Restrictive Trade Policies as Hurdle to Pass for Africa: Evidence from the European Union's Sanitary and Phytosanitary Measures

Olayinka Idowu Kareem
Jean Monnet Postdoctoral Fellow
Global Economics – GGP
Robert Schuman Centre for Advanced Studies
European University Institute
Florence, Italy.
Olayinka.kareem@EUI.eu

1.Introduction

The developmental aspiration of developing countries, especially African countries to achieve sustainable growth and poverty reduction is linked in part 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). It is widely recognised that trade serves as a veritable channel with which countries can interact or relate economically. Global 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/between 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 found it difficult to take full advantage of the opportunities embedded in global trade.

Recent evidence has shown that there is gradual and continuous collapsing of tariffs in global trade due to the bilateral, regional and multilateral trade negotiations and agreements have brought into fore the relevance and the preponderance of the use of non-tariff measure (NTMs) in regulating international trade (Fugazza, 2013; WTO, 2012). In terms of the broad type of NTMs, Gourdon and Nicita (2013) present a frequency index, which shows that among these NTMs, technical measures are often the most use. The technical barriers to trade (TBT) such as technical regulations and standards (Sanitary and Phytosanitary measures (SPS)) stand out among other NTMs because of its ability to be used for trade protectionism and/or the enhancement of the flow of trade through quality products that meet the changing taste and preferences of consumers. To many least developed countries (LDC) and developing countries, technical barriers to trade, especially standard requirements[1] (SPS) are trade restrictive such that it's added to the series of costs faced by their exporters, particularly in the developed markets. These NTMs can almost double the trade barriers effects imposed by tariffs for some products (Moise and Le Bris, 2013).

Further, Fugazza (2013) posits that the increasing incidences of TBT and Sanitary and Phytosanitary measures pose concern for developing countries' exports, particularly the TBT that is mostly used. An average of about 30% of products and trade are confronted with TBT, while that of SPS is 15% of trade in countries, especially the developed ones (Fugazza, 2013). This has implication for developing countries' export earnings, income and in turns their quest for sustainable development through reduction in poverty, unemployment and smallholder producers' inclusively in the trajectory of development. This quest for

[1] The type of standards is public standards, which is mandatory and different from the private standards that voluntary.

sustainable development among other factors is the reason for Africa's continuous global integration, especially through trade relations. Kaplinsky (2008) has identified trade among other channels[2] with which countries could integrate into the global market. Trade channel of global integration has been explore by African countries, however, the gains from trade as advocated by orthodox trade theories has not been fully realized due to the quality of the exports, export base and their development stages as well as the protectionism nature of TBT.

Many African governments and some scholars (see Cheminitz, Grethe and Kleinwechter, 2007; Otski, Wilson and Sewadeh, 2001) opine that standards are trade restrictive as being used, however, there are some studies such as Henson and Humphrey (2008), Maertens and Swinnen (2009) that have concluded that these technical regulations due to increasing demand for quality products, change in taste and preferences of consumers in importing countries, especially in developed markets, would enable producers/exporters to engage in product upgrading that will enhance market access of the products. Although, in the short run, the producers/exporters might incur some compliance costs, but in the long run, these costs will stabilize and thereby enhance their exports to these markets. In reality, there are many standard requirements before a product could access any given market. Most of the studies in this area often used single standard requirement, for instance Liu and Yue (2011) used the Hazard Analysis Critical Control Point (HACCP) on EU orange trade, Otsuki, Wilson and Sewadesh (2001) quantified the impact of EU aflatoxins on African exports of cereals, dried fruits and nuts, Jun Yang and Findlay (2008) investigates the effects of the maximum residue limit (MRL) standards on China's exports of vegetables (Chlorpyrifos MRL) and aquatic products (Oxytetracycline MRL), Wei, Huang and Yang (2012) used MRL of pesticides on China's tea export, Xiong and Beghin (2011) used the tightening of the EU maximum residue limit (MRL) on aflatoxins in 2002 on Africa's export of groundnut, etc. However, this study departs from these previous studies by considering all the applicable standard requirements for the selected products. Also, the use of mostly unexplored Perinom standards data in the two-stage Helpman, et al. (2008) model, are very scare in the literature, especially those with African trade data. The product safety requirements for the selected exported products are called in this study 'hurdles to pass' (HTP) for such products prior to accessing the EU market. Although, in every product, certain standard requirement might be dominant[3] among these requirements, but all the requirements must be complied with before accessing the market. To this end, this study inquires the following; do the EU standard requirements enhance Africa's exports? What are the standards required for agriculture exports in the EU? Is there any border rejection or refusal in this market for Africa's agriculture exports? Thus, from these research questions, this study draws its objective, which is to investigate the impact of EU standard requirements (hurdles to pass before market access) on Africa's exports.

2. The Research Background

The quality of export products will determine whether market access will be allowed or not, especially those in conformity with the directives and regulations of the authority. The EU has its directives and regulations on standards from every product line at all levels of product classifications, such that any non-compliance will be meant with border refusal.

2.1 EU Standard Requirements: Hurdles to Pass for Selected Products

An evaluation of the 'hurdles to pass' (HTP) in the EU market for all product lines, especially foods and feeds indicates that more than one hurdle (standard requirement) needs to be passed or is place on a product before accessing the EU market. In this study, I have examined the HTP for 4 selected products. Table 1 presents different HTP for these products as prerequisite for market access to the EU market. Fish and fishery products have 10 HTP that are always examined before these products could access the market, in which every standard requirement is as important as others. Fruits and vegetables have 11 HTP

[2] Other channels are investment, migration, finance, global governance and environment.

