THE EUROPEAN UNION AND USA'S NON – TARIFF BARRIERS AND AFRICA'S EXPORTS: AN IMPACT ANALYSIS

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Abstract

There have been divergent opinions as to what undermine Africa's export flows to the European Union (EU) and United State of America (USA). While tariff barriers had been said to be major hindrances to Africa's exports according to African governments, empirical studies did not support this. However, most of these studies examined only the tax (price) – related trade restrictions without considering the non – tariff barriers (non-price). Besides, conclusions of these studies were based on data that were limited to sub – Saharan Africa. These gaps were filled in this study by evaluating the impact of tariffs and non – tariff barriers in the EU and USA on Africa's exports. The study covered 25 African countries' exports that spread across three sectors, using a gravity model on data from 1990 to 2009, which were obtained from World Integrated Trade Solution. To mitigate potential endogeneity and heteroscedasticity problems the generalized method of moments was used in the analysis. This study finds tariffs were not the cause of Africa's export inability to access these markets, but the incidences of the use of non-tariff barriers, such as standards, sanitary and phytosanitary etc, mostly inhibited Africa's export flows to these markets, such that non-tariff barriers have larger magnitudes and significant in both markets.

Keywords : Non-Tariff Barriers, Exports, Gravity Model

INTRODUCTION

The desire of developing countries, especially African countries to attain economic development through sustainable growth, employment generation and poverty reduction is linked to their interaction and integration to the rest of the world. Integration into global market by the poorer countries offers the opportunity and potential for rapid growth and reduction in poverty (Martinez and Poole, 2004). Recognition and acknowledgment have been accorded to trade as a veritable channel through which countries can interact economically. Generally, trade has been acknowledged by many theorists; especially the orthodox ones, to have been beneficial and countries could gain from their participation. These theorists based their propositions on the

premise that there will be trade flows among participating countries. However, in reality, this is often not the case as there are various trade barriers to some key exports, especially those that developing countries and particularly Africa, has comparative advantage. As a result of these trade policies, Africa in particular, found it difficult to take full advantage of the opportunities embedded in global trade. Among these trade policies that inhibit trade flows among countries are the non-tariff barriers (NTBs). These non-tariff barriers could be used in different forms depending on the wish of the trading country in line with the World Trade Organisation (WTO) requirements. The incidences of non-tariff barriers are said to be on the increase in recent time (Martinez and Poole, 2004; Carrere and De Melo, 2009; Kareem, 2010; World Bank, 2012, etc). However, the frequency of the incidences of these barriers would greatly influence the flow of goods and services to that country.

The theory of comparative cost advantage advises countries to specialise in order to realise gains from trade. Africa's exports during the 1950s and 1960s performed relatively well in terms of the volume and the number of products, while the issue of trade barriers, especially non-tariff barriers to their exports in the markets of their trading partners did not arise. As a result, Africa's comparative strength lay in the production of crude products that in these times attracted fewer restrictions in the developed nations' markets (especially in the markets of the former colonial powers). However, from the 1970s until 2000, most of the countries of Sub-Saharan Africa (SSA) – except for the Republic of South Africa, which faced a politically motivated trade embargo – experienced decades of stagnation. The tightening of internal agricultural policies that subsidised farming in the United States and the expanding European Union undermined Africa's comparative advantage in agricultural products in these regions of the world.

However, the major hindrances to market access of Africa's exports are the trade policies in the continent's trading partners' markets. Specifically, the issue of tariffs and non-tariff barriers has been seen as germane to market access of Africa's exports. Of this, trade policies studies have shown that the magnitude of the impact of tariffs is very minimal due to the fact that most of exports of Africa origin are being granted preferential tariff rate. The main restriction to Africa's exports access to developed and developing countries' markets is the non-tariff barriers. Most of Africa's exports do not meet the required standards set by these countries for any product coming to their markets. This is because Africa does not have the technical wherewithal in terms of advanced technology and sciences to produce products of quality standards that will meet international product standard requirements. The imposition of these market access conditions on exports, especially those that African countries have comparative advantage had hindered the extent to which export sector contribute to overall income growth in the rural areas, stimulate growth in other sectors of the economy through the expansion of

goods and services demanded from these sectors. Also, it has restricted the degree with which earnings on agricultural exports could be used to reduce poverty, hunger, and overall malnutrition levels in the continent.

Studies in the literature modeling the actual distortions to trade due to trade barriers have focused more on the impact of tariff barriers on trade flows between developing and developed countries, i.e. south–north trade with capital and consumer products flowing in one direction and primary products in the other. More so, there are very few studies that have examined the effects of non-tariff barriers on trade flows among these trade partners. Aside this, there are scanty specific studies that determine the impact of non-tariff barriers on Africa's sectoral exports despite the importance of this issue. It is on this backdrop that this study tends to close these gaps by determining the effects of non-tariff barriers in the European Union's (EU) and United States of America's (USA) markets on Africa's exports and to determine the sector that is mostly affected. Thus, it on this basis that this study draws its objective by examining the impact of non-tariff barriers on Africa's exports flow to the EU and USA markets. Specifically, it is to determine these effects at the sectoral level.

The Motivation

Generally, many of the trade policies' studies usually focus on the effects of trade restrictions on developing countries' exports. Some of these studies have their shortcomings in terms of their coverage and methodology. Ianchovichina, Mattoo and Olarreaga (2001) assessed the impact of unrestricted market access on sub-Saharan Africa's exports using a simple partial model that assumed perfect factor mobility between sectors. However, in reality there is no perfect factor mobility and also the study did not consider all Africa's exports.

Yeats (1994) examined the exact worth of trade preferences granted by Organization of Economic Cooperation and Development (OECD) to sub-Sahara African countries without sufficiently considering the effects of NTBs on Africa's exports. The study of Amjadi, Reinke and Yeats (1996) uses a cross sectional analysis to examine whether external barriers cause the marginalization of sub-Saharan Africa in world trade with limited period coverage and provided inadequate justification for the scientific inferences. Also, their study classifies African countries in terms of the preferences granted, but the study's classification is based on exports structure of African countries.

Another similar study is the one carried out by Jabati (2003) where he examined market access issues in agricultural products for developing countries of Africa. The study's methodological and analytical basis was uncertain. Hammouda et al. (2005) evaluated the unrestricted market access for least developed countries in the world including sub-Saharan

Africa. While the data used for simulation was only for 2001, the study cautiously interpreted its results, apart from the observation that post-2001 changes could create the need for an update. Ajakaiye and Oyejide (2005) carried out a study on the ways of removing impediments to African exports. However, this study only examined the supply side of market access. Ogunkola and Oyejide (2001) evaluate the effects of changes in the EU's import policies on Nigeria's exports to EU's markets. They measure the effect of trade restrictions and preference treatment on Nigeria's exports to the EU markets. However, this study is only limited to Nigeria (Importer) and European Union (Markets). Further, this study uses 1992 and 1996 data for the analysis, in which there is need to increase the data points. The market share model that was used could only be applied to analysis of a country's performance in the import market of another country, which makes the analysis to be restricted in coverage. Thus, the model could only distinguish between the two main components of changes in imports over two periods.

