

# TRADE, WTO AND THE FATE OF SELECTED AFRICAN COUNTRIES

By

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## *Abstract*

*Trade is exerting a profound impact on developing economies, especially the African commodities oriented countries, as World Trade Organization's (WTO) tariff-reduction crusade makes some domestic entrepreneurs less internationally competitive. The challenge is not ideological protectionism, rather international market interconnectivity with equal participation without compromising domestic investments. On the other perspective, the international market playing field is not flattened enough to reduce poverty through trade as conventionally advocated by WTO. The solutions to the aforementioned are not universal-based; rather they are country-specific. Hence, this study focused on five (5) selected African countries-one from each region: Democratic Republic Congo-DRC (Central), Egypt (North), Kenya (East), Nigeria (West), and Zambia (Southern) -1970-2007. In this light, the study explored comparatively the impact of trade issues on the selected Africa countries using empirical data and econometric model. The empirical results, inter alia, indicate that trade openness could improve citizens' welfare provided the technological equipments adopted through trade are utilized for domestic production.*

**Key words:** Technology, Trade, Welfare, WTO

**JEL Codes:** F11, F31.

## 1. INTRODUCTION

The impact of cross border trade has generated intensive debate among commentators (academic and professionals), but the impact on developing countries especially within Africa has helped to fuel the contention. While some advocated for trade liberalization as a prerequisite for economic growth (Edwards, 1997; David and Scott, 2005), Stiglitz (2002) cautioned against drastic openness. Along these perceptions disparities, the African commodities oriented countries are somewhat in dilemma as World Trade Organization's (WTO) tariff-reduction crusade makes the continent an economic-lake-importing and consuming Western product without significant improvement in export.

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From a cursory observation, almost all Africa countries have instituted strategic vision aiming at 2020 as the developmental hallmark. However, the intrinsic mistake is to anchor a developmental strategy on the expansion of primary product exports. This assumption rests on the precept that the price of primary products at the international market is always affected by unfavourable terms of trade. Also, the forces of nature at times may affect the harvest of the agricultural produce. Moreover, the crucial aspect in the international trade is the masqueraded protectionism adopted by the developed world against African manufactured products- low standard. While WTO has claimed to be upright in its policies implementations, the body has not done much with respect to cautioning the developed countries in their tacit policies of protectionism.

The current tariff reduction issue is a strategic means of polishing the poverty of Africans and to make the unending economic failure a home-breed disappointment. This economic failure has been among others the ingredient fuelling the political unrest within Africa nations. The failure should be understood as a system error, that economic development is both interrelated and interactive. The exceptional advantage accorded the developed countries within the WTO creates an element of hierarchy within the system. Hence, instead of comparative advantage, the system stimulates complementary trade-off. The trade excluded exhibits characteristics of *have-nots* despite Africans' participation in international trade.

The WTO's crusade for tariff-removal seems to be replacing the poverty eradication dictum that was embellished in the millennium developmental goals (MDGs). While some Africa countries have worked to roll-back poverty, the perception error cascaded to Africans has not changed. The error was initiated by the mistake that the Western countries have the therapeutic dose to Africa economic problems. Hence, prescriptive interventions have led to economic and political vulnerability over the years. Further, the policies and conditionalities dictated by International bodies at the international scene have not change the economic nature of Africa countries much.

From observation, the international businesses playing field and the WTO membership composition are not flattened enough to herald into Africa the promise of international trade. On the membership composition argument, the lopsided nature of WTO in terms of staffing arrangement is obvious. For example, USA and France has up to 45 members of staff each while some African countries such as Nigeria and Ghana have 1 and 2 members, respectively (Aremu, 2005). Some other African members have none at all. This reveals the reasons while policies are not always tailored for equitable implementation since the articulations were Western oriented instead of delegates' collective participations. Hence, the promise of world trade benefits for Africans remains unfulfilled. For instance, the total trade for services for Africa in 2007 was 3% compared to Asia 24% (WTO, 2008).

In articulating this, it is not this paper's proposal to promote protectionism or anti-WTO sentiment among Africa countries, rather a means of expanding participation autonomy and allows equitable economic development among WTO members. The preoccupation and our advocacy are on trade-democracy instead of trade-dependency. From this, WTO empowers each participating member states to gain from economic interdependency for economic development. Thus, a new perspective for reinterpreting trade to economic growth emerges instead of the traditional concept that limits and restricts the economic effort of the nations classified as living below certain income threshold.

In light of this, the paper examines the WTO's issue and the fate of five selected Africa countries namely- Democratic Republic of Congo-DRC (Central), Egypt (North), Kenya (East), Nigeria (West) and Zambia (Southern). The countries were selected on three criteria; real per capita GDP below US\$1,000; member of WTO; and relatively large size (UNCTAD, 2006; UNSTAT, 2008; WTO, 2008). The paper is structured into sections; introduction, theoretical and literature review, empirical model development, presentation of econometric results and analyses, and conclusion.

## **2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

From the era of Marco Polo till present, cross-border trade has been increasing as capitalists uncover trade routes, improved production system, transportation, and the technological supports that drive trade. Nevertheless, the 1990s saw a general conviction that cross-countries trade liberalization is imperative for economic growth. The validity of this conclusion was fostered by empirical and theoretical studies (Helpman and Krugman, 1985; Dollar, 1992; Sachs and Warner 1995; Edwards, 1997; David and Scott, 2005). Also, Grossman and Helpman (1995) presume that the world integration has an influence on the entrepreneurs which directly impact the social fabrics of nations' economic system. Hence, it is conventionally accepted that trade openness is a vital component of economic growth (Winters, 2002; Mackay and Winters, 2004).