[3] For instance, aflatoxin in groundnut, cereal and other products.

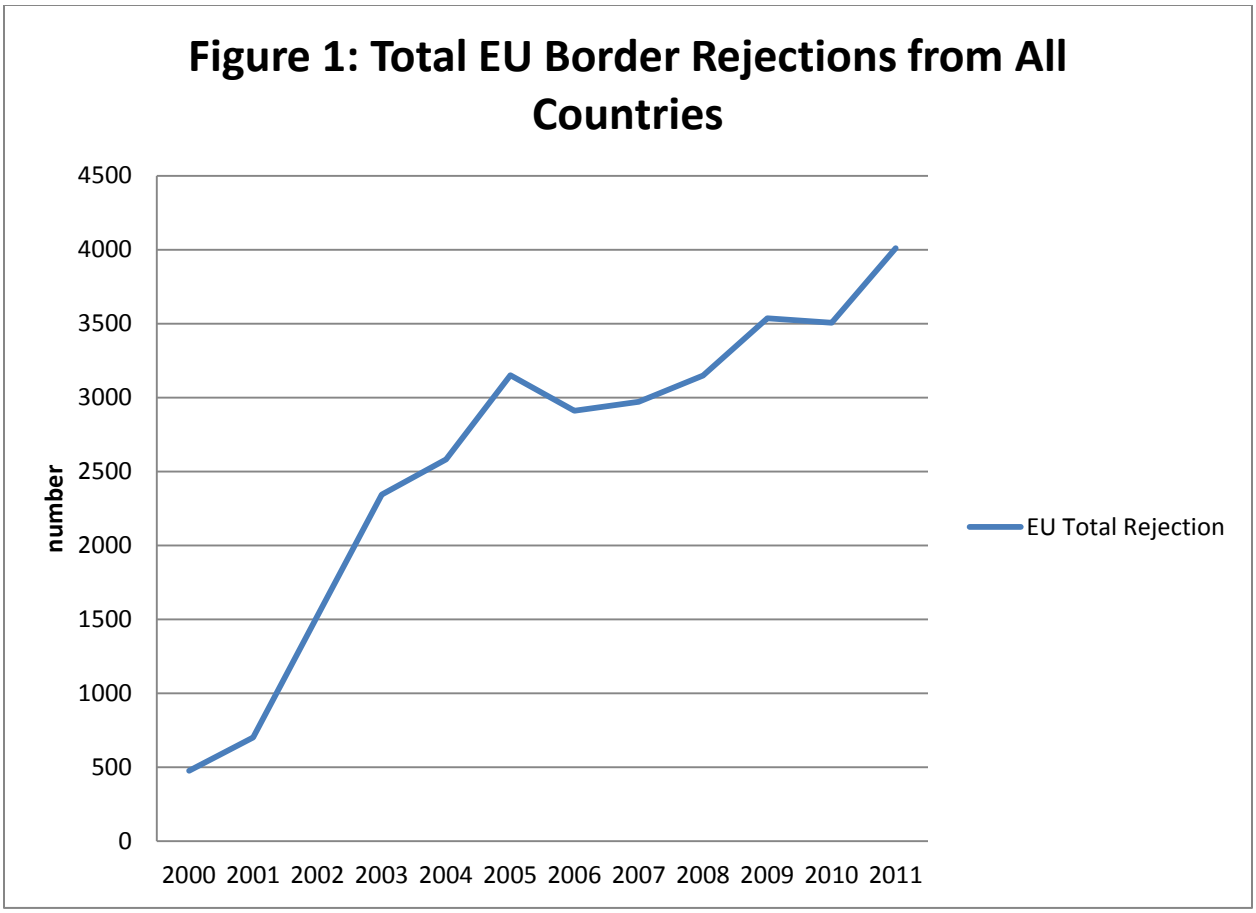
that must be complied with otherwise market access will be denied. Mycotoxins, microbiological contaminations, foreign bodies, radiation and not determined/other are HTP required for nuts and seeds exports. The HTP requirements for herbs and spices are foreign bodies, pesticide residues, unauthorized food additives, microbiological contaminants and mycotoxins. It should be noted that these HTP are for the period from 2002 to 2012. There might be withdrawal and/or additional to the HTP requirements at any point in time.

Table 1: The EU Standard Requirements for Some Selected Products

Standard	Fish & Fishery	Fruit & vegetable	Nuts & Seeds	Herbs & Spices
Mycotoxins		X	X	X
Microbiological Contaminants	X	X	X	X
Veterinary drug Residues	X			
Heavy metals	X	X		
Unauthorized food additives		X		X
Product composition	X	X		
Pesticides Residues		X		X
Migration				
Industrial contaminants	X			
GMO/Novel food		X		
Foreign bodies		X	X	X
Biotoxins / Contaminants	X			
Radiation	X	X	X	
Organoleptic	X			
Bad or Insufficient control	X			
Parasitic Infestation		X		
Labelling				
Packaging				
Other Chemical contamination				
Allergens				
Feed additive				
Not determined / other	X	X	X	