Specifically, empirical studies on trade policies (see Mayer and Zignago, 2005; Sanguinetti, Traistaru, and Martincus; 2004; Hammouda et al. 2005; etc) mostly estimated the extent to which developing countries have gained from tariff preferences granted to the continent. Studies modelling the actual distortions to trade due to non-tariff barriers have focused on trade flows mostly between developed and developing (see Shepherd and Wilson, 2010; Dean et al., 2009; Fugazza and Maur, 2006), while only very few of them concentrated on sub-Saharan Africa, which excluded the North African countries.

World Bank (2012) conducted a study on de-fragmenting Africa through deepening of regional integration in goods and services; it examines the issue of trade policies in intra-Africa trade, specifically among the East African Community (EAC). The findings show that while tariff barriers have been reducing within the sub-region, non-tariff barriers (NTBs) are critically inhibiting regional trade. This study covers intra-Africa trade and did not look at Africa's trade with its foreign trade partners, which the present study is focusing. The report of the Pacific Economic Cooperation Council (2000) on non-tariff measures (NTMs) in goods and services trade shows that the effects of NTMs would be based on its definition. While, if it is narrowly defined would not pose much problem, but broadly defined will continue to be a growing problem to trade in the region. A survey was carried out to examine different definitions and scope of NTMs. It discovered that important barriers are the ones that are more difficult to define, such as product standards, conformance assessment procedure, SPS measures, custom procedure, rules of origin, etc. However, the study did not examine the NTMs in terms of their effects on exports.

Dean et al. (2009) estimated the price effects of NTBs for more than 60 countries cutting across 47 consumer products in 2001. They used a cross-sectional data in different products model to capture the imperfect substitutability between products. The model was estimated

using an instrumental variables approach in order to incorporate the endogeneity of NTBs. However, this study was conducted for selected developing countries for a single year and the classification of product was not base on the structure of each country's export. The study considers price effects rather than export effects that this study is considering. The study of Fugazza and Maur (2006) focused on NTBs in a non-tariff World by providing a quantification of the effects of liberalization of NTBs at the global level using data from World Bank and UNCTAD. However, their study mainly focused on methodology questions related to the treatment of NTBs in CGE model with a focus on the GTAP model. The study did not examine the export effects of NTBs. Saqib and Taneja (2005) examined the effects of ASEAN and Sri Lanka's NTBs on India's exports, and discovered that the incidences of NTBs have been increasing. Thus, these NTBs have inhibited India's exports to these trade partners. Although, this study looked at the impact of NTBs on exports, but it does not covers Africa, which my study examines; more so, the survey data collected was analysed using qualitative descriptive analysis.

However, a perusal of the literature shows that scanty studies exit on non-tariff barriers as instruments of trade policy, in which to the best of my knowledge little or none exist on the export effects of non-tariff barriers in Africa, especially at the sectoral level using the incidences of NTBs in the importing countries. It is against this background that this study aims to fill the gaps in the literature by determining the export effects of incidences of NTBs in the EU and USA on African countries.

Non – Tariff Barriers in the EU and USA

The incidences of non-tariff barriers, especially the use of anti-dumping measures by the USA has been declining over time. Anti-dumping investigations initiated and imposed in their domestic economic from 1980 to 1990 were 418, while from 1991 to 2001, they have risen to 492. The use of anti-dumping measures on products to the USA reduced from 35 in 2002 to 26 in 2004 and later dropped to 7 in 2006 (WTO, 2008).

However, by 2007 the anti-dumping investigations and measures have increased to 29 due to USA protection of its economy (see table 1).

Table 1: Anti-dumping Investigations and Measures Imposed, 1980-2007

	1980-90	1991-01	2002	2003	2004	2005	2006	2007
Investigations	418	492	35	36	26	13	7	29
Preliminary injury determinations, affirmative	336	410	15	29	25	9	7	4
Preliminary dumping determination, affirmative, of which	..	..	15	23	25	9	7	4
Provisional measure applied	..	..	12	23	25	9	7	4
Final dumping determinations	283	355	14	20	21	9	5	2
Final injury determinations, of which	183	231	12	16	16	6	2	0
duty order imposed	183	229	12	16	16	6	2	0
Suspension agreements	0	2	1	1	0	0	2	0
Sunset determinations[a]	n.a.	391	11	6	30	65	74	29
Revocations	69	142	7	2	33	21	15	26

Source: WTO (2008) Secretariat based on U.S. Department of Commerce; USITC; and notifications.
Note: .. Not available.   n.a.   Not applicable.
a   Number of AD orders continued or revoked as a result of sunset reviews.
Figures refer to the year in which the investigation was initiated.

Table 2: Countervailing Duty Investigations and Measures Imposed, 1980-2007

	1980-90	1991-01	2002	2003	2004	2005	2006	2007
Investigation	240	89	4	5	3	2	3	5
Preliminary injury determinations, affirmative	210	71	3	2	3	2	3	3
Preliminary countervailing duty determination, affirmative, of which	..	..	3	2	3	2	3	3
provisional measure applied	..	..	3	2	3	2	3	3
Final countervailing duty determinations	176	71	3	2	1	2	0	0
Final injury determinations, of which	..	..	2	2	0	2	0	0
Duty order imposed	107	44	2	2	0	2	0	0
Revocations	83	93	0	0	2	4	11	7

Source: WTO (2008) based on U.S. Department of Commerce, USITC and notifications information.
Note: ..   Not available.   Figures refers to the year in which the investigation was initiated.

The USA imposition of countervailing measures has been declining over the years, which could be seen in table 2. The number of countervailing duty investigations and measures that were imposed on imported products to the USA during the period 1980 to 1990 was 240. However, the period 1991 to 2001 witnessed 89 measures of countervailing. This countervailing measure was just 4 in 2002, dropped to 3 in 2006 and later rose to 5 in 2007.

Table 3 evaluates the incidences of non-tariff barrier measures used in the EU; it shows that between 1995 and 1999, 37 initiations of anti-dumping investigation were carried out in order to protect their domestic economies. However, there was a reduction in the use of anti-dumping investigation in 2001, which dropped to 27 and got to its lowest in 2003 with just 3 investigations. A sudden rise in the anti-dumping initiations to 24 in 2006 was witnessed due to much influx of goods to the EU, which they did not desire for their domestic economies. The definitive measures of the EU was 21 between 1995 and 1999, this figure rose to 40 in 2000 and dropped to its lowest in 2001 with 3 measures, but by 2006, it has risen to 11 definitive measures of the non-tariff barriers in the EU. The countervailing measures of the EU have been at a moderate level over the years. Between the year 2000 and 2006, an average of 2 measures were used to protect their domestic economies from the influx of foreign goods. Further, the use of safeguard measures was at its minimum. The highest of the safeguard initiation was in 2003 and 2005 with only 2 investigations.

