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**DEVELOPMENT, TRADE, AND TARIFF NEXUS IN AFRICA:
CHALLENGES AND CHOICES**

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Abstract

Tariff and trade are exerting some impacts on countries' development process, especially the African commodities oriented countries. The challenge is not ideological protectionism, rather international market interconnectivity with participation without compromising domestic investments. On the other perspective, the international market playing field is not flattened enough to induce development through trade as conventionally advocated. Hence, this paper empirically explored how the development process in Africa has fared in relation to trade and tariff using panel data techniques. First, the paper investigated the development of African economies in relation to the countries' regional grouping – Central, East, North, Southern, and West Africa in the descriptive aspect. Secondly, in the empirical estimation aspect, the paper assessed RE and GMM estimates with a view to having efficient and reliable results. The results established, among others, that regions with higher level of domestic investment had higher values in development indicators. It was also found that domestic investment and labour played a more crucial role in Africa's development process. The challenge noted was the fact that increased trade integration do not translate to increased development in Africa. The basic choice for African countries is to improve domestic investment and enhance their labour productivity, which are more crucial for development than trade and tariff. The findings above are germane in this era of global economic downturn where countries need to rely on factors that are not easily influenced by external shocks.

Key words: Development, Export, Tariff, Trade

JEL Codes: F11, F31.

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Development, Trade, and Tariff Nexus in Africa: Challenges and Choices

1 Introduction

The impact of international trade has generated intensive debate among academic commentators, but the impact on developing countries especially within Africa has helped to fuel the contention. Some scholars advocated for trade liberalisation as a prerequisite for economic growth (Edwards, 1997; David and Scott, 2005). Stiglitz (2002) cautioned against drastic trade openness. Along these perceptions disparities, the African commodities oriented countries are in dilemma as World Trade Organization (WTO)'s tariff crusade makes the continent an *economic-lake*; importing and consuming a variety of products without significant improvement in exports.

Many African countries have instituted strategic vision aiming at 2020 as the developmental hallmark especially with a view of improving the welfare of their citizens and attaining meaningful development. However, some countries anchored their developmental strategy on the expansion of primary product exports, which may not yield much result. This is because the price of primary products at the international market is affected by unfavourable terms of trade. The occurrence of recent global economic crisis that has resulted in decrease in commodity prices lends credence to this stance. This, among other reasons, may be instrumental in development *lukewarmness* experienced in many Africa countries even when most of them have had 50 years of political independence. For instance, while many countries of the world have recorded steady improvements with regards to human development in the past years, many African countries suffered human development reversals from which they are yet to recover (Human Development Report -HDR, 2009).

The tariff and trade debate may or may not favour countries at the same rate due to difference in economic structures. This should be understood as a system error, that economic development is both interrelated and interactive. The advantage experienced by the developed countries within the international trading system, which has made improvements in the welfare of their citizens create an element of hierarchy within the global system. Hence, instead of comparative advantage, it is somewhat *selective-advantage* while there could be possibilities of complementary trade-off. The current trade exhibits characteristics of *have-nots* despite Africa's participation in trade. Hence, the promise of world trade benefits for Africa remains unfulfilled. For instance, the total trade for services for Africa in 2007 was 3% compared to Asia 24% and

average contribution of Sub-Saharan Africa (SSA) to world total export in 2008 was modicum of 0.05% compared to the global average of 0.64% (World Bank Group, 2010).

The above is crucial given the targets in Millennium Developmental Goals (MDGs). Some Africa countries have made some efforts in that regard but much success has not been recorded in many respects especially in economic and human development. Africa had some signs of impressive economic performance as the real per capita GDP in the first half of 1970s where her 2.7% growth rate (1970-1974) was similar to that of Latin America and Caribbean and even higher than South Asia. However, Africa has had some disappointing records in development in recent times. For instance, Africa had the lowest value of real per capita GDP for the period 2005-2008 compared to other regions of the world (World Bank Group, 2010). On a similar note, human development index (HDI) for Africa was in the very low ebb compared to other regions of the world. The average HDI for Africa was 0.489, which was far lower than world average of 0.747 in 2007 (HDR, 2009). This paper was motivated with a view to examining the extent to which trade and tariff issues are relevant in explaining development (economic and human) in Africa.

In articulating this, 50 African countries were selected, which covered good representation of the five regions, namely: Central, East, North, Southern and West Africa. Data sourced from HDR, World development Indicators (WDI), and World Trade Indicators (WTI) were analysed using both descriptive and econometric techniques. The rest part of the paper is structured as follows: some stylised facts; theoretical underpinning and literature review; empirical model formulation; presentation of econometric results and analyses; and conclusion.

2 Stylised Facts on Development, Tariff and Trade

Table 1 gives some stylised facts on trade and development nexus across some regions of the world including Africa from 1970-2008 using five year period average. It also gives single average for the period. This is with a view to further situate the nexus on development, trade and tariff in Africa within the global context. The information on tariff was 1995-2008, period that data were available. Trade outcome indicators using total trade integration ratio (trade as % of GDP) and export integration ratio (export as % of GDP) is shown in Part A and B of Table 1, while growth rates of

real per capita GDP and population are in Part C and D, respectively. The last segment reports data on tariff in Africa in comparison to other region and global average.