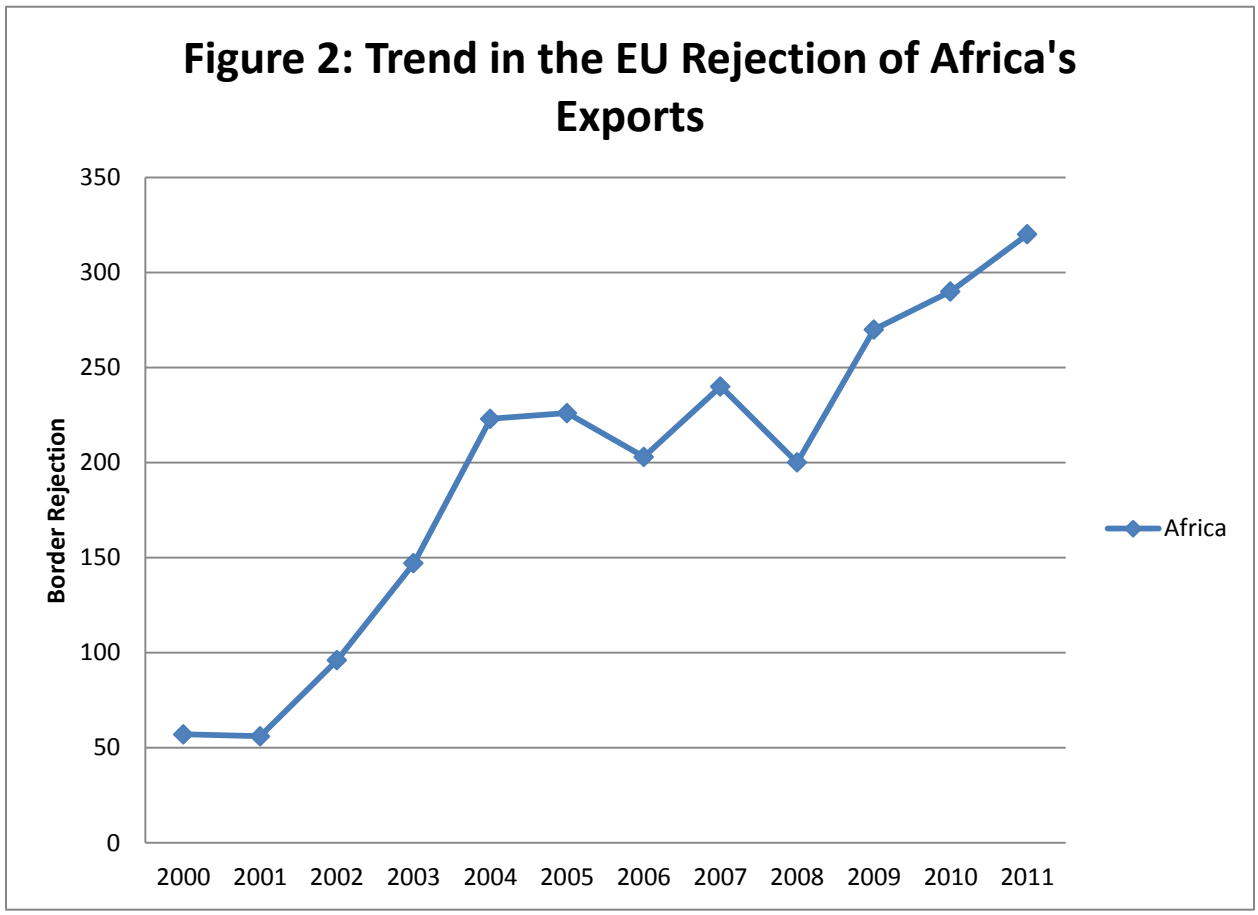
Source: Author's Compilation from Rapid Alert System for Foods and Feeds (RASFF).

These standards as applicable to product lines must be adhere to, otherwise market access will be denied. To this end, the EU had denied many volume of exports access to its market mainly due to non-compliance The border refusal of exports cut across all countries and it is not limited to any specific country or region. The number of border rejections in the EU has been increasing over years. This could be as a result of new standards that are being introduced due to advancement in science and technology that are necessitated by change in taste, fashion and preferences for the good health of human, animal and plant as well as green environment. Figure 1 presents the trend in the EU border rejection in the period between 2000 and 2011. The total EU refusal of exports in 2000 was 477, which later increased by almost 220% two years later to 1524 before rising to 3152 in 2005. There was a slight decline in these border rejections of 8% in 2006, which later rose to 3505 and 4011 in 2010 and 2011, respectively. It could be seen that import refusal in this market as really gone up more ten times its number in 2000. The implication of this is that the amount of trade recorded by the EU during this period would have increased more than the actual trade statistics if these exports are of the required standards. However, these border rejections could also mean prevention of communicable infections in human, animals and plants.



Source: Compilation from RASFF

A decomposition of the EU total border rejections was carried out in order isolate the rejections from Africa; figure 2 shows the trend of exports refusal of products originating from the continent. There has been an upward trend in the movement of the slope of these border rejections during the period under review. Africa had only 57 cases of border refusal of its exports to the EU, but the number of rejected products was more than triple in 2003 due to standards non-compliance. This rising trend of border rejection continue and got to 226 in 2005 before declining to 203 in 2006, which later increase in 2007 to 240. A drop of export refusal was witnessed in 2008 by 17% at the beginning of the global economic crisis, although this could be attributed to the reduction of export to this market. However, by 2009, the number of refusal exports rose to 270, which later got 320 in 2011. Pedagogically, it will be appropriate to say that these rejections will significant impact on the exporters economies, especially among the poor producers.