Table 3: Contingency Measures Notified by the EU

	Average 1995-99	2000	2001	2002	2003	2004	2005	2006[a]
Anti-Dumping								
Investigations	37	31	27	20	7	29	24	24
Definitive measures	21	40	12	25	3	9	19	11
Countervailing								
Investigations	6	0	6	3	1	0	2	0
Definitive measures	1	11	0	3	2	2	0	0
Safeguards								
Investigations	0	0	0	1	2	1	2	0
Definitive measures	0	0	0	1	0	1	1	0

Source: WTO (2007) Committees on Anti-Dumping Practices, Subsidies and Countervailing Measures, and Safeguards.

Note: a To 30th September 2006.

REVIEW OF THE LITERATURE

Many studies have been carried out to show the extent to which trade restrictions or barriers retard, inhibit, or have slow down the free flow of goods and services among countries. Dean et al. (2009) estimate the price effects of NTBs using city level retail price data to directly estimate

the average impact of core NTBs on prices of 47 consumer products, grouped into four separate sectors, for more than 60 countries in 2001. Both government reported data and private sector complaint data were used to assess NTB incidences. A differentiated products model was used to capture imperfect substitutability between products, which was estimated with an instrumental variables approach in order to incorporate the endogeneity of NTBs. Their findings suggest that the core NTBs are still highly restrictive in many countries and for many traded goods. Also, the results show that in some sectors, the restrictiveness of NTBs is highly correlated with country income.

Fugazza and Maur (2006) examine the quantification of the effects of NTBs' liberalization at the global level using data from UNCTAD and the World Bank. There is significance increase in the dataset used for the model in the study, which is larger than previous studies. They used a 27-sector and 26-region aggregation based on the GTAP 6 database. Basically, the study evaluates the questions relating methodology in the treatment of NTBs in CGE models with special interest on the GTAP model. They found that serious modeling effects remain to be undertaken in order to make CGE modeling a useful policy tool to analyse NTBs. Saqib and Taneja (2005) determine the effects of NTBs in ASEAN and Sri Lanka on India's exports. In order to accomplish the study objective, it measures the incidence of non-tariff measures applicable to India exporters who face NTBs through a survey of exporters. The outcome of the survey shows that the incidence of non-tariff measures on India's exports to ASEAN and Sri Lanka has increased. However, the incidence is higher in Indonesia, Philippines, Malaysia and Thailand than in Singapore, Vietnam and Sri Lanka. At the firm level, most of the barriers were related to the application of measures on technical barriers to trade and sanitary and phytosanitary measures.

Haveman and Thursby (2000) examine the impact of tariff and NTBs to trade in agricultural commodities at disaggregated level, with the exploitation of data that is available at UNCTAD database for 1994 and 1998. They used data at the six-digit Harmonized Tariff System (HS) level that allows for detailed consideration of sectors and barriers. The study covers 20 agricultural and processed food sectors using a model based on the one developed by Haveman, Nair-Reichart and Thursby (1999) that allowed division of the effects of tariffs and the NTBs used into three distinct effects vis a vis, a reduction, compression and diversion effects. They found that NTBs reduction effects are very large and are greater than tariffs reduction effects. The compression effects of NTBs are mixed, but there appears to be more of a compressing effect when the importer is a developing country. There is no evidence of tariff mitigating of NTBs (that is, the cross effects appears to be zero).

Andriamananjara et al. (2004) measure the effects of non-tariff measures on price, trade and welfare using the Computable General Equilibrium (CGE) model. The study constructed a

database of institutional information that identified alleged instances of NTMs for particular products and countries based on WTO, U.S. Government, and EU sources, and compared with the UNCTAD policy inventory. This database is then concorded to a GTAP-feasible multiregion, multisector aggregation. The EIU city database provided the retail price, which was analysed using econometric approach with consideration to the systematic deviations from purchasing-power parity in order to determine the extent to which the presence of alleged NTMs is associated with higher prices. The estimated price effects are then used to calibrate a CGE simulation in order to obtain simulation estimates of trade and welfare effects of their removal, which can be disaggregated. Removal of the categories of NTMs under consideration yields global gains on the order of $90 billion. These gains arise notably from liberalization by Japan and the EU by region, and from liberalization of apparel and machinery/equipment by sector. Gawande and Li (2005) present a theory-based empirical work on the determinants of bilateral non-tariff barriers, using the Grossman – Helpman (GH) (1995) model to develop an econometric model. Their findings raised the same puzzle as previous studies of the unilateral GH model did, that is, the weight given to welfare are exceedingly high and do not appear to be consistent with the high welfare losses created by NTBs.

Furthermore, looking at the effect of market access restrictions and difficulties on developing countries' economies, Mayer and Zignago (2005) developed a method of assessment of market access difficulties with an application to manufactured trade patterns between developing and developed countries. This method also assess the effect of the regional trading arrangements and they applied the micro-founded gravity-type model to estimate the effect of national borders on revealed access to developed markets by developing countries. They concluded that though tariffs still have in general an influence on trade patterns, they are not an important component of market access difficulties faced by developing countries exporters in developed markets. Hammouda et al. (2005) examine unrestricted market access for the least developed countries through the simulations, based on the version 6.0 of the GTAP database. Their results of the expanded unrestricted market for least developed countries in the QUAD markets indicate that unrestricted access to QUAD markets for least developed countries would benefit all of these countries; African countries would gain significantly less than Bangladesh and other South Asian countries; the measure would also lead to a deterioration in the trade balance of Sub-Saharan African countries, as local demand for imports would grow more than exports to the QUAD; also it will lead to a reinforcement of agricultural specialization in this region to the detriment of industrial production; and lastly the extension of unrestricted market access from African countries only to all LDCs does not seem to alter the benefits Africa could draw from it.

Ogunkola and Oyejide (2001) analysed the performance of Nigeria's exports in the EU between 1992 and 1996; and their analysis reveals that the share of Nigeria's exports to the EU has remained very low. The study used market share model and found that there has been increasing market share of Nigeria's exports to the EU. They concluded that external factors alone cannot fully explain the performance of Nigeria's exports in EU market, thus, domestic policies that are consistent with international agreement are required. Hammouda et al. (2005) assessed empirically the impact of eliminating all tariff and non-tariff barriers faced by all exports from Sub-Saharan African to the developed economies of the QUAD, using a global CGE model in its analysis. They found that as a result of unrestricted market access, African exports would increase by US$1.9billion, which are mainly from agricultural exports towards Japan and the European Union. And that due to the supply-side constraints, the growth in exports to the QUAD countries would be associated with a decrease in exports to other markets.

Francois, Hoekman and Manchin (2005) argued that because of the concern that tariff reductions will translate into worsening export performance for the least developed countries, trade preferences have proven a stumbling block to developing countries support for multilateral liberalization. Thus, their study examines the actual scope for preference erosion, including an econometric assessment of the actual utilization and also the scope for erosion estimated by modeling full elimination OECD tariffs and hence full MFN liberalization-based preference erosion. They discovered that preferences are underutilized due to administrative burden that is estimated to be at least 4% on average, which reduces the magnitude of erosion costs significantly. For those products where preferences are used, the primary negative impact follows from erosion of EU preferences. This suggests the erosion problem is primarily bilateral rather than a WTO – based concern.