Trade liberalization to economic growth is a multidimensional issue comprising of a complex number of aspects, e.g., tax, foreign direct investment, export, real gross domestic production, and poverty, which sometimes are difficult to evaluate. In particular, economic growth is influenced by a combination of factors, technology (Schumpeter, 1911; 1942), human capital and capital (Solow, 1957), production efficiency (Smith, 1776) and institutional framework (Powell and DiMaggio, 1991) characteristics. These studies offer insights into the relationship between examined categorical factor and economic growth. However, the studies are also complementary to one another.

The notion that trade liberalization and economic growth are positively correlated is credited to Solow (1956) which has significantly influence the empirical literature. The thrust of Solow argument was that market-centred trade liberalization will accelerate the dynamic of economic growth. With respect to individual productivity pay-off, the aggregate market interactions were to trigger growth (Bhagwati, 1988; Evans, 1989) which is in accordance with the neoclassic theory of trade and growth. However, the distinction between unknown probability and the known African countries' experiences-their propensity to actively participate in world trade needs adjustment despite the promise of economic growth.

The progress in trade is becoming even more important in the analysis of economic growth. Thus, it is necessary to examine theoretical and empirical evidences towards substantiating the claims of WTO that the removal of tariff influences economic growth. Some economic commentators give intellectual reasons for trade liberalization, and its propensity to promote economic growth. Among these scholars are Winters (2002); Stern (2001); Berg and Krueger (2003) and Mackay and Winters (2004). These cross-countries empirical studies conclude that the liberalization of world trade has impacted significantly the economic growth of countries.

From Mackay and Winters (2004) documentation, non-interruption in the importation of capital goods and technological goods create knowledge spillover which increases international competition. Through the competition, trade enhances growth and concomitantly leads to variety of goods availability at cheaper prices. The modern trade theory developed by Helpman and Krugman (1985) and the new growth theory by Grossman and Helpman (1991) illustrate that the benefits from trade is fundamental for free trade which makes it instrumental for economic growth. Although these studies were Western-based, some economists believe that the argument for freer trade provides significant incentives for developing countries. This view is common in the studies of Krueger (1999), Srinivasan (2000), Stiglitz (2002), Tangermann and Josling (1999), and Huff (2000).

In a similar manner, some empirical studies associated trade liberalization with wealth accumulation (e.g. Levine and Renelt, 1992 and Taylor, 1998) and that a stronger economic growth exists over a short period. In the same perspective, Tilat (2002) concludes that trade openness has no significant association with long-term economic growth and suggested that short-run effects out-weigh the perceived benefits of trade liberalization. However, the studies of Winters (2002) and Mackay and Winters (2004) found that in the short run, trade liberalization harms poor actors in the economy and even in the long run, successful open states may create a return to below the poverty line, which means an escalation in poverty density and a punctured economic growth.

Most economics literature supports the argument that a countries's development requires economic growth to alleviate poverty and greater participation in the world markets. However, some of the literature did not examine the possibility of "Goliath-David trade" to plummet economic growth. Unfortunately for most Africa countries, none of the promised benefits is secured, hence it is not difficult to link trade openness with a nation's less economic performance along e.g. primary extraction/commodities. This possibility was extensively examined by Rodriguez and Rodrik, (2001). The traditional theory of trade as illustrated by Stolper-Samulson reveals that an increase in the relative price of a commodity results a corresponding increase in the real-return to factors utilized in producing that commodity (Dixit and Norman, 1980).

To investigate the relationships between trade openness through tariff removal to economic growth within Africa, the effects on total factor productivity is imperative. Studies show that reduction in trade barriers were followed by significant increases in total factor productivity (TFP) Winters (2004). This resulted from the increase in import competition according to Ferriera and Rossi (2001) with the study in Brazil, Jonsson and Subramanian (2001) in South Africa and Karry (1997) obtain inconclusive results for China, while Aw, Chung, and Roberts (1999) discovered little evidence for Latin America and Asia, accordingly. However, the significance of these studies resonate the debate about whether agricultural commodities and primary extractions export for the poor countries in Africa is the option for tariff removal.

Freer trade by definition involves greater interdependence among nations, and Tilat (2002) linked it to the phenomenon of globalization. Although reforms have been uneven, there is clear evidence that protection of import substitutes with tariffs and non-tariff barriers within Sub-Saharan Africa has declined significantly (Nash, 1993). However, Africa's share in global exports fell from 4.5 % in 1977 to 2 % in 1997, and also, Africa's share of total

developing country exports dropped from 15.5 % in 1981 to 9.2 % in 1997 after many countries implemented the Structural Adjustment Program. In addition, Africa's share of FDI flows to developing countries fell from 23 % in 1970 to 4.7 % in 1997 according to the African Development Bank (2000).

Nevertheless, the study of Agama (2001) in Africa which utilized a database to investigate the connection between trade openness and economic growth for forty countries in Africa is subjective. Agama argues that between 1980 and 1999, the more open countries in Africa experienced higher economic growth rates than those that remained closed. Hence, Agama (2001) concludes that although trade liberalization and economic integration increases economic growth for African countries, increases in government consumption expenditure retards the growth. However, Agama (2001) observation is sensitive due to the negligence in considering contextual impact of wars, imposition of International Monetary Fund conditionality, and premature connection into globalization. Also, the study formulated and followed the findings of Western empirical cross-country studies: Dollar (1992), Ben-David (1993), Sachs and Warner (1995), and Frankel and Romer (1999) that connect trade openness with economic growth.

