: 37]

Table 2 shows a selection of measures of openness that have been used by researchers. The indicators of openness used are: (i) the Sachs-Warner openness index; (ii) the World Bank's subjective classification of trade strategies in *World Development Report 1987*; (iii) Edward Leamer's (1988) openness index, built on the basis of the average residuals from regressions of trade flows; (iv) the average black market premium; (v) the average import tariffs from UNCTAD via Barro and Lee (1994); (vi) the average coverage of non-tariff barriers, also from UNCTAD via Barro and Lee (1994); (vii) the subjective Heritage Foundation index of Distortions in International Trade; (viii) the ratio of total revenues on trade taxes (exports + imports) to total trade; and (ix) Holger Wolf's regression-based index of import distortions for 1985. Even more troubling, is that the different measures of openness that have been used in a host of studies, tend not to be correlated with one another.

More recent studies of the openness and growth relationship have resorted to more creative empirical methodologies. These methodologies include: (a) constructing alternative indicators of openness (Dollar 1992; Sachs and Warner 1995); (b) testing robustness by using a wide range of measures of openness, including subjective indicators (Edwards 1992, 1998); and (c) comparing convergence experience among groups of liberalizing and non-liberalizing countries (Ben-David 1993). Following Sachs and Warner [1995] comprehensive measure of openness, an economy is deemed open to trade if it satisfies five tests: (1) average tariff rates below 40 percent; (2) average quota and licensing coverage of imports of less than 40 percent; (3) a black market exchange rate premium of less than 20 percent; (4) no extreme controls (taxes, quotas, state monopolies) on exports; and (5) not considered a socialist country.

One of the limitations of the theoretical frameworks of the existing studies of the openness-growth nexus "is that it lacks microeconomics foundations …their focal point is the macroeconomic aspects to growth and their interrelations with trade" (Jayme, 2001:11). What are we to conclude from this survey of empirical studies about the relationships between openness and growth, besides the fact that there is disagreement among economists on the matter? But, is there any consensus on the definition of openness?

## *Unbundling* the Concept of Openness

Trade openness is interpreted to include import and export taxes, as well as explicit non-tariff distortions of trade or in varying degrees of broadness to cover such matters as 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 institutions and culture (Baldwin, 2002). Most empirical studies define openness of an economy as the ratio of trade to GDP. Trade (exports and imports) as a proportion of GDP does not capture the dynamic effect of trade to growth[12]. "In order to capture the dynamic effects of trade from demand and supply side, growth rate of exports related to marginal

[12] Such analysis from the supply side neglects the manifest balance of payments difficulties experienced by many countries. But balance of payments constraints as well as internal saving and budget constraints are central variables for the understanding of trade and growth nexus.

propensity to import is clearly more appropriate. Exports are an important demand side variable" (Jayme, 2001:15).

Pritchett (1996) laments that the different indicators do not even signal openness, i. e. the rough direction of trade policy, in a uniform way. In 5 cases out of 15 possible comparisons, countries scored as open by one measure have been scored as closed by another. This adds plausibility to the inconsistency of the results of different empirical analyses. However, for time series studies the ratio (exports + imports)/GDP seem more preferable and the only viable choice[13]. It has to be pointed out that this measure is not very useful for cross-country comparisons, since this ratio does vary with the size of a country, large countries usually having smaller ratios and tiny countries having huge ratios. For small countries trade may account for a large share of the GDP than for larger countries. A small country may be open in practice in the face of numerous policy distortions to trading activities. If a country has 45% of average tariff then it must be a closed one compared to country with 25% tariff but again the country with 25% tariff is more closed than a country without any tariff[14]. Is a country with 45% tariff and 20% black market premium more closed than a country with 25% tariff and 35% black market premium? So, we must see what will happen if we change the criteria for openness a little (Lee, 2001). Which means that the effect of openness on growth in general also depends on what criteria are adopted? To round up the picture, this volume index of openness should be complemented by a price index of openness, the export-weighted real exchange rate as an indicator of international competitiveness. (Nowak-Lehmann, 2001).