Pelikan and Brockmeier (2008) empirically assessed the relationship between tariff aggregation and market access in Canada and the EU. They use two approaches, in which the first involves a direct and detail calculation of tariff line level of the summary protection indexes. They simulate the effects of market access liberalization proposed in the WTO draft modality paper of February 2008. The result shows that the direct tariff line approach and the hybrid tariff line CGE approach yield similar results. These indicate that access to Canada's agricultural sector is particular restricted for milk imports from high – income countries. While in contrast, developing countries have particular difficulty accessing the EU's single market where high trade restrictions on beef, sugar and rice are most relevant. However, in the study carried out by Rich, Perry and Kaitibie (2009) to evaluate the effects of market access conditions on Ethiopian beef exports to the Middle Eastern markets. However, the binding constraint is high domestic input costs rather than the costs of SPS compliance. The sensitivity analyses reveal that while investments in feed efficiency and animal productivity would enhance Ethiopia's export

competitiveness, the competitive nature of international beef markets may still prevent market access.

Having perused through the literature, I discovered that there had been little specific study that covers Africa on the issue of the trade policy, especially NTBs that actually hinder Africa's exports to the developed countries' markets. Apart from this, most of the studies in the literature did not cover non-tariff barriers, measures of trade policy, in their empirical analyses in order to determine the impact of these measures on export of any region. Few studies that combine these measures in their analyses constructed indices (like dummy variable) to captured non-tariff barriers instead of the real incidence of its occurrence. While Milgram (2004) tries to determine the effects of supply in conjunction with the market access conditions on EU's clothing import, the study uses 1996 cross sectional data for gravity model analysis for 22 developing countries. Further, related studies in the literature are dated (Kee at al., 2006; which is the closest covers only five years from 2000 to 2004) and need to be updated given a lot of changes that have occurred in the measures of trade policy imposed by the developed countries. Also, in the literature, the estimation of the gravity model were done through ordinary least square panel data estimation technique, however, no consideration was given to the fact that there will be endogeneity and heteroscedascity problems in the model. In addition, none of the studies tends to ascertain the reliability of the panel data so that the estimate thereafter will not be spurious. More so, the panel data that were used in the literature often classify countries based on their level of development (i.e. developing or developed), income group (i.e. low, middle and high), region (i.e. SSA, Middle East and North Africa (MENA), etc) and trade preference (i.e. based tariff preferential arrangement). Therefore, based on the aforementioned identified gaps in the literature, this study contribution to the literature will be by covering Africa in order to examining the effects of NTBs in the EU and USA on African countries' exports. The study will also combine tariffs with the number of the incidence of non-tariff barriers in the empirical analysis. I have extended the data point to twenty years (1990 to 2009) to include different periods of changes in trade policies in these markets. In order to mitigate the problems of endogeneity and heteroscedascity that are associated with least panel data analysis, I have used the generalised method of moment. The classification of countries in this study is based on export structure of the selected countries rather than through the above.

METHODOLOGY

Mayer and Zignago (2005) modeled market access in global and regional trade through a border-effect methodology. The empirical work carried out for this study has modified their work by including regional trade agreements, colonial affiliation and language. The theoretical

framework for this model is derived from the new trade theory above that made provision for economic of scale and imperfect market. Bergstrand (1990) provides a description of the link between gravity equation and bilateral trade patterns in a monopolistic competition framework of the new trade theory.

Tinbergan (1962), Poyhonen (1963) and Linnemann (1966) first applied gravity model to the analysis of global trade flows. The name of the model was derived from its passing similarity to Newtonian physics, which indicates that large economic entities such as countries or cities are said to exert pulling power on people (Migration Model) or their goods (trade models) or capital (FDI model). The simplest form of international trade gravity model assumes that the volume of trade between any two trading partners is an increasing function of their national incomes and populations, and a decreasing function of the distance between them. In the model it is common to use the dummy variables to capture geographical effects (such as signalling whether the two countries share a border, or if a country has access to the sea), cultural and historical similarities (such as if two countries share a language or were linked by past colonial ties), regional integration (such as belonging to a free trade agreement or sharing a common currency), as well as other macroeconomic policy variables (such as biliateral exchange rate volatility). Anderson (1979), Bergstrand (1985) and Helpman and Krugman (1985) have derived gravity equations from trade models based on product differentiation and increasing returns to scale. Linnemann and Verbruggen (1991) have explicitly studied the impact of tariffs on bilateral trade patterns using a gravity model framework. However, it was Estevadeordal and Robertson (2002) that explicitly studied the incorporation of preferential tariff rates in a gravity model.

The Model
The model for this study is adopted from the empirical work of Mayer and Zignago (2005) that modelled market access in global and regional trade through a border-effect methodology. The modification that this study has done to the work of Mayer and Zignago (2005) is by including regional trade agreements, colonial affiliation and language. The theoretical underpinning the gravity type will occur in almost every trade model with full specialization, as shown by Evenett and Keller (2003). The theoretical framework for this model is derived from the new trade theory that made provision for economics of scale and imperfect market. Bergstrand (1990) provides a description of the link between gravity equation and bilateral trade patterns in a monopolistic competition framework of the new trade theory.

Thus, based on all the above, we obtain an estimable equation with respect to Africa's trade relations with its major trade partners from the monopolistic competitive equation of Krugman (1980):

$$In\left(\frac{m_{ij}}{m_{ii}}\right) = -(\sigma-1)[\beta+\eta] + In\left(\frac{\upsilon_j}{\upsilon_i}\right) - \sigma In\left(\frac{P_j}{P_i}\right) - (\sigma-1)In(1+t_{ij}) - (\sigma-1)In(1+ntb_{ij}) - (\sigma-1)\delta$$

$$In\left(\frac{d_{ij}}{d_{ii}}\right) - (\sigma-1)[\theta_1 - \eta_1]RTA_{ij} + \in_{ij}$$

----------- (1)

where $\in_{ij} = (\sigma-1)(e_{ij} - e_{ii})$

$(-(\sigma-1)[\beta+\eta])$ is the constant of equation (1) and it gives the border effect of the international trade for countries that belong to the same group, the South for instance. If the coefficient is positive, then it is trade creation otherwise it is trade diversion. This includes both the level of protection of the importing country (η) and the domestic bias of consumer (β). The coefficient RTA measures the effects that the regional trade agreements have on African exports. This study covered 25 African countries (comprising SSA and North Africa countries) that trade with the EU and USA on products that spread across agricultural, industrial and petroleum sectors from 1990 to 2009[1].

Estimation Techniques

The generalized method of moment was used to estimate the panel data. These methods allow us to estimate our regression equations for the whole of Africa. The reason for the use of panel data technique in the gravity model is based on the several benefits of the technique as identified by Hsiao (1985, 1986), Klevmarken (1989) and Solon (1989). It could be used to control for individual heterogeneity, it provides more informative data, more variability, less collinearity among the chosen variables, more degree of freedom and more efficiency. Also, panel data technique is a better option when one intends to study the dynamics of adjustment and duration of economic states like poverty and employment, and if these panels are long enough, they can shed light on the speed of adjustments to economic policy changes. Panels are necessary for the estimation of inter-temporal relations, life-cycle and intergenerational model and they can easily relate individual's experiences and behaviour at another point in time. They are better able to identify and measure effects that are simply not detectable in cross-section or time-series data, such as in ordinary least square (OLS) method.