The debate about a positive empirical association between trade openness and economic growth especially within the Africa domain remains far from settled. In spite of the recent movement towards trade reforms for most Africa countries, there remain some major controversies regarding certain aspects of trade and the message of WTO. The effects of trade tariff removal and economic growth appear to be direct and imperative for some selected Africa countries. To satisfy the academic curiosity, this paper examines the relationship between trade WTO stance and citizens' welfare over a time-slice among Africa selected countries towards crafting policies for Africa leaders.

### 3. MODEL SPECIFICATION AND ESTIMATION TECHNIQUE

The model for this study assumes a relationship between citizens' welfare (measured by real per capita gross domestic products-*RPGDP*) and some economic variables as well as WTO variable that can exert influence on the welfare level of some selected African countries. It could be understood that real per capita income would be a best-fit proxy for the welfare level of the countries. This is because it shows the amount of wealth that can be accrued to each citizen. Other explanatory variables that were included in the empirical model are the level of trade openness in the countries (*OPEN*), domestic investment (*INVD*), and a measure of their technological advancement in their economic activities (*TECH*). This can be represented by the functional relationship below:

$$RPGDP_{it} = f(WTO_{it}, OPEN_{it}, INVD_{it}, TECH_{it}, U_{it}) \text{-----} 1$$

The above equation can be expressed in explicit form as:

$$rpgdp_{it} = \alpha_0 + \alpha_1 wto_{it} + \alpha_2 open_{it} + \alpha_3 invd_{it} + \alpha_4 tech_{it} + e_{it} \text{-----} 2$$

Where:

*rpgdp*: is the real per capita income measuring the welfare level in the countries.

*wto*: captures the influence of WTO agreements/activities especially with respect to tariff and trade in the countries. A dummy for WTO membership is used to measure this

variable, in which case, the years since the countries became members were represented as 1 and 0, otherwise. This variable captures the influence of WTO multilateral trade agreements on the African countries understudied.

*open*: this measures the level of trade openness in the countries. This is crucial in the increasingly globalizing world where trade liberalization and openness have been the *in thing*. It is captured by the ratio of total trade to GDP i.e.  $\{(\text{export}+\text{import})/\text{GDP}\}$ .

*invd*: this measures level of domestic investment in the countries. It shows the extent to which the investment in the countries is able to influence their citizens' welfare. It is proxied by gross fixed capital formation.

*tech*: this measures the value added by transport, storage and communication sector in their economic activities. The reason is that a more technologically advanced economy would have, *ceteris paribus*, a better transport, storage and communication system, and vice versa.

*e<sub>it</sub>*: are the error terms that captures other factors influencing *rpgdp* that are not included in the model. They are assumed to be identically and independently distributed (iid) with zero mean and constant variance  $N(0, \sigma^2)$ .

*.it*: are the units (countries) and time dimension of the series.

$\alpha_i$  ( $i = 0, - - -4$ ): the parameters to be estimated, which show the constant and the rate of change in the dependent variable induced (or otherwise) by the respective chosen explanatory variables. Their *apriori* expectation is such that  $\alpha_i$  ( $i = 0, - - -4$ )  $> 0$ .

To estimate the formulated equation above, the study used a vector auto-regression (VAR) method i.e. autoregressive-distributed lag (ARDL) econometric analysis. The ARDL approach has some advantages. This includes its application regardless of the stationary properties of the variables in the sample. In addition, the ARDL method takes adequate numbers of lags to show data generating process in a general-to-specific structure (Pesaran, Shin and Smith, 2000). Also, a dynamic Error Correction Model (ECM) can be obtained from ARDL through a simple linear transformation, which allows for inferences on long-run estimates (Banerjee et al, 1993; Frimpong and Oteng-Abayie, 2008). This is not usually possible under alternative co-integration procedures like Engle and Granger (Toda and Phillips, 1993).

More so, the ARDL method has an advantage of producing consistent values (estimates) of the long-run parameters that are asymptotically normal regardless of the order of integration i.e. whether variables are I(0), I(1) or mutually integrated. This is due to the fact that the need for stationarity pre-testing is not always essential. However, it is still helpful to complement the estimation process with the stationarity test to ensure that none of the variables are integrated of higher order like two i.e. I(2) (Luintel and Khan, 1999). Also the stationarity tests can yield different conclusions as a result of difference in power and lag length selected in each test. Thus, the appropriate lags in the ARDL are corrected for both residual correlation and endogeneity. But once the ARDL model is free of residual correlation, endogeneity does not give problem (Pesaran, Shin and Smith, 2000).

Furthermore, ARDL has advantage over the single equation co-integration analysis such as Engle and Granger (1987) due to the fact that the latter suffers from the problems of endogeneity. The ARDL method can distinguish between dependent and explanatory variables. Thus, when using ARDL approach it is possible to estimate even when the explanatory variables are endogenous (Alam and Quazi, 2003). This means that the ARDL approach produces robust results in small sample size such as less than 80 observations (Narayan, 2004).