Table 1 Development, Trade and Tariff Indicators across the World

Period	1970-74	1975-79	1980-84	1985-79	1990-94	1995-99	2000-04	2005-08	1970-08
Regions	(A)	Trade as % GDP							
East Asia & Pacific	64.51	70.23	77.04	78.99	87.80	94.27	115.23	138.52	90.17
Latin America & Caribbean	59.16	81.31	80.65	78.17	85.01	85.60	85.34	86.75	79.59
South Asia	24.18	77.85	80.76	50.54	58.23	65.96	64.04	48.27	59.71
Africa*	58.72	69.84	69.50	65.64	65.54	72.33	77.47	83.36	69.50
	(B)	Export as %GDP							
East Asia & Pacific	36.09	34.32	34.06	33.64	38.27	43.40	55.84	69.07	42.48
Latin America & Caribbean	28.38	37.27	35.49	36.42	39.11	38.52	38.24	38.48	36.53
South Asia	10.26	33.71	33.50	22.64	26.15	31.81	31.38	29.33	27.71
Africa	27.32	29.08	28.22	28.02	27.01	30.61	35.16	38.28	30.12
	(C)	Real Per Capita GDP Growth (%)							
East Asia & Pacific	5.37	3.90	2.17	2.15	3.51	2.06	2.13	4.35	3.57
Latin America & Caribbean	3.31	2.71	-0.04	1.81	1.55	2.07	1.24	3.61	2.13
South Asia	0.54	2.40	3.75	2.89	2.64	2.82	3.84	3.75	2.85
Africa	2.66	0.91	-1.01	1.18	-1.93	2.83	2.36	2.75	0.67
	(D)	Population Growth (%)							
East Asia & Pacific	2.37	2.03	2.21	2.02	2.00	1.76	1.47	1.46	1.88
Latin America & Caribbean	1.82	1.72	1.76	1.49	1.53	1.41	1.30	1.17	1.55
South Asia	2.45	2.48	2.38	2.33	2.18	1.89	1.72	1.57	2.13
Africa	2.48	2.77	2.90	2.81	2.33	2.61	2.37	2.26	2.64
	(E)	Average Applied Tariff on All Goods (%)				1995-99	2000-04	2005-08	1995-08
East Asia & Pacific					15.96	9.80	9.83	12.01	
Latin America & Caribbean					13.64	11.67	8.22	11.39	
South Asia					29.76	18.53	14.33	21.34	
Africa*					22.44	14.93	12.79	17.00	
Global Average					11.93	10.24	9.35	10.59	

Note: *Africa largely denotes Sub-Saharan Africa.

Source: World Development Indicators (2009), World Trade Indicators (2010)

From Table 1, Africa's trade in the early 1970s was relatively at par with some other regions presented and but it was even above South Asia using both indicators. There were little fluctuations along the line; however, the period 2000-2008, Africa seems to have integrated very much in trade as its value of 38.28% was very close to that of Latin American and the Caribbean with the value of 38.48%. It was even above that of South Asia that has the value of 29.33%. More so, the value of Africa's real per capita income for the period 1970-1974 was far above that of South Asia (almost five times) and a little lower than that of Latin America and the Caribbean. The irony is that towards

the end of the period (2005-2008) Africa had the lowest real per capita income amongst all the regions. The above is converse to its population growth rate that has the highest value all through the period.

With respect to tariff, the last part of Table 1 indicates that the average applied tariff had consistently reduced in Africa. For instance, the average for 1995-1994 was 22.44% which significantly reduced to 12.79 for 2005-2008. In addition, this paper presents another indicator of development, which incorporates the human aspect of development – HDI, which comprises other issues such as social, education, and health. As can be seen in Fig. 1 in the appendix, the HDI was quite low as the average value was 0.489, which was far lower than world average of 0.747 in 2007 (HDR, 2009).

The summary from the stylised facts above include: a) Africa is becoming increasingly more integrated in to trade; 2) Africa is fast becoming the least region with respect to development; 3) Africa has the highest population growth; and 4) Africa's applied tariff in has reduced consistently. The above observations can help to infer that Africa with high population growth experienced less economic development and more importantly the increasing Africa's trade integration do not reflect significantly in her development process. This discourse brings some issues to limelight: the possible nexus between trade and development, which is far from reaching consensus in the economic growth/development literature (Ackah and Morrisey, 2010).

3 Theoretical Underpinning and Literature Review

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 assertion that cross-countries trade liberalisation is imperative for economic growth. The validity of this conclusion was fostered by empirical and theoretical studies (e.g. 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 and development (Winters, 2004; Mackay and Winters, 2004).

Past studies offer some insights into the relationship between the trade, other factors and economic growth/development. However, the studies have divergent conclusions (Ackah and Morrissey, 2010). The notion that trade liberalisation and economic growth are positively correlated is credited to Solow (1956) which has significantly influence the empirical literature. The thrust of Solow's argument was that market-centred trade liberalisation will accelerate the dynamic of economic growth and development. With respect to individual productivity pay-off, the aggregate market interactions were to trigger growth, which is in accordance with the neoclassical theory of trade and growth (Bhagwati, 1988).

The progress in trade is becoming even more important in the analysis of economic growth as well as development. Thus, it is necessary to examine theoretical and empirical evidences towards substantiating the claims of WTO that the removal/reduction of tariff influences economic growth. Some economic commentators such as Berg and Krueger (2003) and Mackay and Winters (2004) give reasons for trade liberalisation, and its propensity to promote economic growth. These cross-countries empirical studies conclude that the liberalisation 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 spill-over 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 has been noted by Srinivasan (2000), and Stiglitz (2002).