Source: Compilation from RASFF

EU Import Rejections of Foods and Feeds and the Reasons

The access of a commodity to any import market will depend largely on its fulfilment of the conditions required for market access. The EU has product standard requirements (i.e. HTP) for all product lines. In this section, I have examined the EU standards that are applicable to foods and feeds, especially those that are relevant to African countries. Table 2 presents the EU border rejection of foods and feeds products, in terms of the volume of exports that were prevented from accessing the EU market. In 2002, the number of fish and fishery product exports that were prevented from gaining access to the EU market was 396, which later dropped to 380 in 2006 and further declined to 166 in 2012. Nuts and seeds products recorded 244 rejected exports in 2002, which later increased to 707 in 2006 before declining to 468, 424 and 272 in 2010, 2011 and 2012, respectively. Fruits and vegetables had 110 border rejections in 2002 and the number of border rejection of the products rise in 2006 to 258 before declining to 244 in 2010 and later increased to 360 and 479 in 2011 and 2012, respectively. Herbs and spices had 26 number of exported products refused access to the EU in 2002 before declining to 116 and 83 in 2011 and 2012, respectively. In 2002, only 2 exported food and contact materials were denied access, but by 2006 it has increased to 109 before dropping to 88 in 2010, which later increased to 125 and 127 in 2011 and 2012, respectively. In relative terms, cocoa and cocoa preparation, as well as coffee and tea had low border rejections because in 2002, it recorded 15 rejections that later rose to 26 in 2006 before declining to 9 in 2010, however, by 2011 and 2012, the number of rejection at the border increased to 16 and 52, respectively. In absolute terms, the EU total border rejections for all foods and feeds products in 2002 was 1049, which later increased to 2197 in 2006 and later rose to 2566, 2845 and 2621 in 2010, 2011 and 2012,

respectively. A closer examination of the products that were rejected in this market shows that nuts and seeds, fish and fishery products, fruits and vegetables, and herbs and spices were mostly denied access many of the EU countries.

Table 2: EU Rejection of Foods and Feeds Products

Product	**2002**	**2006**	**2010**	**2011**	**2012**
Nuts and Seeds	244	707	468	424	272
Fish and Fishery Products	396	380	183	217	166
Fruit and Vegetables	110	258	244	360	479
Herbs and Spices	26	129	153	116	83
Food and Contact Materials	2	109	88	125	127
Cereal and Bakery Products	3	140	52	64	69
Poultry meat and Poultry meat products	112	7	15	14	53
Meat and Meat products	37	28	52	50	40
Confectionery	2	34	13	32	37
Feed for food-producing animals	1	12		2	0
Animal Nutrition	21	39	0		2
Cocoa and Cocoa preparation, Coffee and Tea	15	26	9	16	52
Total	**1049**	**2197**	**2566**	**2845**	**2621**

Source: Author's Compilation from RASFF and United Nations Industrial Development Organisation (UNIDO)

In terms of the reasons for the border rejection of products in the period from 2002 to 2012 as shown in table 3, the statistics from the rapid alert system for foods and feeds (RASFF) suggest that mycotoxins, especially aflatoxin presence in these products were the main reasons for many of the refusal at the EU borders with the total number of 6768 imported products rejected, which is about 38% of all the reasons/hazards of rejections. Other major hazards that affected access to this market were the heavy metals in these products, in which 1198 rejections (about 7% of the total hazards) were recorded for these hazards. The residue of veterinary medicinal products hazards had 1173 rejections, which is about 7%, followed closely by pesticide residues with 1154 (6% of total rejection) and that pathogenic micro-organism was 1140, which was also 6%. Products rejected due to chemical contamination were 1028, while the food additives and flavouring as well as poor or insufficient controls had 708 and 709, respectively. Therefore, the aforementioned hazards were the main reasons for border refusals in the EU market. This is not to say that other hazards were negligible or could be set aside because all standard requirements must be complied with, but those mentioned were often found in exported foods and feeds, in which their compliance level has not been adequate for market access. Thus, mycotoxins as at the period under review tend to be the most hazards affecting market access of the products.

Table 3: EU Reasons for Rejection of Food & Feed Products by Hazard Category

Reason/Hazard	2002	2006	2011	2012	Total[a]	% of EU Total[b]
Adulterated / Fraud	1	1	67	74	216	1.20
Allergens	10		1	3	131	0.73
Biocontaminants		11	5	9	129	0.72
Biotoxin (others)		4			27	0.15
Chemical Contamination (other)	380	5		1	1028	5.70
Composition		24	86	60	459	2.55
Feed Addition			1	33	52	0.29
Food Additive and Flavouring		112	56	59	708	3.93
Foreign Bodies	3	30	119	61	536	2.97
GMO/Novel Food		9	17	52	340	1.89
Heavy Metals		114	107	108	1198	6.65
Industrial Contaminants		14	8	9	155	0.86
Labeling absent/incomplete/incorrect	9	8	16	17	182	1.01
Migration		13	63	51	321	1.78
Mycotoxins		722	514	425	6768	37.55
Non-pathogenic micro-organism			76	50	175	0.97
Not determined/Other	7	45	34	1	406	2.25
Organoleptic	0	24	87	53	422	2.34
Packaging defective/incorrect	4	12	16	18	168	0.93
Parasitic infestation	18	4	59	13	285	1.58
Pathogenic micro-organism		40	114	159	1140	6.32
Pesticide residues	129	15	219	320	1154	6.40
Poor or insufficient controls		18	177	144	709	3.93
Radiation	3	11	12	16	124	0.69
Residue of vetenary medicinal products	356	50	46	18	1173	6.51
TSEs			1		18	0.10
EU Total	**920**	**1286**	**1901**	**1754**	**18024**	**100.00**

Source: Author's Compilation and Calculations from RASFF.