From above information, equation 2 can be reformulated using a vector error correction type of ARDL approach as follows:

$$\Delta rpgdp_{it} = \beta_0 + \beta_1 rpgdp_{i(t-1)} + \beta_2 wto_{i(t-1)} + \beta_3 open_{i(t-1)} + \beta_4 invd_{i(t-1)} + \beta_5 tech_{i(t-1)}$$

$$\sum_{i=1}^m \beta_6 \Delta rpgdp_{t-i} + \sum_{i=0}^m \beta_7 \Delta wto_{t-i} + \sum_{i=0}^m \beta_8 \Delta open_{t-i} + \sum_{i=0}^m \beta_9 \Delta invd_{t-i} + \sum_{i=0}^m \beta_{10} \Delta tech_{t-i} + e_t \text{-----} 3$$

The first component of equation 3 above indicates the long-run dynamics of the model while second aspect shows the short-run relationship between them. The sign-  $\Delta$  implies the first difference operator, and  $e_t$  is a white noise disturbance term earlier defined. Equation 3 also points out that the level of per capita income in a country can to be influenced by its past values.

In carrying out ARDL approach two stages for the estimation of the long-run relationship are usually involved. The first is the examination of the existence of long-run relationship among the series, while the other is the estimation of the long-run and the short-run coefficients of the equation. However, the second stage is essential only when a long-run relationship in the first stage has been established (Pesaran, Shin and Smith, 2000; Narayan, 2004).

To test the existence of long-run relationship, equation 3 was conducted by placing some measures of restrictions on estimated long-run coefficients of the variables as follows:

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0 \quad (\text{No long-run relationship i.e. no co-integration}).$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0 \quad (\text{Existence of long-run relationship i.e.co-integration}).$$

The co-integration test has a non-standard distribution that depend on whether the series are I(0) or I(1), the number of regressors and whether the model contains an intercept and/or a trend. This study used the Johansen and Juselius method to test for the existence (or otherwise) of cointegration among the series before the before the error correction aspect. When using the test, if the calculated trace and maximum Eigen-values are larger than the critical values, then the null hypothesis of no co-integration is rejected in favour of the alternative.

If there is evidence of co-integration among the series, the following long-run models are estimated:

$$rpgdp(P) = \beta_1 + \sum_{i=1}^p \beta_2 (rpgdp(P))_{t-1} + \sum_{i=0}^p \beta_3 wto_{t-1} + \sum_{i=0}^p \beta_4 open_{t-1} + \sum_{i=0}^p \beta_5 invd_{t-1} + \sum_{i=0}^p \beta_6 tech_{t-1} + e_t \text{ --}$$

When co-integration among the series has been confirmed, one can select the lag length for the series. The ARDL approach estimates  $(p+1)^k$  number of regressions in order to obtain optimal lag length for each variable, where  $p$  stands for the maximum number of lag to be used while  $k$  is the number of variables in the equation. The optimal lag length can be selected using either or both the model selection criteria like Akaike's Information Criteria (AIC) and Schwartz-Bayesian Criteria (SBC). The SBC is usually referred to as the parsimonious model due to the fact that it selects the smallest possible lag length. While the AIC selects the maximum relevant lag length.

#### 4. PRESENTATION OF EMPIRICAL RESULTS AND ANALYSES

Data used in the study's estimation were sourced from United Nations Statistical Division (UNSTAT, 2008). The major advantage of the UNSTAT is that the per capita GDP are already computed and the variables are presented in both the countries' national currencies and US dollars. This removes possible approximation error that would have been inherent. In addition, both current values and real values measured at 1990 constant prices are reported. Using the real values help to remove the possible effects of world price fluctuations. Thus, this study employs the real values for the period 1970-2007 for five African countries selected from the five regions in the continent with implicit assurance of data reliability and validity. The selected countries are: Democratic Republic of Congo-DRC (Central), Egypt (North), Kenya (East), Nigeria (West) and Zambia (Southern).

The parameters for countries selected were anchored on: low-income grouping with per capita GDP below US\$ 1,000; a member of WTO; and relatively large population size in the region (UNCTAD, 2006; UNSTAT, 2008; WTO, 2008). As at 2008, Nigeria has the largest population in both West African region and the continent. DRC is the 4<sup>th</sup> in the continent and 1<sup>st</sup> in the Central African region while Kenya is the 8<sup>th</sup> in the continent and 2<sup>nd</sup> in the Eastern African region after Ethiopia. With regards to Egypt and Zambia, the former is the 3<sup>rd</sup> in the continent and 1<sup>st</sup> in the North African region though it started having per capita GDP above US\$ 1,000 from 1994. The latter is the 24<sup>th</sup> in the continent and a member of both WTO and Southern African Development Community (SADC). The five selected countries combined have above 35% of the entire Africa's population, which reflects a good representation.

The respective variables were estimated in their log-linear form, except dummy for WTO. This is because it has been noted in most empirical studies that log- functions helps to reduce the problem of heteroscedasticity and it is equally useful in showing rates of changes and thus, makes variables more comparable (Rehamn, 2007; Osabuohien and Egwakhe, 2008). In addition, it is usually relevant to carry out unit root test of variables. This is to know the order of integration of the variables and obtain more reliable results.