[13] The trade to GDP ratio is, to say the least, a highly idiosyncratic statistic. The trade/GDP ratio is $Open = \frac{X + M}{D_Y + X - M}$, where $X$ represents the value of all exports, $M$ represents the value of all imports, and $D_Y$ represents total domestic consumption and investment (by both public and private sectors). Therefore, to highlight one of the more peculiar idiosyncrasies of the statistic, it is not difficult to notice how a country running a trade deficit, other things being equal, was more "open" by this measure than a country running an identically sized trade surplus. This gives rise to a curiously asymmetrical property in a measure of what should surely be a symmetrical concept. Imagine a hypothetical world of two countries with identically sized domestic economies and no barriers to trade; at any given time, unless there is perfectly balanced trade between them, one of the trading partners was more "open" than the other! Other (less colorful) properties derive from the fact that the measure of GDP in the denominator is not traditionally adjusted for purchasing power parity, making countries with lower relative non-traded goods prices appear more "open," and the fact that countries with small populations tend to appear more "open." (Birdsall and Hamoudi, 2002: 8)

[14]Even worse, because they consider several indices of trade openness naturally we face a question of which one is more important.

Pritchett (1996) finally gives preference to the indicator 'average tariff' which is also positively linked to the ratio of imports covered by NTBs. However, even though this indicator might be the best for cross-country studies, it is not too practical for time series country studies. The variation of 'average tariff' might not be big enough to draw any conclusions on the impact of trade policy. Simple measures of trade barriers tend not to fit significantly well into a well-specified growth regressions, regardless of time periods, sub samples, or the conditioning variables employed. Simple tariff averages underweigh high tariff rates because the corresponding import levels tend to be low. Such averages are also poor proxies for overall trade restrictions when tariff and non-tariff barriers are substitutes. As for the non-tariff coverage ratios, they do not do a good job of discriminating between barriers that are highly restrictive and barriers with little effect. Conceptual flaws aside, both indicators are clearly measured with some errors (due to smuggling, weaknesses in the underlying data, coding problems, etc.).

Even more troubling, is that the different measures of openness that have been used in a host of studies, tend not to be correlated with one another[15]. For example, most of the developing countries that have reduced trade barriers in recent decades have also implemented a variety of other policy reforms in fiscal and monetary policy, capital flows, financial regulation and labor markets. There is a web of complex interrelationships between trade policy and other government policies and various macroeconomic variables, and the interactions cannot be easily separated[16]. Furthermore, most of the economies with high trade barriers are often also characterized by government intervention in internal competition and the financial sector, subsidy and tax programs favoring specific sectors in the economy, inefficient bureaucracy, inconsistent macroeconomic policies, and high inflation[17].

Using a cross-country sample of 68 countries, Dollar and Kraay (2001) relate growth in countries per capita output to change in the trade/GDP ratio. The Trade/GDP ratio has been called a measure of ‘trade openness’; hence 24 out of their country-sample whose trade/GDP ratios increased dramatically over the 1980s and 1990s were classified as ‘globalizers’ and the remaining 44 countries as ‘non-globalizers’. Increases in integration with the world

[15]One reason for lack of convergence is that openness variables may be proxies for other country characteristics that have very little to do with trade.
[16]Variables that attempt to measure trade distortions may be capturing other distortions instead.
[17]Therefore, policy implications for the impacts of openness on growth based on cross-country regressions should be treated with caution.

economy have been substantial among the globalizers, had large changes in trade volumes between the 1970s and the 1990s: a doubling of trade to GDP on average (16% to 33% of GDP)… the trade to GDP ratio also grew dramatically among the rich countries (29% to 50% of GDP), but among the non-globalizers, trade actually fell as a share of GDP (60% to 49% of GDP)[18].

Rodriguez and Rodrik (2000) criticized these studies on their failure to adequately control for other economic policies. To some, the 'trade policy' measure used captures more than just trade policy, or that other plausible control variables have not been included. The policies correlated with growth (government consumption as a share of GDP, stability of monetary policy as proxied by the logarithm of one plus the inflation rate, political stability as proxied by the average number of revolutions occurring during the decade, and an index of the rule of law) are all highly correlated among themselves. Hence when all of these policies are included in regression analysis, it becomes difficult to identify the separate effects of different policies. Rodrik (2000) contends that econometrically in the regressions with trade/GDP used as regressor, the 'identification' assumptions required to ascribe any causality to trade (let alone trade policy) are too stringent to be satisfied.