The basic class of specification of these models is given as:

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[1] See the appendix for the description of data and their sources as well as the classification of African countries into the sectors.

$$Y_{it} = f(X_{it}, \beta) + \delta_i + \gamma_t + \in_{it}$$ ....(2)

This leading case involves a linear conditional mean specification, so that we have:

$$Y_{it} = \alpha + X_{it}\beta_{it} + \delta_i + \gamma_t + \in_{it}$$ ....(3)

Where Y_{it} stands for the dependent variable, X_{it} is a K – vector of regressors and $\in_{it}$ are the error terms for i = 1, 2, …, M cross-sectional units observed for dated periods t = 1, 2, …, T. The α represents the constant of the model, while the δ_i and γ_t represent the fixed and random effects, respectively. Identification obviously requires that the β coefficients have restrictions placed upon them. They may be divided into sets of common (cross-section and periods), cross-section specific, and period specific regressor parameters.

Prior to estimating our model of African market access, we would expect an inverse relationship between relative price and Africa's exports, due to the problem of imported inflation that might arise in the economies of Africa's trading partners. Relative output is expected to have a direct relationship with Africa's exports, that is, as output increases; there will be more to export. Tariffs and non-tariffs are expected to have inverse relationship with Africa's exports. This means that as more market conditions are imposed on Africa's exports there will be restriction in the access of Africa's exports and if eventually the exports get into the trading partners market, it cannot compete favourably with similar products.

This panel estimation technique will enable us to estimate panel equations using linear or non-linear squares or instrumental variables (system of equations), with correction for the fixed or random effects in both the cross-section and period dimensions and in addition, the generalized method of moment (GMM) will be used to estimate the specification with various system weighting matrices. It should be noted that apart from the above basis for panel data analysis, panel equations allow us to specify equations in general form and also permits specification of non-linear coefficients mean equations with additive effects. Panel equations do not automatically allow for β coefficients that vary across-sections or period, but one may create interaction variables that permit such variation.

RESEARCH FINDINGS

In presenting the empirical results of this study, it is important to note that the gravity model does not estimate welfare effects (see Piermartini, 2006). The estimates of the panel-gravity models are done through generalized method of moments (GMM). I have decided to estimate the random effect due to the fact that the models for this study are gravity models that have

dummy variables of which fixed effect estimator will be inappropriate. According to Baltagi (2001) and Greene (2003), fixed effect also known as least squares dummy variables (LSDV) suffers from a large loss of degree of freedom, in which when it involves estimating (N – 1) extra parameters and too many dummy variables, aggravates the problem of multicollinearity among the regressors. Also, the fixed effect estimator cannot estimate the effect of any time-invariant variable like sex, race, language, religious, colonial links, schooling etc because they will be wiped out by the Q transformation, the deviations from means transformation. Thus, they concluded that any regression attempting to use this estimator will fail. It is on this basis that in this study we have used the random effect estimator.

Industrial

The results show that the industrial sector's output in Africa is directly related to the sector's import in the EU and US. This means that importers in both markets will increase their import of industrial products from Africa as the industrial output tends to rise. This result is statistically significant for the two markets, which means that relative output of Africa's industrial sector is highly vital and relevant to the extent to which the sector's import will be demanded. That is, for every 100% decline in industrial output in Africa, there will be over 10% and about 19% fall in imports the US and EU markets, respectively. Further, it could be seen from this result that the EU imports will be more depleted than the US, which means that in terms of supply response of Africa's industrial products, the EU will be more affected by the decline in the supply of the products than the US. This could be seen from the magnitude of their relative outputs coefficients. This result confirms the findings of Mayer and Zignago (2005).

The relative prices were inversely related to industrial imports in both markets, which indicates that higher price of Africa's industrial products/exports will be met with reduction in the sector's import. However, theoretically, we expect such relationship between price and demand for import of the industrial sector. The result shows that for every 100% rise in Africa's industrial sector's exports prices, there will be 0.004% and 0.0003% drop in the demand for the sector's import in the US and EU, respectively. Though, this result is statistically significant in the US, but not in the EU.

The trade agreements that Africa had with the US and EU has contributed positively to the industrial sector import in these two markets. The trade agreements were significant to Africa's industrial sector's import to these markets, such that for every additional trade agreements made, there will be 0.13% and 0.03% rise in the US and EU imports of Africa's industrial products to their markets, respectively. However, it should be noted that the trade

agreements that Africa had with the US contributed more to the continent's industrial products access to the US market than the EU market.

Table 4: Generalized Method Moment (GMM) Random Effect Result

Variable	INDUSTRIAL		AGRICULTURE		PETROLEUM	
	USA	EU	USA	EU	USA	EU
Constant	-3.48E-06 (0.29)	4.03E-05 (0.72)	9.89E-06 (0.46)	0.0008 (0.00)[a]	9.62E-05 (0.00)[a]	0.00008 (0.02)[b]
Routput	0.1038 (0.00)[a]	0.1891 (0.00)[a]	0.0249 (0.00)[a]	0.1796 (0.00)[a]	0.0236 (0.00)[a]	0.1431 (0.00)[a]
Rprice	4.06E-05 (0.03)[b]	-3.19E-06 (0.73)	-2.62E-06 (0.25)	-2.80E-05 (0.03)[b]	1.24E-05 (0.00)[a]	-3.67E-05 (0.03)[b]
RTA	0.0013 (0.00)[a]	0.0003 (0.00)[a]	-6.98E-05 (0.00)[a]	-0.0002 (0.25)	-8.32E-05 (0.07)[c]	-0.0003 (0.45)
Pretarr	-0.0032 (0.00)[a]	-0.0041 (0.01)[a]	-0.0047 (0.05)[b]	-0.0051 (0.00)[a]	-0.0063 (0.02)[b]	-0.0024 (0.00)[a]
NTB	-0.0705 (0.02)[b]	-0.0491 (0.01)[a]	-0.0705 (0.00)[a]	-0.0405 (0.00)[a]	-0.0650 (0.05)[b]	-0.0506 (0.00)[a]
Distance	-1.07E-05 (0.00)[a]	-5.83E-06 (0.00)[a]	5.31E-06 (0.00)[a]	-9.57E-08 (0.00)[a]	3.75E-07 (0.35)	-8.07E-06 (0.03)[b]
R2	0.41	0.63	0.73	0.38	0.66	0.53
Std. Error	0.0003	0.0003	3.79E-05	0.0005	7.59E-05	0.0005
J.Statistic	248.37	304.05	290.91	146.10	94.2450	59.80

Source: Computed

Note: The figures in parentheses are the probabilities of the t-statistic. The superscripts a, b and c indicate 1%, 5% and 10% level of significant, respectively.