**Table 1.0 Unit Root Test of Variables in the Countries Using PP Approach**

SERIES	DRC			EGYPT		
	Intercept no Trend	Intercept & trend	Remarks	Intercept no Trend	Intercept & trend	Remarks
Lnrpgdp	-2.7898	-2.8389		-1.0447	-2.7322	



Dlnrpgdp	-6.2195	-6.1409	I(1)	-7.4891	-7.4497	I(1)
Lnopen	-3.3714	-3.4640		-1.2276	-1.0264	
Dlnopen	-10.1457	-10.8006	I(1)	-4.4552	-4.4522	I(1)
Lninvd	-2.7662	-2.8545		-1.7654	-2.0671	
Dlninvd	-7.9446	-7.8038	I(1)	-4.8753	-4.9271	I(1)
Lntech	-1.1840	-0.9230		-2.2633	-1.3081	
Dlntech	-5.1516	-5.3821	I(1)	-2.8400	-3.0813	I(1)
<b>KENYA</b>				<b>NIGERIA</b>		
Lnrpgdp	-1.8390	-2.1347		-1.6070	-1.6047	
Dlnrpgdp	-4.4066	-4.3113	I(1)	-3.5509	-3.4851	I(1)
Lnopen	-1.5281	-1.3341		-2.3988	-2.3327	
Dlnopen	-6.4600	-7.3676	I(1)	-6.4872	-6.4039	I(1)
Lninvd	0.7748	-0.8981		-2.0083	-1.9513	
Dlninvd	-4.1487	-4.5415	I(1)	-5.2039	-5.1805	I(1)
Lntech	0.3209	-1.7042		0.1694	-0.7680	
Dlntech	-4.8242	-4.8044	I(1)	-4.2659	-4.2955	I(1)
<b>ZAMBIA</b>				<b>Critical values (C.V) @ 5%</b>		
Lnrpgdp	-1.5288	-1.2863		<b>Level</b>	-2.9422	-3.5348
Dlnrpgdp	-4.0106	-3.9962	I(1)	<b>1st Diff</b>	-2.9446	-3.5386
Lnopen	-1.5664	-0.9329				
Dlnopen	-6.3350	-7.0143	I(1)			
Lninvd	-0.7276	0.5243				
Dlninvd	-5.6386	-7.1985	I(1)			
Lntech	3.9991	1.8979				
Dlntech	-4.5371	-5.0997	I(1)			

Notes: A variable is said to be stationary if the PP values (absolute) exceed that of the C.V at a given level. LN and D before the variables are logarithm and difference operators, respectively.

In this regards, this study carried out unit root test of the variables employing Philip-Perron (PP) method, which is similar to the Augmented Dickey Fuller (ADF) method. The major edge of PP over ADF is that it takes accounts of the variable's possibility of structural change (Abdulai, and Jaquet, 2002; Osabuohien, 2007). The results from the unit root test using PP procedure are reported in Table 1.0.

From Table 1.0, it could be observed that none of the variables was stationary at levels for the countries i.e. none was I(0). This made testing at first difference essential. And at first difference, all the variables became stationary across the countries i.e. they were all I(1) series. The implication of the above is that all the variables (*viz: lnRPGDP, lnOPEN, lnINVD and lnTECH*) need to be differenced once to yield meaningful results<sup>1</sup>.

Having ascertained the order of integration and given the fact that all the variables are I(1), it thus becomes necessary to carryout co-integration test among the series. This was done in Johansen technique. The major purpose of performing co-integration test is to examine if

<sup>1</sup> WTO was not subjected to unit root test due to the fact that it is a dummy variable.

there exist a long-run relationship between the variables. In other words, it helps in determining whether or not the variables are compatible (with respect to co-movement) in the long-run.

In addition, one of the main benefits of the Johansen's approach is that it not only helps answering the above question but it also presents the estimates of the long-run equilibrium values in the co-integrating equation(s). The results for the co-integration test are reported in Table 2.0 for the respective countries.

The co-integration test in Table 2.0 reveals that for DRC, Nigeria and Zambia there is one co-integrating equation at both 5% and 1% level of significance. This is because the likelihood ratio is greater than the critical values at those levels. Whereas for Egypt and Kenya there is one co-integrating equation at 1% and two co-integrating equations at 5%. Thus, using only 1% significant level, it can be concluded that for each of the countries there is the existence of a long-run relationship between the real per capita GDP, level of domestic investment, degree of openness, level of technological development in the selected countries. This implies that there is a long-run relationship between welfare in the countries and the respective chosen explanatory variables aforementioned. In other words, when there is distortion between the variables in the short-run, there is possibility of moving together in the long-run.

**Table 2.0 Test of Cointegration among variables in the Countries using Johansen Technique**

Series: LNRPGDP, WTO, LNOPEN, LNINVD, and LNTECH				
Eigenvalue	Likelihood Ratio	5% C.V.	1% C.V	Ho: No. of CE(s)
<b>DRC</b>				
0.808562	118.6388	87.31	96.58	None **
0.559121	62.43036	62.99	70.05	At most 1
0.35911	34.58489	42.44	48.45	At most 2
0.294906	19.45838	25.32	30.45	At most 3
0.199791	7.577982	12.25	16.26	At most 4
<b>EGYPT</b>				
0.717552	107.8770	87.31	96.58	None **
0.580327	63.62786	62.99	70.05	At most 1 *
0.390935	33.23809	42.44	48.45	At most 2
0.233051	15.88400	25.32	30.45	At most 3
0.171795	6.597296	12.25	16.26	At most 4
<b>KENYA</b>				
0.595549	104.8519	87.31	96.58	None **
0.539086	67.16904	62.99	70.05	At most 1*
0.514515	46.06004	42.44	48.45	At most 2
0.323620	20.76877	25.32	30.45	At most 3
0.183226	7.083764	12.25	16.26	At most 4
<b>NIGERIA</b>				
0.691399	83.22423	68.52	76.07	None **
0.459078	42.07453	47.21	54.46	At most 1