In a similar manner, some empirical studies associated trade liberalisation with wealth accumulation (Levine and Renelt, 1992; 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 liberalisation. However, Mackay and Winters

(2004) found that in the short run, trade liberalisation harms poor actors in the economy and even in the long run, successful open countries may create a return to below the poverty line, which means an escalation in poverty density and a punctured economic growth.

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 utilised in producing that commodity (Dixit and Norman, 1980). However, some of the literature did not examine the possibility of 'Goliath-David trade' to plummet economic growth. Unfortunately for most Africa countries, the expected benefits of international trade have not been sufficiently experienced; hence it is not difficult to link trade openness with a countries' economic less performance along e.g. primary extraction/commodities.

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 (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. 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 reduction.

Freer trade by absolute definition involves greater interdependence among nations, and Tilat (2002) linked it to the phenomenon of globalisation. 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 (AfDB, 2008).

Nevertheless, the study of Agama (2001) in Africa which utilised a database to investigate the connection between trade openness and economic growth for 40 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, he concludes that although trade liberalisation and economic integration increases economic growth for African countries, increases in government consumption expenditure retards the growth. Most studies believe that a significant relationship exists between exports, trade openness, and economic growth (Khalifa Al-Youssif, 1997; Agama, 2001) and cross-country study tends to confirm the importance of exports for developing nations (Ngoc, Phuong Anh, and Nga, 2003). The doubts exist pertaining to the importance of trade. For example, Clarke and Kirkpatrick (1992) utilised a data pool for 80 developing countries (1981-1988) to estimate the impact of trade policy reform on the economic performance and conclude that trade reform does not affect profoundly the economic performance.

The debate about a positive empirical association between trade openness and economic growth especially within the Africa domain remains far from being over. 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/reduction and economic growth appear to be direct and imperative for some selected Africa countries. To contribute to the academic debate and towards recommend some policies for Africa leaders, this paper examines the relationship between trade, tariff reduction and economic growth and development among selected Africa countries (1995-2008).

The Ricardian and Heckscher-Ohlin theories on trade are based on the supply-side differential (Pugel, 2008). These academic works make comparative advantage and factor endowment concepts incentives for trade liberalisation. Also, the interconnectivity of this to vent-for-surplus theory (Krugman, 1983) would encourage non-trade member to belong. However, the North-South thesis of unequal trade (Stiglitz, 2002; Hare, 2004; Pugel, 2008) reveals the disparities and the unlikely aftermath of trade to generate economic growth. As a result, trade is one-way-traffic and poor countries hardly experience changes in economic welfare, but unending unemployment, poverty, and income inequality.

Theoretically, the profound implication of international trade on development especially along economic growth, income distribution, poverty, and employment are impressive (Krugman,

1983; Bhagwati, 2004). This is anchored on the economic theory that says a completely liberalized global market constitutes the most efficient path to foster growth, because a particular country that specialises in producing the goods and services in which it has a comparative advantage gains from trade. Nonetheless, trans-national corporations have become instruments of eroding nations' comparative advantage since they dominate the global marketplace and create a non-flattened relation of power and information. Further, the problem is that free trade based on comparative advantage is not actually and equally free. For example, agricultural subsidies and other designed trade barriers common to the USA and some nations in Europe hinder Africa poor countries from entry and participating in these vital markets despite the comparative advantage concept.

4 Empirical Model and Estimation Technique

The model for this paper, as informed from literature and the theoretical framework in the previous section, is discussed in the section. It draws some insight from the endogenous growth model that has labour and capital as basic explanatory factors for growth and also allows the incorporation of other factors of interest. The model assumes a relationship between indicators of development of the selected African countries and capital, labour and other explanatory variables especially trade and tariff. This is based on recent growth literature (e.g. Agama, 2001; Stiglitz, 2002; Winters, 2004) that have established the influence of trade on economic growth in some countries.

It is commonly purported that the more countries trade the better the level of development. Thus, a functional relationship between economic development and trade can be related. This is taken further, that per capita income, a major indicator of development in connection with real per capita income would show the amount of wealth that can be accrued to each citizen. However, it has been argued that real per capita income covers mainly the economic aspect of development. To handle this, this paper employs HDI, which incorporates other aspect of development especially human component. The key variables used as explanatory variable that can exert influence on the welfare level of some selected African countries are trade and tariff. Other explanatory variables are the level of domestic investment and labour force. This is represented by the functional relationship below:

$$Dev_t^j = f(Lab_{it}, Invest_{it}, Tradint_{it}^K, Trdgrot_{it}, Apt_{it}, U_{it})-----I$$

The above equation is expressed in explicit form as:

$$Dev_t^J = \alpha_0 + \alpha_1 Lab_{it} + \alpha_2 Invest_{it} + \alpha_3 Trade^K + \alpha_4 Trdgrot_{it} + \alpha_5 Apt_{it} + e_{it} \text{ ----- } 2$$

Where:

Dev^J: Level of development in the selected countries. *J*=1 and 2. This represents two equations: the real per capita GDP -*rpgdp* (economic aspect of development) and human development index-*HDI* (the human aspect of development). *rpgdp* is measured at 1990 constant prices in United States dollars (USD), while *HDI* is taken as reported in HDR with values ranging from 0 to 1; the higher, the better.