Tariffs, measures of trade policy, have the theoretically required signs for the two markets. That is, there were inverse relationships between tariffs imposition and industrial imports in both markets, which means that as more preferential tariffs are granted in both markets, there are increase in Africa's industrial products import. In the US, the result shows that for every 100% reduction in tariffs on Africa's industrial imports, there will be a significant rise in the import of these products to the tune of 0.3%, while in the EU, though the industrial imports will be increased by 0.4% as a result of 100% reduction in tariffs, but this increase in import is greater than that of the US. This means that Africa's industrial sector's products will gain more access in the EU should there be reduction in tariff rates on these products than in the US.

The non-tariff barriers (NTBs), which is this study's focus variable, also indicate that it has inverse relationship with the industrial sector's import from Africa by the US and EU. The implication of this is that, any incidence of NTB on the Africa's industrial sector's imports in both markets will serve as hindrances to Africa's export of industrial products and at the same time, show the extent to which these markets protect their domestic economies from foreign products invasion. Thus, for every additional incidence of NTB, there will be 7% and about 5% reduction in the US and EU imports of Africa's industrial products, respectively. It should be noted that the magnitudes of the reduction in the industrial sector's imports in these markets due to the use of NTBs are far higher than that of tariffs.

Distance has an inverse relationship with industrial products imports to the US and EU. That is, the more the distance between Africa and these trading partners, the lower the imports of Africa's industrial products to these markets. This indicates that higher trade costs of which distance measures inhibit the flow of Africa's industrial products export to these markets. This result is expected theoretically and it is statistically significant.

Agriculture

The result of the agricultural sector indicates that relative output has a positive relationship with agricultural sector's import in both the US and EU markets. This means that as the output of agricultural products in Africa increases, there will be rise in the US and EU import of these products, such that for every 100% increase in agricultural sector's output, there will be about 2.5% and 1.8% rise in the US and EU imports, respectively. The implication of this is that if African could increase its productivity in the agricultural sector, there are markets for the output such that there will be more market access for these products in these two markets. This result shows that relative output is significantly related to Africa's industrial imports in the US and EU.

In terms of the degree of association between relative price and import of agricultural products of Africa in the US and EU, the result shows that there are inverse relationships, which means that prices of agricultural products imports to these markets are indirectly related to their imports. That is, if the prices are reduced, then agricultural products from Africa will gain more access to these markets, such that if the prices are reduce by 100%, there will be 0.0002% and 0.003% rise in agricultural products import in the US and EU, respectively. The relative price is statistically significant in the EU models, while it is insignificant in the US model.

Africa's trade agreements with the US and EU have not contributed to additional market access of African's agricultural products in the US and EU markets. In other words, the trade agreements that Africa had with the US and EU did not impacted positive to Africa's agricultural products access to the markets of these trading partners. The implication of this is that there are

some levels of non-compliance with these agreements, which has made the agreements ineffectively implemented and thereby could not facilitate enhanced market access to Africa's export of agricultural products to the US and EU.

The preferential tariff rates on agricultural products in the US and EU enhances agricultural products access to the two markets. This indicates that tariff impositions could either act as hindrance or enhancement to Africa's agricultural products access to these markets depending on the direction of the imposition. Given this, it means that an inverse relationship exists between tariffs and agricultural products imports. This is in the sense that for every 100% rise in the preferential tariffs, there will be 0.04% and 0.05% increase in the US and EU imports of agricultural products, respectively. The result as presented indicates that Africa's agricultural products responded more to the reduction in tariffs through the preferential tariffs granted in the EU than in the US. The implication of the result is that, preferential tariffs on agricultural products enhances the products market access, however US market stands out to be more restrictive than the EU.

The non-tariff barriers also present an inverse relationship with agricultural imports to the US and EU. The result shows that agricultural products from Africa are very sensitive to the various incidences of NTBs in the US and EU, such that if there are increases in the incidences of NTBs, for example, countervailing, standards, SPS etc., agricultural products from Africa cannot stand the test of these measures of NTBs and thereby the products will be restricted from gaining access to these markets. The implication of this is that, African agricultural products standard and qualities need to be enhanced in order to facilitate the products' access to these markets. For instance, any additional incidence of NTBs will lead to about 7% and 4% reduction in Africa's agricultural products imports from the US and EU, respectively. This means that NTBs are more trade restrictive than tariffs in both markets.

Distance, a measure of trade cost, is inversely related to Africa's agricultural import to the EU. This means that the more the distance between Africa and the EU, the lower the amount of agricultural imports from Africa that get to the EU. This degree of association is statistically significant. However, in the trade relation between African and the US, distance is not a barrier to trade as it has a direct relationship with the level of agricultural products imports to the US. That is, trade cost that is incurred in the cause of exporting Africa's agricultural product to the US does not inhibit the flow of these products to their market.

Petroleum

Analysis of results under the petroleum sector indicate that relative output has the expected sign of a positive relationship with the sector's import in the US and EU. This suggest that as petroleum output increases there will be more access of the output in the markets of both the

US and EU, such that for every 100% rise in petroleum output there will be over 2.3% and 14% increase in the US and EU imports, respectively. This result shows that the EU imports more of African petroleum products than the US and it confirms the a priori expectation of the study.

Relative price of petroleum products from Africa is inversely related to the EU import of the products, which means that as the petroleum products prices rise in the EU market, there will be drop in the consumption of petroleum products by the consumers. This result shows that the EU has an alternative source of energy that is different from petroleum product with which they could easily shift to if there is a rise in petroleum products prices. Thus, for every 100% rise in Africa's petroleum products prices, there will be 0.004% drop in the EU import of the products. However, this could not be said of the US import of petroleum products because Africa's petroleum prices were directly related to the US import of the products. This means that the more the prices of the products, the higher US import of petroleum products, such that for every 100% rise in the prices there will be 0.001% increase in their import. The implication of this result is that the US has not found an appropriate substitute to petroleum products.

The trade agreements that Africa had with the US and EU have nothing to do with Africa's petroleum products export to the markets, such that the agreements did not contribute to improve market access of Africa's petroleum products import to these markets and it is due to the influence of Organisation of Petroleum Exporting Country on all its members. This could be seen from the sign of the coefficient of trade agreements in both the US and EU model estimates. Though, the coefficients are statistically insignificant for the two markets. The implication of this result is that petroleum sector has been vital such that irrespective of the trade agreements between Africa and her trading partners, the sector's output will be needed by many markets all over the world.

Tariffs, measure of market access conditions, were inversely related to Africa's petroleum products import to the US and EU. This shows that an increase in the rate of preferential tariffs in these markets will lead to a rise in the level of importation of Africa's petroleum products. Put differently, if the governments of the US and EU decided to raise revenue and protect their economies through imposition of higher tariffs on petroleum products from Africa, it would lead to a reduction in petroleum products import. Thus, for every 100% rise in preferential tariff rates, there will be 0.6% and 0.2% increase in the US and EU imports of petroleum products. The effect of tariffs on petroleum products is very minimal in the US compared to that of the EU.