0.315467	20.56770	29.68	35.65	At most 2
0.186716	7.302078	15.41	20.04	At most 3
0.001954	0.068456	3.76	6.65	At most 4
<b>ZAMBIA</b>				
0.705514	96.63117	87.31	96.58	None **
0.489830	53.84280	62.99	70.05	At most 1
0.334719	30.28741	42.44	48.45	At most 2
0.251162	16.02331	25.32	30.45	At most 3
0.155133	5.900155	12.25	16.26	At most 4

Notes: \*\* and \*: Reject Ho at 1% and 5% significant level respectively. Test assumption: Linear and deterministic trend in the data. The optimum lag length of two were used as determined by Akaike Information Criteria-AIC and Schwarz Selection Criteria-SSC from a number lags tested.

Furthermore, when there is the existence of long-run relationship between variables, it is needful to examine the degree to which the variables adjust from the short-run to long-run. This is usually done employing vector error correction (VEC) technique. Thus, the VEC tells us the speed of adjustment from short-run dynamics to long-run equilibrium values. This study carried out the VEC techniques and reports them along with the co-integrating equations across the countries in Table 3.0. (Only the error correction terms are reported for the countries, since the long-run estimates from the co-integrating equations are presented<sup>2</sup>).

**Table 3.0 Normalized Co-integrating Equation and VEC Term for the Countries**

<b>LNOPEN</b>	<b>LNINVD</b>	<b>LNTECH</b>	<b>WTO</b>	<b>Constant</b>
<b>DRC</b>				
2.34893 (5.2497)*	0.533018 (1.3041)	2.07373 (3.9534)*	2.52257 (4.4866)*	0.135512 (6.1401)
<b>EGYPT</b>				
0.20161 (0.9440)	0.401851 (4.6121)*	0.62405 (4.6748)*	0.50252 (5.5805)*	0.01632 (1.3866)
<b>KENYA</b>				
1.824228 (9.2577)*	2.16732 (7.0488) *	1.760811 (4.7537)*	0.387406 (3.0507)*	-0.06289 (3.0844)
<b>NIGERIA</b>				
3.156668 (1.4243)	-2.43944 (2.2876)*	-1.59607 (2.7907)*	0.087018 (0.1905)	2.48027 (2.9001)
<b>ZAMBIA</b>				
0.404841 (1.3825)	-5.70019 (4.8673)*	0.409988 (2.2580)*	0.163107 (1.0434)	0.108885 (4.4864)

<sup>2</sup> The full VEC results was not reported here for brevity sake. Also the standard diagnostics tests were carried out and it was found that normality and error terms assumptions were not violated, this was not equally reported for same reason.

VEC Term				
DRC	Egypt	Kenya	Nigeria	Zambia
-0.19354	-0.5942	-0.604354	0.3451	-0.1903
(-1.9560)**	(-3.0591)*	(-2.7565)*	(-2.559)*	(-1.9966)**
<b>Adj R<sup>2</sup>: 0.6083</b>	<b>0.5895</b>	<b>0.6863</b>	<b>0.5610</b>	<b>0.6791</b>

Notes: The dependent: LnRPGDP (-1). t-values are in parentheses. \* and \*\*: significant at 1% and 5%, respectively

The VEC term in the lower segment of Table 3.0 indicates that there is convergence between the variables from the short-run to long-run across the countries. This is seen from the expected negative signs of the VEC terms, which was significant at 5% for DRC and Zambia but at 1% for the rest. Examining the speed of adjustments, the VEC term coefficients reveal that there is low speed of adjustment for Zambia (19.0%), DRC (19.4%) and Nigeria (34.5%); while for Egypt and Kenya it is moderate (59.4% and 60.4%, respectively). In addition, the adjusted coefficient of determination (Adj. R<sup>2</sup>) implied that the explanatory variables jointly explain about 61%, 59%, 69%, 56% and 65% changes in DRC, Egypt, Kenya, Nigeria and Zambia, respectively. The values equally denote that the model had good fit. This supports the VEC terms that were significant for the respective countries.

In Table 3.0, one can deduce that the degree of trade openness as well as membership of WTO are positive for all the countries denoting possibility of trade and WTO agreements impacting positively on their citizen's welfare. However, in terms of significance, the level of trade openness was not significant for Egypt, Nigeria and Zambia at 5% level. But for DRC and Kenya it was. This may mean that though the level of trade openness has the potentials of positively influencing real per capita income (welfare) in three of the countries - Egypt, Nigeria and Zambia, such impact have not been significantly felt for the period studied. In similar vein, WTO membership was significant for DRC, Kenya, and Egypt at 5% but it was not Nigeria and Zambia. This may be due to the fact that the nature of their exports remains primary product while they import consumer goods against industrial goods. However, for Kenya and DRC, there is positive and significant relationship. This may be due to their emerging tourist sector, which other African countries can take a clue from.

In furtherance, the level of technology effects on real per capita income has a significant and positive influence for all countries. This means that improvement of technology in the respective countries would have significant impact on their citizens' welfare. With respect to the influence, it is highest in DRC followed by Egypt, Kenya, Zambia and Nigeria, in that order. Though the governments of most African countries have appreciated this fact, their commitment to it is not fully observed.