Lab: Labour force measured in million persons.

Invest: Domestic investment proxied by gross fixed capital formation measured in million USD at 1990 constant prices.

Trade^K: Level of trade integration, with *K* =1 and 2. This is measured by total trade openness/integration -*trdint* (defined as ratio of total trade to GDP i.e. {(export+import)/GDP} and export integration -*expint* (defined as ratio of export to GDP. These are the key measures of trade integration with the third as import integration (import/GDP). However, it has been noted that the first two measures are expected to positively influence growth and development but the impact of import integration is ambiguous (Leyaro and Morrissey, 2010). Hence, this paper used *trdint* and *expint*.

Trdgrot: Real growth in trade, which shows rate of growth in trade over a given period. The inclusion of this variable is necessitated with a view to examine the influence real trade growth over the studied period as it is possible to have trade integration without real trade growth.

Apt: Average applied tariff.

e_{it}: Error terms that captures other factors influencing the dependent variables 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: The countries and time dimensions.

$\alpha_i (i = 0 - 5)$: Parameters to be estimated, which show the constant and the rate of change in the dependent variable induced by the respective chosen explanatory variables. Their apriori expectation is such that $\alpha_i (i = 0, -4) > 0$. This means that the explanatory variables are expected have positive influence on the indicators of development. Tariff can be positive or negative depending on the economies. The empirical results will help resolve this.

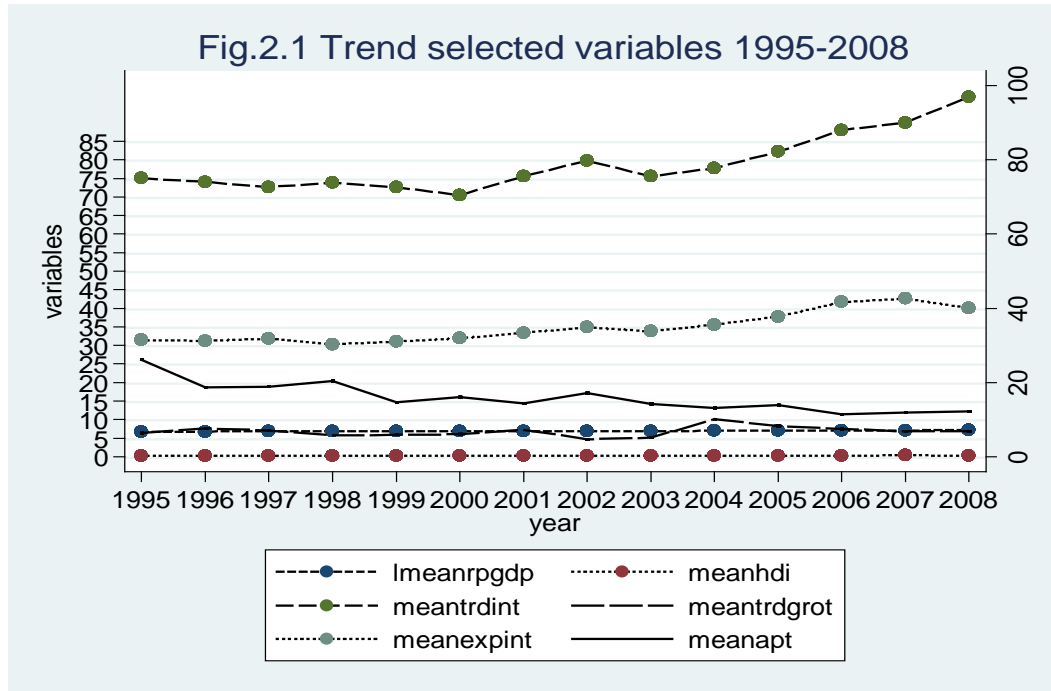
To estimate the formulated equation above, the paper used a panel data regression technique. Panel data regression technique is a relevant method of longitudinal data analysis because it allows for a number of regression analyses in both units and time dimensions. It also gives room to for data analysis especially when the data are from various sources and the time series are quite short for separate time series analysis (Baum, 2006). In panel data analysis, there are usually choices to be made from three possibilities: pooled Ordinary Least Squares (OLS) regression, Fixed Effects (FE), and the Random Effects (RE) models. However, in panel data there are some issues such as omitted variables, unobserved heterogeneity, measurement errors and endogeneity biases (Baum, 2006; Leyaro and Morrissey, 2010). To address them, the Generalised Method of Moments (GMM) estimator was employed. GMM procedure allows freedom in specifying the lag structure for the instruments. The results from OLS, FE, RE and GMM are reported and analysed in the next sub-section.

5 Empirical Results and Analyses

The data engaged in the empirical analyses were sourced from human development reports, World Development Indicators, and World Trade Indicators for the period 1995-2008 using STATA 10.1 econometric package. The number of countries in Africa selected was 50 drawn from the five regions in the continent. The selected countries represent about 87.72% in number and over 95% in economic size with respect to GDP. Thus, this will give a good representation. The list of countries selected arranged according to their regions is in Table 2 in the appendix.