Dollar and Kraay (2001) agree that adequate measures of trade policy are difficult in practice. For instance, in many developing countries non-tariff barriers have been particularly pernicious – licensing schemes that amount to firm-specific planned allocations of imports. Hence, NTB coverage ratios do not effectively capture how severe non-tariff barriers are. Also, where average tariff rates provide some information about trade policy, yet changes in reported tariff rates are often not accompanied by any change in trade volume. They debunked the use of level of the trade/GDP ratio as a measure of openness arguing that it is likely to be more a product of a country's initial conditions than of policy, and tells little about the effects of trade policy on growth, and many simply reflect the effects of geography on growth through other channels. Since initial conditions occur once, Dollar and Kraay reason that they can "control" for them by differencing countries' trade/GDP levels between time periods. This reasoning of focusing on changes rather than level is valid to the extent that the intervening variables that make the initial conditions to change are controlled for.

[18] The globalizers have also had large reductions in tariffs, a total of 22% (from 57% to 35%), while tariff cuts among the non-globalizing developing countries were a much more modest 11% (from 31% to 20%)" (Dollar and Kraay, 2001:9).

The effects of the initial conditions are not the same in every period (the effect vary with time), and the intervening variables that cause the changes are sometimes beyond the control of policy makers. As a result, any observed increases in the trade/GDP ratio can then be taken to be the result of policies, which foster openness.

**Research Methodology and Model specification**

Methods of trade openness in general differ in several studies significantly. Prevalently, the trade to GDP ratio has been used by many as a proxy for openness. In our analysis, we also included the growth rate of exports as a proxy also to vary the results on a long-run relationship between economic growth and trade openness. Several empirical studies abound which have attempted to improve research on trade openness by taking cognizance of the variables in this study.

The openness equation can be written as:

⇒ **Openness and Growth: Long run relationships**

$$LRGDP = \alpha + \beta LOPEN_t + \mu_t.$$

*Where*

$$Open = \frac{X + M}{D_Y + X - M}$$

Where LRGDP denotes the logarithm of real GDP, $\alpha$ and $\beta$ are constants to be estimated and LOPEN is the logarithms of the openness variables and $\mu$ is the error term with mean zero and constant variance.

Data for this paper was sourced from Central Bank of Nigeria Annual Reports (various sources) and Statistical Bulletin, December 2002. The analysis was done using the Econometric-Views Software.

**Time series analysis technique**

Co-integration analysis provides potential information about the long-term equilibrium relationship of the model. It is now widely recognized following Granger and Newbold (1974) that most economic series exhibit a non-stationary (unit-root) pattern in their levels, i.e. the means and variances are time dependent and such variables are said to be I(1) (Holden and Perman, 1994). The implication is that all computed statistics in a regression model, which use these means and variances are also time dependent. It implies that such variables fail to converge to their true values as the sample size increases (Rao, 1994). If, after

differencing, the variables become stationary then they are referred to as being I (0). The technique of co-integration is not only essential, but absolutely necessary in estimating an equilibrium relationship with unit root or nonstationary variables to determine long-run relationship.

Appropriate tests developed by Fuller (1976), Dickey and Fuller (1981), Phillips (1987), and Perron (1988) and others to test whether a time series is integrated of order one against the alternative of zero order integration was used in this paper. In addition, there are various approaches to estimating cointegrating regressions. Two broad approaches are available at the present: (a) Engle-Granger (1987), (b) Johansen (1988), and Johansen-Juselius (1990). This study in providing answers to objective two, used the approach developed by Johansen (1988) and Johansen-Juselius (1990), which is based on the full information Johansen Maximum Likelihood method (JML). Most studies have used the first approach, which is popular due to its simplicity and ease of calculation. However, there are some problems with the Engle and Granger (1987) procedure. With the Engle-Granger approach, the estimation of the long-run equilibrium regression requires that the researcher place' one variable on the left-hand side and use the other as regressors. For example, in the case of two variables, it is possible to run the Engle-Granger test for co-integration by using the residuals from either of the following two 'equilibrium' regressions: $y_t + \beta_{10} + \beta_{11}z_t + e_{1t}$ and $z_t + \beta_{20} + \beta_{21}y_t + e_{2t}$. However, a problem arises from finite samples. As the sample size increases, asymptotic theory indicates that the test for a unit root in the first error sequence becomes equivalent to the test for a unit root in the second error sequence (Enders, 1995). Unfortunately, the large sample properties on which this result is derived may not be applicable to the small sample sizes typically available to researchers! Furthermore, it is possible to find that one regression indicates the variables are co-integrated, whereas reversing the order indicates no co-integration (Enders, 1995). The VAR approach considers this possibility and treats all variables as potentially endogenous. Moreover, recent Monte Carlo evidence strongly favors the Johansen Maximum Likelihood method (JML) approach over the Engle-Granger's (Dejong, 1992). The Hypothesis is that "If variables are co-integrated, they share a long-run relationship and will move closely together over time".