The non-tariff barriers, another measure of market access condition have inverse relationship with petroleum products imports in the US and EU. This means that whenever there

is increase in the incidence of NTBs in economies of these trading partners, there will be reduction in Africa's petroleum products imports due to the fact that most of these petroleum products might not be able to pass the test of these incidences of NTBs. However, if at all the products pass the standard and other tests; they will not be able to scale through the safeguard measures if used. Thus, for every 100% increase in the incidence of NTBs, there will be 6.5% and 5% decrease in the US and EU imports of Africa's petroleum products, respectively. From this result, it could be seen that the effect of incidence(s) of NTBs on Africa's petroleum products is more felt in the EU than in the US.

Distance, a measure of trade costs shows that it has positive relationship with Africa's petroleum products import to the US. That is, in Africa trade relation with the US, distance did not act as hindrance or a barrier to the flow of Africa's petroleum sector's products to the US, though, it is statistical insignificant. However, distance inhibit the free flow of Africa's petroleum products to the EU, such that for any additional trade cost incurred in the cause of exporting to the EU, there will be a significant 0.0008% reduction in the EU import. The implication of this result is that trade cost as measured by the distance must be considered before embarking on the export of petroleum products to the EU markets, though the magnitude indicates that it is negligible. This also indicates that, Africa's petroleum products that will be exported to countries in the EU that are far from Africa will be small compared to those countries that are close to the continent.

CONCLUSION AND RECOMMENDATIONS

This study has determined the effects of non-tariff barriers on Africa's exports. The results of the sectoral analyses show that the inadequate output of the industrial product had reduced the level of African exports to the EU and USA, while an increase in the price of African industrial products will reduce the consumption of these products and therefore, the export of the products will decline. The trade agreements between Africa and these trade partners had contributed positively to the access of industrial products to these markets. Preferential tariffs granted to African countries had enhanced the flow of African industrial products to these markets. While the incidences of non-tariff barriers that were imposed by these trade partners tend to reduce African industrial products access to these markets. The distance, which is a measure of trade cost, serves as a barrier to the trade between Africa and the EU as well as the USA.

In terms of agricultural sector, the results show that the low supply response (output) of African countries had led to the decline in market access of the products to the EU and USA. The high prices of agricultural products due to high cost of production from the inefficient production processes led to the decline in the consumption of these products. Most of the agreements on trade between these trade partners were not fulfilled and this had made the

agreements to have little impact on African agricultural products' access to the EU and USA. Preferential agricultural tariffs granted to African countries tend to accelerate market access of these products to the EU and USA, while the rise in the incidences of non-tariff barrier measures often decrease restrict agricultural exports flow to these trade partners. Trade cost, measured by distance, did not restrict African agricultural exports to the USA, but it did for the EU.

In the petroleum sector analysis, the increased supply response of petroleum products tends to enhance or improve market access of the products in both markets. The increase in the prices of petroleum products did not reduce the demand of these products in the USA; this is because of the importance and necessity of the products to the consumers in this country. However, in the EU, any rise in this products prices will reduce the consumption of the products and therefore, the export of the products will fall. The results also indicate that trade agreements did not contribute to the flow of petroleum products in these two markets. This means that the supply of these products go beyond these agreements, but, are determined by the Organisation of Petroleum Exporting Countries (OPEC). The reductions in tariffs through preferential tariffs are propelling factors that accelerate the export of petroleum products to these markets. However, the incidences of non-tariff barrier measures would restrict the flow of these products to the EU and USA. Trade costs as measured by the distance between Africa and these trade partners, indicate that in the EU, distance is an inhibiting factor. While in the USA, distance did not restrict export of African countries.

Thus, this study concludes that African exports have not been gaining access to both the EU and USA markets not because of the tariffs imposed on these products, but as a result of the various non-tariff barriers imposed. Also, these NTBs retarded Africa's export supply such that the continent cannot meet up with the demand for her exports at these trade partners' markets. The trade agreements could be used to propel Africa's exports in all products except petroleum products, this is because export of these products goes beyond trade agreements and it involved Organisation of Petroleum Exporting Countries (OPEC) quota arrangements. However, descriptively, the study concludes that products of relevance to African countries are confronted with higher NTBs in the EU than USA. In addition, tariffs are not the main hindrances to Africa's access to the EU and USA since the continent enjoys preferential tariff rates, rather, it is the non-tariff barrier measures used by these countries that inhibit the continent's exports.

REFERENCE

Anderson, J.E. (1979), A Theoretical Foundation for the Gravity Equation, American Economic Review, Vol. 69.

Andrianmananjara, S., Dean, J.M., Feinberg, R., Ferrantino, M., Ludema, R. And Tsigas. M. (2004), The Effects of Non-Tariff Measures on Prices, Trade and Welfare: CGE Implementation of Policy-Based Price Comparisons, USITC Economics Working Paper, No. 2004-04.A

Baltagi, B.H., (2001), Econometric Analysis of Panel Data, 2nd Edition, West Sussex, John Wiley & Son.

Bergstrand, J.H (1985), The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence, Review of Economic and Statistic, vol. 67, pp.34 -78.

Bergstrand, J.H. (1990), The Heckscher – Ohlin – Samuelson Model, the Linder Hypothesis, and the Determinants of Bilateral Intra – Industry Trade, Economic Journal, December, vol.100, pp.1219 -1229.

Carrere, C., De Melo, J. and Tumurchudur, B. (2009), Disentangling Market Access Effects of Preferential Trading Arrangements with an Application for ASEAN Members under an ASEAN – EU FTA, The World Economy, 10.1111/j.1467 – 9701.

Dean, J.M, Feinberg, R., Signoret, J.E., Ferrantino, M. And Ludema, R. (2009), Estimating the Price Effects of Non-Tariff Barriers, Office of Economics Working Paper, U.S. International Trade Commission, No. 2006-06-A(r).

Estevadeordal, A. and Robertson, R. (2002), From Distant Partners to close Neighbours, The FTAA and the pattern of trade, Integration, Trade & Hemispheric issues Division, Inter-American Development Bank.

Evenett, S. and Keller, W. (2003), On Theories Explaining the Success of the Gravity Equation, Journal of Political Economy, vol. 110, No. 281-316.

Francois, J., Hoekman, B. and Manchin, M. (2005), Preference Erosion and Multilateral Trade Liberalization, Institute for International Integration Studies Discussion Paper, No.87, August.

Fugazza, M. and Maur, J. (2006), Non-Tariff Barriers in a Non-Tariff World, Conference Proceedings of the Ninth GTAP Annual Conference on Global Economic Analysis, Addis Ababa.

Gawande, K. and Li, H. (2005), Trade Barriers as Bargaining Outcomes, The World Economy, vol. 29 (4), pp. 437-57.

Greene, W.H., (2003), Econometric Analysis, Third Edition, New Jersey, Prentice Hall.

Grossman, G. and Helpman, E. (1995), The Politics of Free – Trade Agreements, American Economic Review, pp.667 – 90, September.

Hammouda, H.B., Karingi, S., and Perez, R. (2005), Unrestricted Market Access for Sub-Saharan African: Important Benefits with Little Cost to the QUAD, UNECA ATPC Work in Progress, No. 11.