5.1 Descriptive Analysis

To have first-hand information of the key issues, the paper plotted the major variables of interest as shown in Fig. 2. As can be observed in Fig.2, indicators of trade, namely trade and export integration ratios increased remarkably throughout the period, though they experienced little fluctuation 2000-2003. On the hand, indicators of development, namely real per capita GDP and HDI maintain a somewhat minimal increase over the period. However, average applied tariff decreased markedly and consistently over the same period. The above finding implies that Africa has experienced some form of increased trade integration and declined tariff rate but the level of development has not considerably improved. This denotes the challenge of Africa's trade inability to translate to development.



Note: Mean values were used for the graph; logarithm of *rpgdp* was taken to get the rate.

Source: Authors' computation.

5.2 Summary Statistics

The paper reports the summary statistics of the variables used in the estimation process with a view making their comparison across the five regions in Africa, namely: Central, East, North, Southern, and West; and make discussion on them. This is reported in Table 3.

Table 3 Summary Statistics of Selected Variables

<i>Variables</i>	<i>Statistics</i>	<i>All Africa</i>	<i>Central</i>	<i>East</i>	<i>North</i>	<i>South</i>	<i>West</i>
<i>Rpgdp</i>	Mean	1308.19	1314.62	1360.29	3030.91	1535.92	552.87
	Std. Dev.	1815.84	1782.50	2260.02	2654.32	1298.36	322.12
<i>Hdi</i>	Mean	0.50	0.48	0.51	0.69	0.53	0.73
	Std. Dev.	0.13	0.13	0.13	0.08	0.11	0.25
<i>Trdint</i>	Mean	78.96	71.46	74.55	72.98	105.82	72.80
	Std. Dev.	44.59	50.75	48.03	26.24	47.87	33.66
<i>Trdgrot</i>	Mean	6.94	9.99	6.13	6.58	6.52	6.11
	Std. Dev.	13.06	18.11	11.64	6.47	10.24	13.21
<i>Expint</i>	Mean	34.87	33.35	29.69	38.49	49.39	29.98
	Std. Dev.	22.89	27.38	23.92	17.57	26.24	12.44
<i>Apt</i>	Mean	14.78	17.17	15.50	14.05	11.57	15.36
	Std. Dev.	8.08	2.76	8.20	7.45	6.43	10.63
<i>Invest</i>	Mean	2680.00	904.00	1220.00	11500.00	4760.00	694.00
	Std. Dev.	6260.00	926.00	1580.00	6950.00	11100.00	800.00
<i>Lab</i>	Mean	6.58	4.51	9.21	10.00	4.82	5.81
	Std. Dev.	8.30	5.77	9.22	7.56	4.92	9.81
<i>Observations(N)</i>		700	126	168	70	126	210

Note: Only mean and standard deviation were reported for brevity sake.

Source: Authors' computation.

Table 3 reports that the mean of real per capita GDP for the entire 50 sampled African countries was USD 1308.19. Across the regions, it was highest in North Africa, which was about twice the means of other regions, while the least was in West Africa. A related observation is seen for HDI that was 0.50 for Africa, which was even lower for Central Africa with the value of 0.48. On the other hand, both measures of trade integration indicate that Southern Africa region was more integrated in trade than the rest part of Africa, which is followed by North with the least been Central over the period studied.

Conversely, the mean values of applied tariff indicate that Central Africa region has the highest tariff rate, which is followed by East, West, North and South, in that order. The values in Table 3 point out that the average domestic investment was highest in North African region with value that was more than 10 times above those of West and Central regions. In terms of labour force, the highest was in North Africa followed by West. The inference that can be made from the discussion on the summary statistics is that the regions with better level of domestic investment as well as labour force seem to have higher values in development indicators. This does not hold for tariff and trade.

5.3 Correlation Test of Variables

Taking a step further before presenting the estimation result, the paper reports the correlation matrix to examine possible problem of collinearity among the explanatory variables. The variables except real growth in trade were used in their logarithmic forms given the assertion that this process helps mitigate the issue of heteroscedasticity and also brings the variables to a more comparative form with regards to their rate of change (Olokoyo, Osabuohien and Salami, 2009).

Table 4 Coefficient of Correlation among the Variables

	<i>lnrpgdp</i>	<i>Lnhdi</i>	<i>lntrdint</i>	<i>Trdgrot</i>	<i>lnexpint</i>	<i>lnapt</i>	<i>lninvest</i>	<i>Lnlab</i>
<i>lnrpgdp</i>	1.0000							
<i>Lnhdi</i>	0.8348	1.0000						
<i>lntrdint</i>	0.4243	0.4948	1.0000					
<i>Trdgrot</i>	0.0266	0.0032	0.0696	1.0000				
<i>lnexpint</i>	0.5359	0.5425	0.8308	0.0590	1.0000			
<i>Lnapt</i>	-0.1047	-0.2526	-0.0878	-0.0827	-0.0590	1.0000		
<i>lninvest</i>	0.4425	0.4614	-0.0004	0.0740	0.1743	-0.2358	1.0000	
<i>Lnlab</i>	0.2875	0.2625	-0.1849	0.0512	-0.1937	0.0250	0.1877	1.0000

Source: Computed by the authors'

The values in Table 4 show that the two measures of development - real per capita income and HDI exhibit strong correlation between them. This is not unexpected as they give interpretation on level of development. Since both of them are used differently as dependent variables, it will not pose any challenge in the results. This observation is also similar to correlation between trade and export integration ratios, which necessitate their usage differently in estimation process. In addition, their separate use will help to ascertain, which of the two measures are more relevant for Africa's development process.