Note: a is the total of the hazard from 2002 to 2012, while b is share of this total in the EU total specific hazard.

Statistics of 10 most affected countries in Africa is shown in table 4, in terms of border refusals in this market. Morocco had the highest export rejection in 2002 with 17 of its foods and feeds refused access, followed by 16 rejections from Namibia, South Africa had 13, Egypt recorded 9 while Cote d'lvoire had 7. Ghana, Egypt and Nigeria had the highest refusals of exports in 2006 with 44, 30 and 29, respectively. Morocco recorded 23 rejections while both Tunisia and South Africa got 7 exports denied access. By 2012, all the countries recorded double digit border rejections except Cote d'lvoire, while Morocco and Egypt got the rejections of 61 and 55, respectively. Thus, during the period from 2002 to 2012, a total of 432 foods and feeds (17% of total Africa rejection) exports were refused entry from Morocco, followed by Egypt with 405 (16%), Ghana had 13% of total rejection and Nigeria recorded 241, which was about 10% of the Africa's export rejections.

Table 4: EU Rejection of Food and Feeds by Ten Most Affected African Countries

Country	2002	2006	2011	2012	Total	% Share[4]
Tunisia	5	7	25	15	160	6.45
Morocco	17	23	71	61	432	17.41
Egypt	9	30	55	55	405	16.32
Nigeria	1	29	13	13	241	9.71
South Africa	13	7	26	26	170	6.85
Mauritania	1		13	10	54	2.18
Senegal	4	6	31	47	185	7.46
Ghana	1	44	22	14	317	12.78
Nambia	16	3	1	12	83	3.35
Cote d' lvoire	7	11	3	4	64	2.58
Other Countries	24	39	36	53	370	14.91
Total	98	199	296	310	2481	100.00

Source: Author's Compilation and Calculations from RASFF

A disaggregation of the reasons for the border rejection at the Africa products level was presented in table 5 for some selected countries in the period from 2002 to 2008. A total of 101 exports of foods and feeds from Ghana were denied access due to the presence of product composition; for the same reasons 23 exported goods were rejected from Egypt, Nigeria had 18, Morocco only got 1 while none of Tunisia exports were rejected as of this hazard. Mycotoxins in foods and feeds exports led to 130 exports rejection from Egypt, 91 from Ghana, Nigeria got 90, while 5 and 1 were recorded for Morocco and Tunisia, respectively. Microbiological contaminants accounted for 44 border rejection for Morocco, while it was 31 and 30 for Tunisia and Egypt, respectively; and Nigeria as well as Ghana got 30 apiece. Basically, product composition, mycotoxins, microbiological contaminants, unauthorized food additive and presence of heavy metals were the main reasons for rejecting foods and feeds from continent.

Table 5: EU Reason for Rejections of Food and Feed Products, 2002-2008

Reason	Ghana	Egypt	Nigeria	Morocco	Tunisia	Total
Mycotoxins	91	130	90	5	1	5335
Mocrobbiological Contaminants	13	30	13	44	31	1740
Veterinary Drug Residues	0	2	0	0	0	1327
Heavy Mentals	5	1	10	15	8	1124
Unauthorized food Additives	11	8	16	17	24	1009
Product Composition	101	23	18	1	0	985
Pesticide Residues	0	41	1	30	1	651
Migration	0	1	0	1	0	390
Industrial Contaminants	8	1	1	4	2	292
GMO/Novel Food	0	0	0	0	0	280
Foreign Bodies	5	11	7	1	16	251
Biotoxins/Contaminants	0	0	0	14	1	215
Radiation	0	0	1	0	0	169
Organoleptic	6	1	2	4	4	160
Bad or Insufficient control	6	2	2	5	6	159
Parasitic Infestation	0	0	1	1	2	105
Labelling	4	3	1	2	4	98

[4] This is the percentage share of each country total in total Africa border rejections during the periods under consideration.

Packaging	4	0	0	2	1	67
Other Chemical Contamination	0	0	0	1	0	42
Allergens	0	0	0	0	0	37
Feed Additives	0	0	0	0	0	19
Not determined/Others	8	5	2	0	6	403
Total	264	259	164	147	107	14858

Source: Author's Compilation and Calculations from RASFF

2.2 Descriptive Analysis of Food Exports from Africa and Income Growth

The trends in the flow of exports originating from Africa to the EU are presented in following figures. Import of Africa's fish in this market has been relatively increasing over the past three years. The import increased from $3.2 million dollars in 1995 to $4.5 million in 2000, which later got $7 million in 2010 and $11 million in 2012 (table 6). However, the cumulative HTP (standards)[5] on this product has been on the rise from 18 standard requirements in 1995 to 27 standards in 2000, which later rose to 49 different hurdles for Africa's fish export to pass before gaining access to this market in 2012. This increasing trend in standard requirements affected the volume of fish export. Figure 3 indicates that Africa has been witnessing increment in income, and the growth rate on the average is 11% in the last three years, but this has not translated into improvement in fish output for export as compliance to the technical requirements is still a challenge to exporters.