Haveman, J. And Thursby, J.G. (2000), The Impact of Tariff and Non-Tariff Barriers to Trade in Agricultural Commodities: A Disaggregated Approach, Purdue CIBER Working Paper, Paper 143.

Haveman, J., Nair-Reichert, U. And Thursby, J.G. (1999), Trade Reduction, Diversion and Compression: Empirical Regularization in the Effects of Protective Measures, Working Paper, Purdue University.

Helpman, E. and Krugman, P. (1985), Market Structure and Foreign Trade, Cambridge, MA: MIT Press.

Hsiao, C. (1985), Benefits and Limitations of Panel Data, Econometric Review, Taylor and Francis Journals, vol.4(1), pp 121-74.

Hsiao, C. (1986), Reply, Econometric Review, Taylor and Francis Journals, vol.4(1), pp 187-89.

Ianchovichina, E., Matoo, A. and Olarreaga, M. (2001), Unrestricted Market Access for sub-Saharan Africa: How Much is it worth and who Pays? Journal of African Economies, vol.10, no.4, pp.410-32.

Jabati, M.C. (2003), Market Access for Developing Countries of Africa: The Reality, AGSF Occasional Paper No.1, United Nations Food and Agriculture Organisation. Rome.

Kareem, O.I. (2010), The Effects of Market Access Conditions on Africa's Exports, An Unpublished Thesis Submitted to the Faculty of The Social Sciences, University of Ibadan, Ibadan, Nigeria.

Kee, H.L., Nicita, A. and Olarreaga, A. (2006), Estimating Trade Restrictiveness Indices, World Bank Policy Research Working Paper 3840, February.

Klevmarken, N.A. (1989), Introduction, European Economic Review, Elsevier, vol.33(2-3), pp523-29.

Krugman, P.R. (1980), Scale Economies, Product Differentiation, and the Pattern of Trade, American Economic Review, pp 950-59.

Linnemann, H. (1966), An Econometric Study of International Trade Flows, Amsterdam, North-Holland.

Linnemann, H. and Verbruggen, H. (1991), GSTP Tariff Reduction and its effects on South-South Trade in Manufactures, World Development, vol.19.

Martinez, G. M. and N., Poole (2004), The development of private fresh produce safety standards: implications for developing Mediterranean exporting countries, Food Policy, 29 (3). pp. 229-255.

Mayer, T. and Zignago, S. (2005), Market Access in Global and Regional Trade, CEP II Working Paper, No. 2005-02.

Milgram, J. (2004), Quantitative Restrictiveness on Clothing Imports: Impact and Determinants of the Common Trade Policy Towards Developing Countries, Funacion Centro de Estudies Andaluces, Documento de Trabajo, Series Economia E2003/04.

Ogunkola, E.O., and Oyejide, T.A. (2001), Market Access for Nigeria's Exports in the European Union: An Assessment of the Impact of the Lome Convention and the Uruguay Round, Nigerian Journal of Economic and Social Studies, Vol. 43, No. 1.

Pacific Economic Cooperation Council (2000), Non-Tariff Measures in Goods and Services, A report of the Pacific Economic Cooperation Council, 2000.

Pelikan, J. and Brockmeier, M. (2008), Tariff Aggregation and Market Access: An Empirical Assessment for Canada and the EU, Canadian Journal of Agricultural Economics, vol. 56, pp.413 – 27.

Piermartini, R. (2006), Trade Liberalization and Growth: Market Access Advantage, Discussion Paper Series in Economics and Econometrics, 0007, Economics Division, School of Social Sciences, University of Southampton.

Poyhonen, P. (1963), A Tentative Model for the Volume of Trade Between Countries, Weltwirtschaftliches Archive, vol.90, pp.93-100.

Rich, K.M., Perry, B.D. and Katibie, S. (2009), Commodity – Based Trade and Market Access for Developing Contry Livestock Products: The Case of Beef Exports from Ethiopia, International Food and Agribusiness Management Review, Vol.12, issue 3.

Sanguinetti, P., Traistaru, I. and Martincus, C. (2004), The Impact of South-South Preferential Trade Agreements on Industrial Development: An Empirical Test, A Paper Presented at the 3rd Workshop of the Regional Integration Network (RIN), Punta del Este2004.

Saqib, M. and Taneja, N. (2005), Non-Tariff Barriers and India's Exports: The Case of ASEAN and SRI LANKA, ICRIER Working Paper, No.165.

Shepherd, B. And Wilson, N. L. (2000), Product Standards and Developing Country Agricultural Exports: The Case of the European Union, Working Paper, 2010.

Solon, G. (1989), The Value of Panel Data in economic Research, in Daniel K., Greg D., Graham K., and M.P., Singh (eds.), Panel Survey, pp 486-96, New York: Wiley,

Tinbergen, J, (1962), Shaping the World Economy Suggestions for an International Economic Policy, the Twentieth Century Fund.

World Bank (2012), De-Fragmenting Africa: Deepening Regional Trade Integration in Goods and Services, Publisher, The World Bank, NW, Washington D.C.

World Trade Organisation (2008), Trade Policy Review: The United States of America, WT/TPR/200, pp.23-149.

Yeats, A. (1994), What Are OECD Preferences Worth to Sub-Saharan Africa? World Bank Policy Research Working Paper 1254.

APPENDIX

Data Description, Data Sources and Classification of Countries

This section presents the definitions of all the variables used in the empirical analysis in this study. The type of data and their sources were also presented, while classification of countries that is based on export structure of countries was shown here.

Table A: Variable Description and Sources

Variable	Description	Source
P_j/P_i = Ratio of Prices (Rprices)	This is the ratio of prices between the selected African countries and her trading partners (measured by CPI and also known as relative prices). j = selected African countries, while i = EU, USA.	IFS
V_j/V_i = Ratio of Outputs (Routputs)	The ratio of output/production between African countries and the selected trade partners (Measured by their GDP and this stands for the supply).	IFS
dis = distance	The distance from the capital of í (trade partners) to the capital of j (selected African countries). This is a measure of transport cost.	www.timeanddate.com
t_{ij} = Tariffs	Average of preferential tariff rates	UNCTAD/WTO/World Bank (WITS)
NTB = Non-tariff barriers	Non-tariff barriers measured by the incidence of non-tariff measures[2] in the EU and USA that is used to distort trade.	WTO
RTA = regional Trade Agreements	Regional trade agreement is given one when both partners belong to this arrangement, otherwise zero. For Africa-EU trade agreement I have used the Lome IV agreements, which later extended to Cotonou Partnership Agreement (CPA)	Dummy
M_{ij}/M_{ii} = Ratio of Imports (Rimports)	This is the ratio of imports between the selected African countries and her trading partners.	IMF DOT

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[2] The use of this measure to capture non-tariff barriers is appropriate because it is a non-price measure for which non-tariff measures are known. Thus, any attempt to use a tariff equivalent to capture non-tariff measures will turn it to a price measure and will not be appropriate to capture non-tariff measure (see Kee et al., 2006).