Surprisingly, the coefficient of correlation between trade and tariff was very minute (far less than 0.1), which implies that they can be combined together without problem of multicollinearity as the issue of multicollinearity becomes crucial when the coefficient of correlation becomes high, say above 0.5 (Baum, 2006:86). This is quite surprising given the fact that tariff should have been expected to influence trade; the reason for this especially in Africa is sufficient for another research. In précis, the correlation test has shown that there is no challenge of multicollinearity among the explanatory variables and as such the estimated results can be relied upon for useful deductions. Other tests before the estimation would have been panel unit root and co-integration tests. However, given the fact that GMM was among the estimators engaged which uses differenced in the variable, these pre-test are not always essential (Leyaro and Morrissey, 2010). Hence, the paper reports and analyses the estimated results in the next sub-section.

5.3 Presentation of Estimated Results and Analyses

Tables 5.1 and 5.2 present results from OLS, FE and RE and as well as system GMM for the two indicators of development used as dependent variables, namely: real per capita income (*Lnrpgdp*) and human development index (*Lnhdi*), respectively.

The overall statistics in the estimations in the last segments of Tables 5.1 and 5.2, namely: coefficient of determination (*Adj. R²/R²*), F-Statistics, Wald Statistics which were significant at 1% denoting that all the coefficients are jointly significant. This means that the models had good-fit. However, this does not address the issue of endogeneity and measurement errors. The paper also appraised the results from FE and RE using Hausman test, which indicates that the estimates from RE were more efficient than those of FE.

Furthermore, the system GMM, which helps to address endogeneity and measurement challenges are reported. To evaluate whether models were correctly specified and whether instruments were valid, The Hansen/Sargan J statistics and the test for first and second order serial correlation of the residual in differenced equation were carried out $[(AR(1)$ and $AR(2)]$. If the model is correctly specified, the variables in the instrument set should be uncorrelated with the idiosyncratic component of the error term. More so, for the instruments to be valid, the probability values for Sargan test and the $AR(2)$ tests should both be greater than 0.05. The $AR(1)$ test is asymptotically distributed as a standard normal under the null of no first-order serial correlation. The GMM estimator requires that there is first-order serial correlation $AR(1)$ but no second-order serial correlation $AR(2)$ in the residuals (Arrelano and Bond,1991; Leyaro and Morrissey, 2010). The tests statistics show that the estimates are reliable. Hence, this paper focus discussions on RE and GMM estimates.

Table 5.1 Estimated Results with Real Per Capita Income

<i>Estimators ⇒ Variables ↓</i>	<i>Dependent Variable ⇒ Lnrpgdp</i>									
	<i>OLS</i>	<i>FE</i>	<i>RE</i>	<i>GMM (Syst)</i>	<i>GMM (Syst)</i>	<i>OLS</i>	<i>FE</i>	<i>RE</i>	<i>GMM (Syst)</i>	<i>GMM (Syst)</i>
<i>Lnrpgdp(-1)</i>				0.6475 ^a (0.000)	0.6587 ^a (0.000)				0.5208 ^a (0.000)	0.5403 ^a (0.000)
<i>Trdgrot</i>	0.0090 ^a (0.001)	0.0019 ^b (0.033)	0.0031 ^a (0.004)	0.0015 ^a (0.000)	0.0014 ^a (0.000)					
<i>Lntrdint</i>	0.1825 (0.103)	0.0666 (0.167)	0.0134 (0.235)	0.0126 (0.477)	0.0139 (0.474)					
<i>Lnapt</i>	0.0423 (0.423)	-0.0448 (0.180)	-0.0617 (0.240)	-0.0114 (0.580)	-0.0123 (0.589)	0.1101 (0.054)	-0.0357 (0.170)	-0.0432 (0.142)	-0.0035 (0.864)	-0.0306 (0.195)
<i>Lninvest</i>	0.6654 ^a (0.000)	0.1378 ^a (0.000)	0.3404 ^a (0.000)	0.0642 ^a (0.000)	0.0664 ^a (0.000)	0.6507 ^a (0.000)	0.1563 ^a (0.000)	0.3184 ^a (0.000)	0.0886 ^a (0.000)	0.0914 ^a (0.000)
<i>Lnlab</i>	0.7036 ^a (0.000)	0.4446 ^a (0.000)	0.4554 ^a (0.000)	0.1380 ^c (0.072)	0.1060 ^c (0.054)	0.6660 ^a (0.000)	0.3026 ^c (0.060)	0.4418 ^c (0.000)	0.1377 ^c (0.073)	0.1465 ^b (0.046)
<i>Lnexpint</i>						-0.0011 (0.983)	0.0197 (0.582)	0.1095 (0.202)	0.0137 (0.414)	0.0002 (0.489)
<i>Constant</i>	4.0223 ^a (0.000)	2.6174 ^a (0.000)	6.4644 ^a (0.000)	3.0932 ^b (0.014)	2.5447 (0.162)	2.7717 ^a (0.000)	1.2076 (0.525)	6.3720 ^a (0.000)	3.4012 ^a (0.006)	3.4734 (0.136)
<i>Adj. R²/(R²)</i>	0.8633	0.5234 38.00 ^a (0.000)	0.4459			0.8421	0.4916 42.300 (0.000)	0.4399		
<i>F-stat</i>										
<i>Wald Stat.</i>			72.39 ^a (0.000)	85.25 ^a (0.000)	96.74 ^a (0.000)				48.44 ^a (0.000)	73.30 ^a (0.000)
<i>Hausman test</i>			13.22 ^a (0.000)						19.86 ^a (0.000)	
<i>Hansen J</i>									0.5722	0.4807
<i>AR(1)</i>									0.001	0.002
<i>AR(2)</i>									0.367	0.4212
<i>Time effect</i>				No	Yes				No	Yes