Table 6: Africa's Food Exports ($' Million) and the Hurdles to Pass in EU

Year	Vegetable	HTP for Veg.	Fish	HTP for Fish	Total Food
1995	26.67	1	3.21	18	10509.34
2000	11.62	4	4.49	27	9160.48
2005	19.25	9	11.97	34	14668.41
2006	21.83	9	13.19	37	15446.45
2007	29.58	10	12.21	37	18307.34
2008	29.26	11	9.81	42	20228.37
2009	29.26	11	9.81	42	19102.28
2010	35.75	11	6.97	47	19903.40
2011	53.98	11	8.54	47	22691.06
2012	41.18	11	11.05	49	20291.54

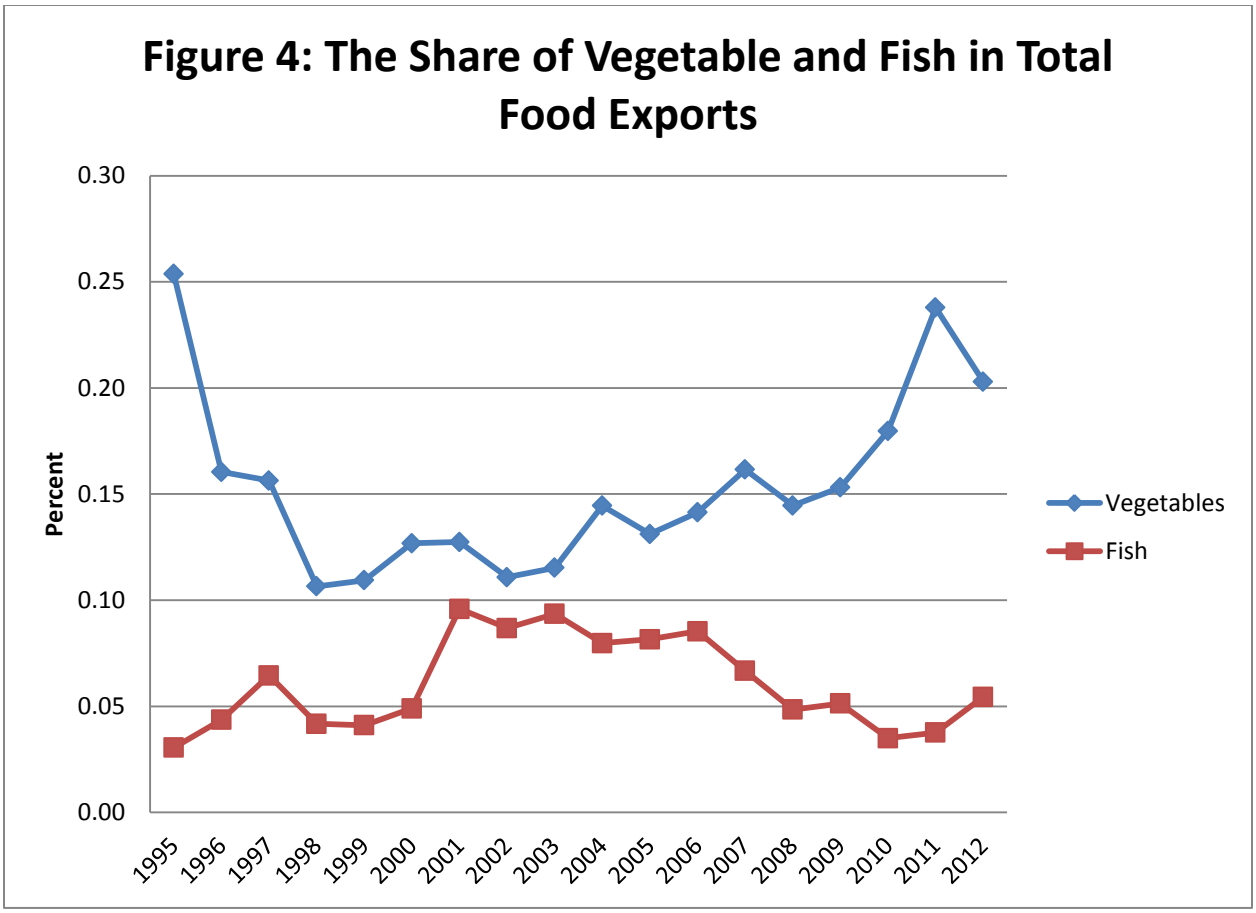
Sourced: UNCTAD Statistics

[5] This is the addition of previous to current standards minus the withdrawals.

Source: Computed

Africa's vegetable export to this market drops from $26 million in 1995 to about $12 million in 2000; this was partly as a result of the HTP that increase from 1 to 5, in the same periods. The volume of vegetable export managed to rise to $19 million in 2005 before getting $36 million and $ 41 million in 2010 and 2012, respectively. The increment recorded in this export was due to the stability in the HTP since 2007 up till 2012. Although, one could be tempted to say that the income growth in Africa has relatively boosted export of this commodity, but the volume of export did not really commensurate with economic growth. This implies that more needs to be done to enhance vegetable export through adequate standards compliance.