### 5.1.Results and Analysis

**Analysis**

The Augmented Dickey-Fuller (ADF) unit root test is employed to determine the integration level of the variables. There are other tests available besides the ADF, such as the Phillips-Perron (PP) and the Sargan-Bargawa Durbin-Watson Statistic (SBDW). The ADF test results for a unit roots confirm (see Table 5) that the variables are integrated of order one. They are difference stationary.

**Table 5**

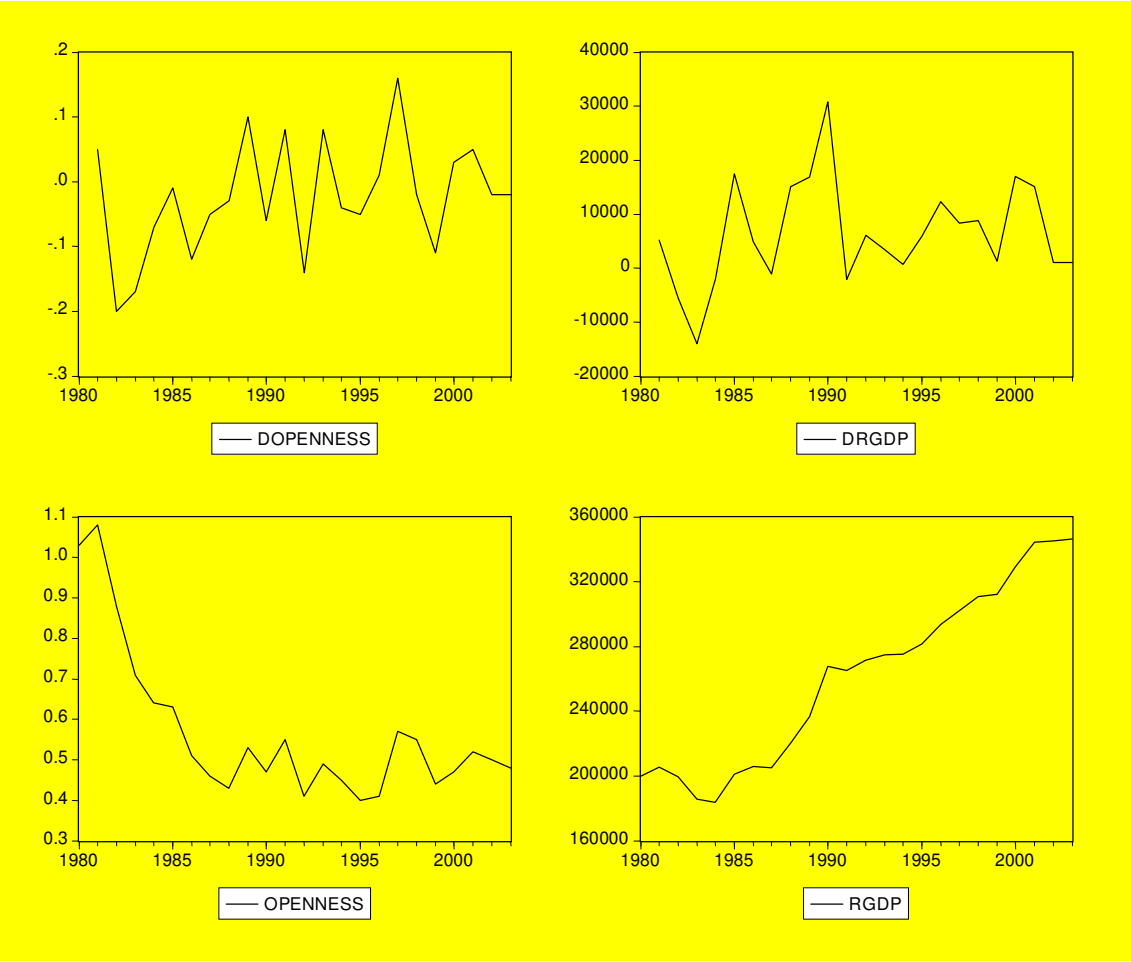
**ADF test for unit roots**

| Variables | Test Statistic | Critical Values | | Order of Integration |
|---|---|---|---|---|
| | | 1% | 5% | |
| RGdp | -0.346433 | -3.752946 | -2.998064 | I(1) |
| Openness | -2.859518 | -3.752946 | -2.998064 | I(1) |

Notes: The critical values were calculated from the formula provided by MacKinnon (1991). The intercept terms are included in the ADF equation. Also an augmentation of one, generally, appears to be sufficient to secure lack of autocorrelation of the error terms. Regressing the variables on time resulted in non-stationary residuals so we concluded that the series is not trend stationary

The results of the unit root test confirm that the variables exhibited a white noise and were integrated of I(1) at 5% and 1% critical levels.

The Figure below shows the plots of trade to GDP ratio - (openness) and GDP in level and difference forms, which sets the analytical framework as regarding the long-term relationship of openness and real growth.




Again the fact that plots of the first differences appear to be stationary consistent with the two series being integrated of order one, i.e. the series appears stationary after first differencing confirm the unit roots tests. The correlogram evidence also supports this view. However, the auto-correlation die down slowly for the levels of ***LRGDP*** and ***LOPEN*** those for the first differences damp very quickly, and then appear to fluctuate in a non-systematic way around and close to zero. The conclusion is that the two series are I(1) and that the LRGDP series appears to contain a deterministic element. However, as Holden and Perman (1994) points out: "[t]he use of graphical and correlogram evidence is unreliable in making inferences about unit roots" and as a result formal testing procedures are needed. The formal testing evidenced in the above table gives credence to the analysis. Nevertheless, plots of the first differences show no evidence of changing means, except for the fact that there is a large volatility in the movements suggesting the presence of structural breaks.