Note: OLS - Ordinary Least Squares; FE- Fixed Effects; RE- Random Effects; GMM- Generalised Method of Moments. R² for OLS is adjusted but for FE and RE it is the overall. The probability values are in parenthesis. Superscripts ^a,^b and ^c denote significant at 1, 5 and 10%, respectively.

Source: Authors' computation.

In Table 5.1, using real per capita income as indicator of development, the results show that the key determinants of economic development in the selected African countries within the studied period include: past level of economic development, real growth in trade, domestic investment and labour force. This is given the fact their coefficients were significant at the usual levels. Surprisingly, trade and export integration ratios were found not to be significant in influencing economic development, though they had the expected positive association. In a similar fashion, average tariff had negative sign; however it was not significant at 10%.

Table 5.2 Estimated Results with HDI

Estimators ⇒ /Variables ↓	Dependent Variable ⇒ <i>Lnhdi</i>									
	<i>OLS</i>	FE	RE	GMM (Syst)	GMM (Syst)	<i>OLS</i>	FE	RE	GMM (Syst)	GMM (Syst)
<i>Lnhdi(-1)</i>				0.0167 (0.886)	0.0898 (0.462)				0.0497 (0.662)	0.0659 (0.580)
<i>Trdgrot</i>	0.0031 ^a (0.002)	0.0005 ^b (0.030)	0.0010 ^b (0.043)	0.0002 ^a (0.007)	0.0001 ^c (0.074)					
<i>Lntrdint</i>	0.0490 (0.135)	0.0414 (0.130)	0.0744 (0.210)	0.0373 (0.282)	0.0469 (0.197)					
<i>Lnapt</i>	-0.0095 (0.647)	-0.0027 (0.837)	-0.0101 (0.451)	0.0116 (0.724)	0.0186 (0.637)	-0.0033 (0.759)	-0.0072 (0.293)	-0.0100 (0.143)	0.0283 (0.373)	0.0309 (0.407)
<i>Lninvest</i>	0.1660 ^a (0.000)	0.0652 ^a (0.000)	0.1334 ^a (0.000)	0.0544 ^b (0.015)	0.0368 ^b (0.014)	0.0861 ^a (0.000)	0.0329 ^a (0.000)	0.0636 ^a (0.000)	0.0719 ^a (0.003)	0.0550 ^b (0.040)
<i>Lnlab</i>	0.1304 ^a (0.000)	0.2896 ^a (0.000)	0.1034 ^a (0.000)	0.5246 ^a (0.000)	0.6260 ^b (0.017)	0.0726 ^a (0.000)	0.1283 ^b (0.030)	0.0506 ^a (0.000)	0.4575 ^a (0.000)	0.5541 ^b (0.017)
<i>Lnexpint</i>						0.0103 (0.286)	0.0355 (0.120)	0.0465 (0.201)	0.0585 (0.160)	0.0568 (0.191)
<i>Constant</i>	-2.3740 ^a (0.000)	-6.6354 ^a (0.000)	-2.2162 (0.000)	-1.0074 ^a (0.000)	-1.1101 ^a (0.070)	-0.2222 ^a (0.000)	-2.2291 ^a (0.000)	-0.1869 (0.120)	-1.4619 ^a (0.000)	-1.4488 ^c (0.091)
<i>Adj. R²/(R²)</i>	0.7672	0.5660	0.5005			0.7626	0.5735	0.5256		
<i>P. Value</i>	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
<i>F-Stat</i>		42.00 (0.000)					54.4500			
<i>Wald Stat.</i>			85.740 (0.000)	87.18 (0.000)	90.70 (0.000)			96.04 (0.000)	91.36 (0.000)	96.84 (0.000)
<i>Hausman Test</i>			26.14 (0.001)					40.98 (0.000)		
<i>Hansen J</i>									0.6071	0.5787
<i>AR(1)</i>									0.000	0.001
<i>AR(2)</i>									0.3976	0.4851
<i>Time effect</i>				No	Yes				No	Yes

Note and Source: Same in Table 5.2

Table 5.2 reports the result using the second indicator of development –human development index. The results appear a bit similar to the previous one as the major determinants were observed to be domestic investment, labour force and real trade growth. However, previous level of HDI was positive but not significant. Both trade and export integration ratios were not significant but real trade growth was significant. The interpretation for this may mean that in the long-run, real rate of Africa's growth in trade has the possibility of impacting on development unlike mere trade integration. This implies that unguided openness to trade does not lead to

development as it has been noted that the argument for protection of infant industry in Africa is far from been over (Ackah and Morrissey, 2010).