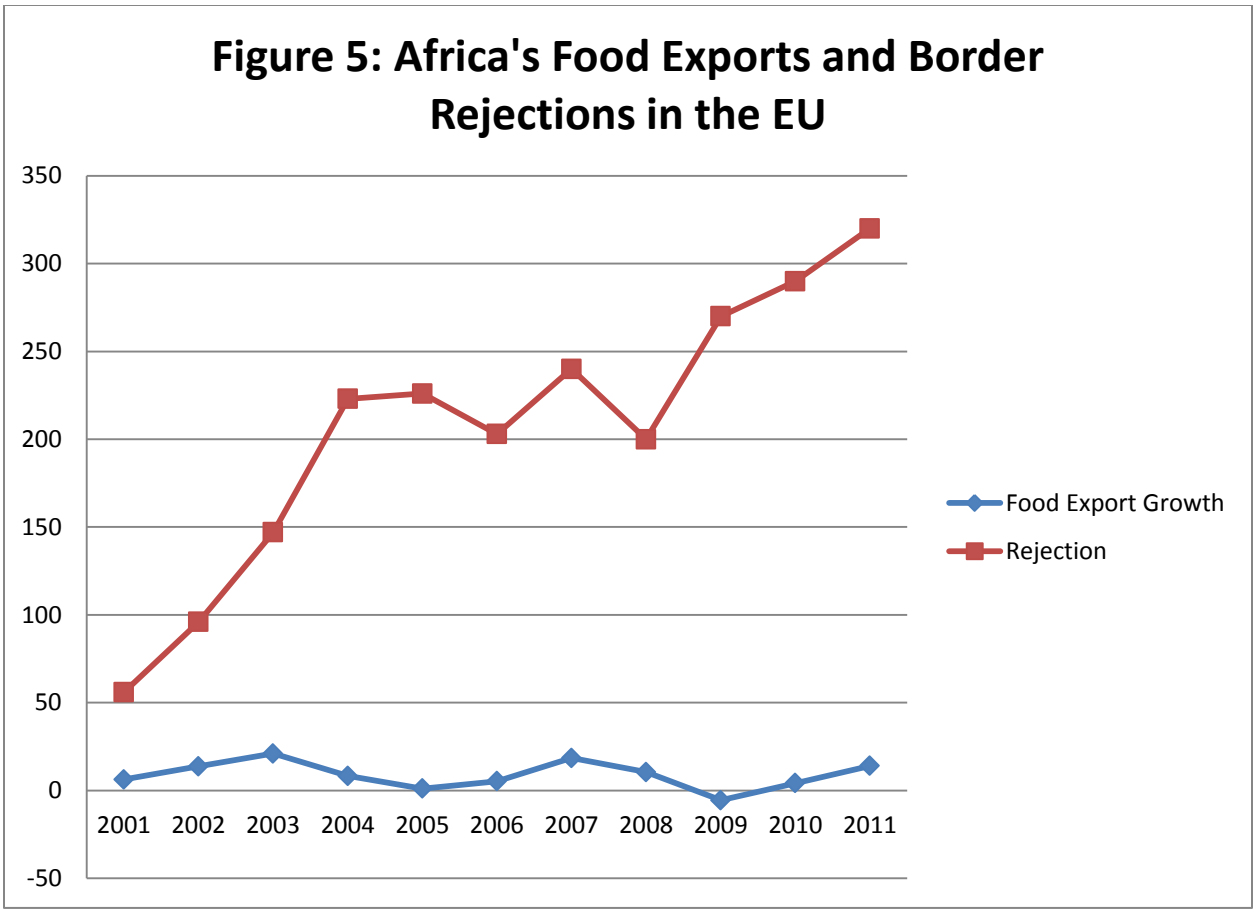
In terms of the shares of the selected products in Africa's total food exports to the EU, figure 4 shows vegetable and fish exports shares in Africa's to food exports are less than 1% all through the years under consideration. This presents the fact that Africa's has not been doing well in exporting high value food commodities to this market, especially these two products.



Source: Computed

An examination of the trend in border rejection due to export growth of these products indicates that although border rejections often increase with the growth in export of the products, however, this is not always the case. For instance, total food exports grew by 6% in 2001 with 56 border rejections; exports grew by 21% in 2003 with a 147 corresponding border refusal of 147, which later increased to 223 and 226 despite the reduction in the growth rate of food exports to 8% and 1% in 2004 and 2005, respectively. However, when food export increased in 2006 to 5%, border rejection dropped to 203 before increasing to 240 when the growth of food exports got to about 19% in 2007. Similar trend was also witnessed in 2009 when the border refusal increased from 200 with growth rate of 10% in previous year to 270 when the growth rate of export was negative (-6%). In 2010, positive growth of food exports was recorded (4%) with a corresponding rise in border rejection to 290 before increasing to 320 in 2011 due to rise in the growth rate of export by 14%. Same trend was seen with the selected products[6]. Thus, although, we expect that the number of border rejection should increase with the growth of export of the product, but evidence in this study has shown that this might not always be the case.