## 5. CONCLUSION

The debate over the welfare of Africans in relation to World Trade Organization membership, openness, and the promise of economic growth has not stopped. This study examined the fate of selected African countries from the crusade of WTO to economic

growth using data over the period 1970-2007. The reviewed literature identified significant effect of WTO's membership and trade openness to economic growth, with a large number of dissenting opinions. However, this study found that, at aggregate level, WTO's membership and trade openness do have a positive effect on country's welfare- real per capita income, although not across the selected countries. Despite this, technological effects on real per capita if adopted through traded can improve the economy and the people.

The implications from the empirical result of the study favoured largely the need for economic interdependency and global participation for African countries. The study observed that the degree of a nation's openness through global trade interconnectivity has implication on citizens' welfare. However, the study cautioned against sweep generalization, since some of the countries did not feel the impact much over the period covered by the study. The encouraging aspect of the study for the Africans is that technological diffusion resulting from world trade could improve their citizen's economic welfare provided WTO participation encourages technological adoption by Africans.

The empirical evidence also suggests that African countries should consider deeply the policy of WTO and selectively adopt technological and cutting-edge equipments that can ensure national productivity through which their participation in WTO could have meaningful impact on welfare. In the future, more research in the same area, but with more countries may suggest more policy options to maximize participatory benefits from WTO.

## REFERENCES

- Abdulai, A. and P. Jaquet (2002). "Exports and Economic Growth: Cointegration and Causality Evidence for Cote d'Ivoire" *African Development Review*, 14 (1):1-17.
- African Development Bank. (2000). *African Development Report*, New York: Oxford University Press.
- Agama, L. A. (2001). "Assessing the Desirability of a Free-Trade Area in Southern Africa", *International Economic Review*, July/August: 1-6.
- Alam, I. and Quazi, R. (2003). "Determinants of Capital Flight: an Econometric Case Study of Bangladesh", *International Review of Applied Economics*, 17 (1):85-103.
- Aremu, J.A (2005) "Understanding the World Trade Organization Negotiation Process", *Globalization Review*, 1(1):7-46.
- Aw, B.Y., Chung, S. and Roberts, M.J. (1999). "Productivity and Turnover in the Export Market: Micro Evidence from Taiwan and South Korea, *NBER*, February .
- Banerjee A, Dolado J, Galbraith J.W, Hendry D.F. (1993), *Co-Integration, Error Correction, and the Econometric Analysis of Non-Stationary Data*, Oxford :Oxford University Press.
- Ben-David, D. (1993). "Equalizing Exchange Trade Liberalization and Income Convergence", *Quarterly Journal of Economics*, 108: 653-679.

- Berg, A and Krueger, A (2003). "Trade, Growth, and Poverty",. *IMF Working Paper*, WP/03/30.
- Bhagwati, J., (1988). "Export-Promotion Trade Strategy: Issues and Evidence", *The World Bank Research Observer*, 1: 27-57.
- David and Schott, (2005). *Macroeconomics: Understanding the Wealth of Nations, A Handbook* New York : John Welly & Sons..
- Dollar, D. (1992). "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985", *Economic Development and Cultural Change*, 40(3): 523-44.
- Dixit, A. and Norman, V. (1980). *Theory of International Trade*, Cambridge: University Press
- Edwards, S. (1997). "Openness, Productivity and Growth: What Do We Really Know?", [\*NBER Working Papers\*](#), No. 5978.
- Engle, R.F.and. Granger, C.W.J, (1987), 'Co-integration and Error Correction: Representation, Estimation and Testing', *Econometrica*, 55:251-276.
- Evans, D. (1989). "Alternative Perspectives on Trade and Development",. in Chenery, Hollis and T.N. Srinivasan, (eds)., *Handbook of Development, Economics*, 2. Amsterdam: North-Holland, 1241-1304.
- Ferriera, P. C. and Rossi, L. (2001). "New Evidence on Trade Liberalization and Productivity Growth", *Ensaio Economicos da EPGE* 433.
- Frankel, J. A. and Romer, D., (1999), Does Trade Cause Growth? *American Economic Review*, June :379-399.
- Frimpong,J.M and Oteng-Abaiye, E.F. (2008), 'Bivariate Causality Analysis between FDI Inflows and Economic Growth in Ghana', *International Research Journal of Finance and Economics*, 15:104-112.
- Grossman, G. M. and E. Helpman (1991), *Innovation and Growth in the Global Economy*, Cambridge : MIT Press.
- Grossman, G.M. and Helpman, E (1995), "Trade Wars and Trade Talks", *Journal of Political Economy* ,103: 675-708.
- Helpman, E. and Krugman, P (1985), *Market Structure and Foreign Trade*, Brighton: Wheatsheaf Press.
- Helpman, E. and Krugman, P., (1989). *Trade Policy and Market Structure*, Cambridge: MIT Press.
- Huff, K. (2000). "Developing Country Concerns and Multilateral Trade Negotiations". *CATR Paper 2000-02*, Canadian Agri-Food Trade Research Network. (January)