6 Conclusion

The debate on development trade and tariff is yet from been over especially in Africa with varying opinions in literature. This motivated the present paper, which examined the nexus between development, trade and tariff for the period 1995-2008. To achieve the objective of the study, data sourced from human development reports, world development indicators, and world trade indicators were analysed using both descriptive and econometric techniques.

The results obtained from the empirical analyses established that regions in Africa that had higher level of domestic investment showed indicators of development. The paper equally found that domestic investment and labour played more significant contribution to development in Africa than both trade and tariff. The challenge in this regards is the fact that increased trade integration in Africa do not significantly lead to enhancement of her development process. Thus, improving domestic investment and enhancing labour productivity will promote development more than trade and tariff. Hence, the paper cautioned against swift trade integration and unguided tariff reduction since they did exert much impact on development over the period studied.

The implication of the above findings is that there is a somewhat challenge of Africa's trade integration measures though having the potentials but such potentials is yet to result in enhancement of development in the continent. Another implication from the result is that domestic investment, labour, real growth in trade are important factors for Africa's development. Thus, the choice before African countries is to enhance domestic investment and harnessing of their labour force in order to improve the level of development. This finding is very crucial given the current era of global economic crisis where commodities prices and global demand of primary products trade by most African countries has nose-dived. Thus, reliance of domestic investment and labour force, which are not so subjected to external shocks, will be a better policy choice more than clamour for trade integration and tariff reduction. Other issues that need to be examined include technology, political stability, and infrastructural provisions.

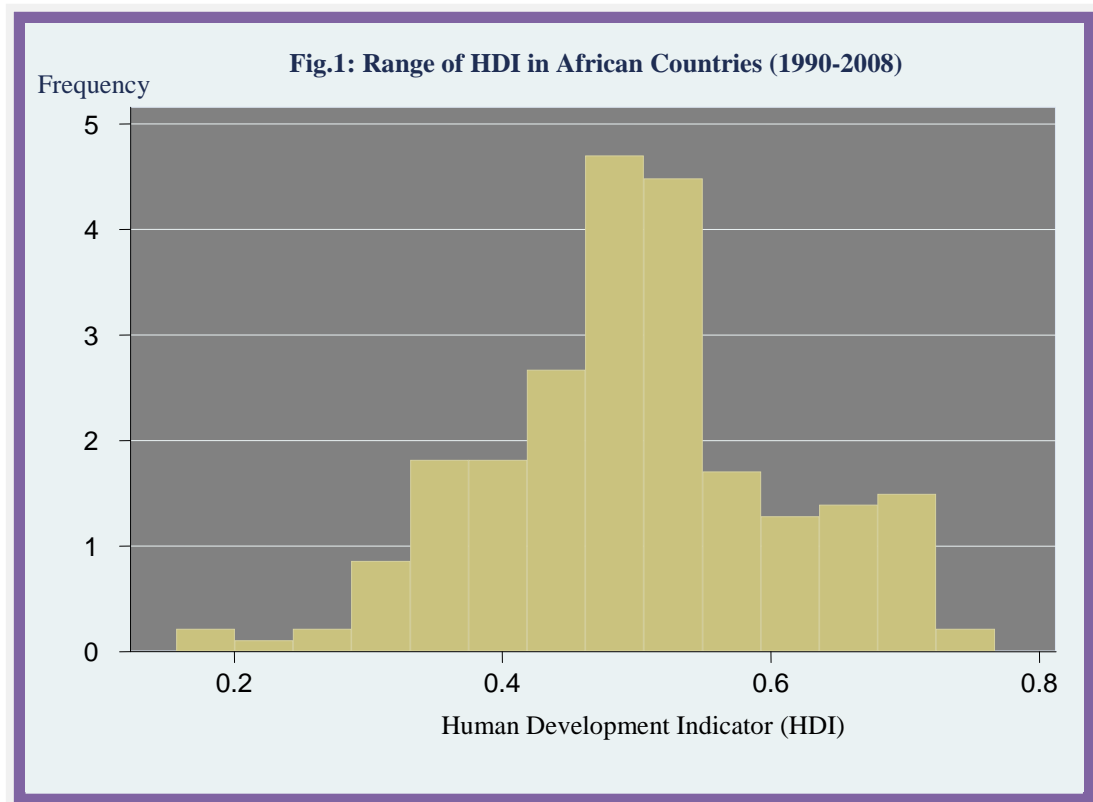
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Appendix



Source: Computed by the authors from data obtained from Human Development Reports-HDR (Various Issues).

Table 2 List of Countries used in the estimation

Central	East	North	Southern	West
Burundi	Comoros	Algeria	Angola	Benin
Cameroon	Djibouti	Egypt	Botswana	Burkina Faso
Central Africa Rep.	Eritrea	Libya	Lesotho	Cape Verde
Chad	Ethiopia	Morocco	Mozambique	Cote d'Ivoire
Congo,DR	Kenya	Tunisia	Namibia	Gambia
Congo, Republic	Madagascar		South Africa	Ghana
Equatorial Guinea	Malawi		Swaziland	Guinea
Gabon	Mauritius		Zambia	Guinea Bissau
Rwanda	Seychelles		Zimbabwe	Mali
	Sudan			Mauritania
	Tanzania			Niger
	Uganda			Nigeria
				Senegal
				Sierra Leone
				Togo

Source: WTO (2009) *International Trade Indicators*