As discussed earlier, if two non-stationary time series are co-integrated, their linear combination can be a stationary process. If variables are co-integrated, they share a long-run relationship and will move closely together over time. This means that the difference between such variables was stable over time and there is some degree of convergence in the long run. Furthermore, it is said that the error term obtained from the long-run equation can be interpreted as the equilibrium error term. We restrict our VAR to a lag of one period given that we have only a small number of annual observations (1980 – 2003). However, the order of the VAR was increased if auto-correlation is a problem. It is crucial for the JML approach that the residuals are white noise. Because of the presence of structural-break, the co-integration relationship was estimated for two sub-samples. It is hypothesized that there exists a long-run relationship between real GDP and openness to trade proxied with trade to GDP ratio and growth of exports.

As explained above, the presence of a cointegration relation forms the basis of any error correction model specification. The first part of the table reports for testing the number of cointegrating relations. The first block reports the so called trace statistics. The first column shows the number of cointegration relations under the null hypothesis, the second is the ordered eigenvalue of the *II* matrix, the third column is the third statistic, and the last columns are the 5% and 1% critical values. It should be noted that the (nonstandard) critical values are taken from Osterwald-Lenum (1992), which differ slightly from those reported in Johansen and Juselius (1990). The trace statistic tests the null hypothesis of r cointegrating relations against the alternative of k cointegrating relations, where k is the number of endogenous variables, for R = 0, 1,….., K – 1.