- Johansen, S. and Juselius, K. (1990), 'Maximum Likelihood Estimation and Inference on Cointegration-with applications to the Demand for Money', *Oxford Bulletin of Economics and Statistics*, 52:169-210.
- Jonsson, G. and Subramanian, A. (2001), "Dynamic Gains from Trade: Evidence from South Africa", *IMF Staff Papers*, 48(1):187-224.
- Kraay, A. (1997), "Exports and Economic Performance: Evidence from a Panel of Chinese Enterprises", Mimeo, Development Research Group, The World Bank.
- Krueger, A. (1999). "The Developing Countries and Next Round of Multilateral Trade Negotiations", *The World Economy*, 22:909-932.
- Lee, J-W. (1996), Government Interventions and Productivity Growth, *Journal of Economic Growth*, 1 (3): 391-414.
- Levine, R and Renelt, D., (1992). "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, .82 (4) :942-963.
- Luintel,K.B and Khan,M (1999), 'A Quantitative Reassessment of the Finance-Growth Nexus: Evidence from a Multivariate VAR', *Journal of Development Economics*, .60:381-405.
- Nash, J. (1993). "Trade Policy Reform Implementation in Sub-Saharan Africa: How Much Heat and How Much Light?", *Mimeograph*, The World Bank, Washington, DC.
- Narayan, P. K. (2005), 'The Saving and Investment Nexus for China: Evidence from Cointegration Tests', *Applied Economics*, 37:1979-1990.
- Osabuohien, E.S.C and Egwakhe, A.J (2008) "External Reserves and the Nigerian Economy: The Dual Folded Debate", *African Journal of Business and Economic Research*, .3 (2&3): 28-41.
- Osabuohien, E.S.C (2007) "Foreign Capital and Africa's Economic Progress: Facts from Nigeria and South Africa", *Journal of Banking and Finance*, 9 (1): 24-37.
- Oyejide, A., Elbadawi, I., and Collier, P., (1997), *Regional Integration and Trade Liberalization in SubSaharan Africa:Vol.1: Framework, Issues and Methodological Perspectives*, London: Macmillan.
- Pesaran M.H, Shin Y, Smith RJ. (2000), 'Structural Analysis of Vector Error Correction Models with Exogenous I(1) Variables', *Journal of Econometrics*, 97:293-343.
- Powell, W. W. & Dimaggio, P. J. (1991). *The New Institutionalism in Organizational Analysis*, Chicago, University of Chicago Press.
- Rehman, H.U (2007) "An Econometric Estimation of Traditional Import Demand Function for Pakistan", *Pakistan Economic and Social Review*, 45 (2): 245-256.

- Rodriguez, F. and Rodrik, D. (2001). *Trade Policy and Economic Growth: A Sceptic's Guide to the Cross-national Evidence*, NBER Macroeconomics Annual 2000, Cambridge, Mass., MIT Press.
- Sachs, J. D. and Warner, A. M. (1995), "Economic Convergence and Economic Policies", *Brookings Papers in Economic Activity*, 1: 1-95.
- Schumpeter, J. A. (1911). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press, English Translation, 1934.
- Schumpeter, J.A. (1942). *Capitalism, Socialism and Democracy*. New York: Harper.
- Smith, A., (1776). *An Inquiry Into the Nature and Causes of the Wealth of Nations*, London.
- Solow, R. M., (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, 70: 65-94.
- Solow, R. M., (1957), Technological Change and the Aggregate Production Function, *Review of Economics and Statistics*, 39: 312-320.
- Srinivasan, T.N. (2000). "Developing Countries in the World Trading System: From GATT , 1947, to the Third Ministerial Meeting of WTO, 1999", *The World Economy*, 23:437-54.
- Stiglitz, J. E., (2004). "Factor Price Equalization in a Dynamic Economy", *Journal of Political Economy*, 1970, 78(3): 456-488.
- Stiglitz, J. E., (2002). *Globalization and its Discontents*, NY: Norton and Company.
- Stern, N., (2001). *Globalization, Investment Climate and Poverty Reduction*, Mimeographed.
- Tangermann, S. and Josling, T. (1999). "The Interests of Developing Countries in the Next Round of WTO Agricultural Negotiations", *Paper prepared for the UNCTAD Workshop on Developing a Proactive and Coherent Trade Agenda for African Countries*, Pretoria. June 29-July 2.
- Taylor. A.M. (1998). "On the Costs of Inward-Looking Development: Price Distortions, Growth and Divergence in Latin America", *The Journal of Economic History*, 58 (1): 1-28.
- Toda, H.Y and Phillips, P.C.B (1993) "Vector Autoregressions and Causality", *Econometrica*, 61 (6): 1367-1393.
- Tilat, A. (2002). "Impact of Globalization and Liberalization on Growth, Employment and Poverty: A Case Study of Pakistan", *Research Paper*, World Institute for Development Economic Research (UNU-WIDER).
- United Nation Conference on Trade and Development -UNCTAD (2006) *Handbook of Statistics*, Washington DC: United Nations.



United Nations Statistics Division-UNTSAT (2008)  
<http://unstats.un.org/unsd/snaama/SelectionCountry.asp>

White, H. (1997). *Poverty and Adjustment in Sub-Saharan Africa: A Review of the Literature*. The Hague, Institute of Social Studies.

Winters and Mackay, (2004). "Trade liberalization and Poverty: The Evidence So Far", *Journal of Economic Literature*, 42(1):72-115.

Winters, L.A. (2002). "Trade Liberalization and Poverty", *Discussion Paper No7*, Poverty Research Unit, University of Sussex.

Winters, L. A. (2004). "Trade Liberalization and Economic Performance: An Overview", *Economic Journal*, 114 (2):F4-21.

World Trade Organization-WTO (2008) *International Trade Statistics*, Geneva: WTO,  
(available at  
[http://www.wto.org/english/res\\_e/statis\\_e/its2008\\_e/its08\\_toc\\_e.htm](http://www.wto.org/english/res_e/statis_e/its2008_e/its08_toc_e.htm))