Using these trace statistic, we test for the number of co-integrating relationship between LRGDP and LOPEN. Given that we only have two variables, we expect that at least one co-integrating vector is present. We apply the two tests described earlier. Including a constant in the co-integrating relationship, the residuals for both periods appear to be serially un-correlated.

| **Unrestricted Cointegration Rank Test** | | | | |
|---|---|---|---|---|
| **Hypothesized No. of CE(s)** | **Eigenvalue** | **Trace Statistic** | **5 Percent Critical Value** | **1 Percent Critical Value** |
| **None** | **0.494306** | **15.00831** | **15.41** | **20.04** |
| **At most 1** | **0.000371** | **0.008174** | **3.76** | **6.65** |
| ***(**) denotes rejection of the hypothesis at the 5%(1%) level** | | | | |
| **Trace test indicates no cointegration at both 5% and 1% levels** | | | | |

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 5 Percent Critical Value | 1 Percent Critical Value |
|---|---|---|---|---|
| None * | 0.494306 | 15.00014 | 14.07 | 18.63 |
| At most 1 | 0.000371 | 0.008174 | 3.76 | 6.65 |
| *(**) denotes rejection of the hypothesis at the 5%(1%) level | | | | |
| Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level | | | | |
| Max-eigenvalue test indicates no cointegration at the 1% level | | | | |

To test the null hypothesis r = zero against the general alternative r=1, or 2 we use the λ-trace statistic and the Eigen value. Since the null hypothesis is r=0 and there are two variables (i.e., n=2). Please note, that the summation in one of the estimated equations runs from 1 to 2. The calculated value for the trace statistic is 15.008 and 0.008 and comparing this calculated value to the critical value provided by Johansen and Juselius (1990), the null hypothesis of cointegration can be rejected at both 5% and 1% critical levels. The Eigen value indicates also that there is no cointegration between the variables at the 1% significant level. Thus, at the 90% level, the restriction is not binding and we conclude that the variables are not cointegrated[19]. However, as pointed out earlier there is no significant evidence of any co-integrating vector, supporting the fact that there is no long run relationship existing between economic growth and openness to trade in Nigeria.

**Summary of Findings**

The relationship between trade and economic performance has taken the centre stage in economic integration. We used the trade intensity measure as proxy for openness in this study to determine the long run relationship between the *degree of openness* (measured as the ratio of the sum of imports and exports in relation to GDP) and real GDP growth for Nigeria. The Johansen-Juselius co-integration technique was employed to test for long-term relationship between openness and real growth. As discussed above, many researchers have investigated the phenomena without paying attention to disaggregated products and its implication. Johansen and Juselius (1990); show that a VAR is superior to the Engle and Granger (1987) approach in assessing the co-integrating properties of variables, particularly in a multivariate context. The advantage of the VAR is that it treats each variable as potentially endogenous

[19]We checked for autocorrelation by the Ljung-Box *Q* statistics, which showed no evidence of autocorrelation.

(Enders, 1995) and thus avoids the finite sample bias introduced in the Engle and Granger (1987) approach.

**Conclusion**

Available evidence in Nigeria shows that tariff reductions following multilateral and regional integration arrangements raises economic uncertainties in Nigeria, especially in textiles and manufacturing enterprises that are adversely affected by intensified import competition from abroad. This is in tandem with the statistical results of the study. The obvious reactions for these have been the astronomical rise in the volume of imports, putting domestic products within the categories at a big disadvantage. Effective protection for local industries will reduce. Effective rate of protection gives a better of sense of the actual protection tariffs provide to local production than do nominal tariff rates. It measures the overall protection by taking into account protection on both inputs and final products.

In order to fashion out any meaningful trade design, other factors of economic growth should be considered. Economic growth is a function of many variables: - (a) savings, (b) capital accumulation (domestic and foreign investment [FDI], and (c) total factor productivity (TFP). Nonetheless, TFP is primarily influenced by other factor than trade liberalization. TFP growth might be influenced more by political and diplomatic ability to attract technical assistance and reach good terms concerning the transfer of technology. The saving behaviour is basically determined by the age structure of the population and the local availability of a variety of local assets. FDI and domestic investment are often determined by the endowment with natural resources and the rule of law/political stability. Elborgh-Woytek (2003) from a study on commonwealth of independent states identified that governance and corruption problems, weak infrastructure and political conflicts may frustrate the maximization of the objective functions of long-term growth. Given these arguments and empirical evidence, one should think of a rather minor role for trade. It should be noted that this was a statistical analysis of the relationship between openness to trade and economic growth. In order to derive meaningful policy lessons there is a need to derive import elasticities by disaggregating the products along the SITC categories, supported by diagnostic tests within an econometric framework. This has not been done in the present paper and therefore, policy implications of the results should be interpreted with caution.

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