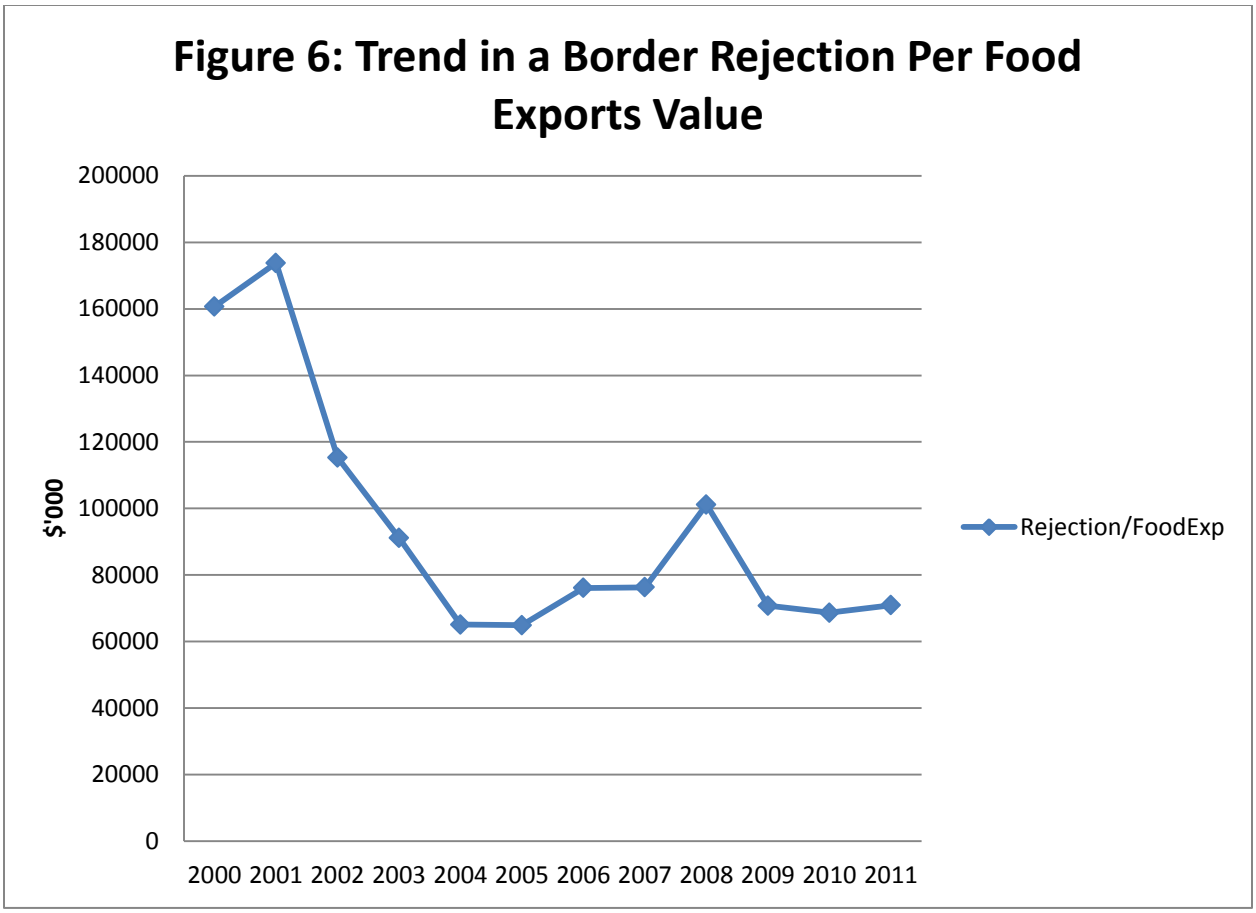
[6] This was done but not presented in this study.



Source: Computed

Quantifying the value of border rejections to Africa, figure 6 presents the trend in border rejection for every food exports value from Africa. It should be noted that the downward trend in the curve does not mean reduction in border refusal per value of food exports but it meant the opposite. That is, the value of food exports refusal increase as it move down to the last year, 2011. For instance, in 2000, for every $160 million worth of food exports from Africa, there will be a border rejection. It was better in 2001 because from every about $174 million food exports only a border denial was recorded which later dropped to about $65 million in 2005[7]. A border rejection was witnessed for every $69 million food exports from Africa in 2010, while it was slightly better in 2011 with a rejection for every %71 million worth of food exports.

[7] This means that if we are to have the value of 2001 in 2005, then about 3 border rejections would have been witnessed.



Source: Computed

3. The Review of the Literature

Available evidences have shown that tariffs are reducing and its impact is gradually becoming marginal due to bilateral, regional and multilateral trade agreements (WTO, 2012; UNCTAD, 2013; Asci et al, 2013; Kareem, 2010). However, the issues of non – tariff measures in global trade have become prominent trade policy and cannot be overlooked in any trade relations (UNCTAD, 2013; Fugazza, 2013; Haveman and Thursby, 2000; Fugazza and Maur, 2006; Fontagne et al, 2010; Staiger, 2011; Kareem, 2012). Non – tariff measures are measures ranging from safeguard measures such as anti-dumping, countervailing to rule of origin, procurement, subsidies, voluntary export restriction, quotas, technical barriers to trade such standards and technical regulations, conformity assessment, certification, etc (see UNCTAD, 2013). Out of all these non – tariff measures, the issue of technical measures has become an importance feature in the regulation of global trade (see Fugazza, 2013; UNCATD, 2013). The importance of these technical standards to Africa's exports has been emphasized and investigated by Otsuki et al. (2001), Okello and Roy (2007), Maertens and Swinnen (2007).

In spite the importance of the issue of product standards (SPS) to Africa and its quest for sustainable development through employment generation, poverty reduction and growth, only scanty studies were conducted to actually determine the extent to which this type of technical barrier to trade (TBT) has influenced market access of products originating from Africa. The paucity of empirical studies which was acknowledged by Shepherd and Wilson (2010), has inhibited research and evidence-based policy formulation by Africa governments in order to solve the problem of inadequate conformity and thereby inaccessibility of African exports to the markets of its trading partners. Three strands of trade impact of standards are available in the literature: first, those that concluded that standards are trade inhibiting;

second, studies that found standards are trade and enhancing; and finally, some studies argued the fact that standards could trade inhibiting (in the short run) and enhancing (in the long run). Studies conducted by Cheminitz, Grethe and Kleinwechter (2007), Wilson and Abiola (2003), Czubala, Shepherd and Wilson (2007), Otski, Wilson and Sewadeh (2001) etcetera, show that Africa's exports were restricted to the developed markets due to its inability to meet the standards set by these markets. For instance, Dean (2008) concluded that the Food Safety Law of the EU effectively restricted East Africa's livestock exports to their market. Mutume (2006) opined that the implicit standards that is aimed at raising African countries standards to the developed countries' levels resulted in extra layers of developed countries regulatory barriers, which has shut out cheap exports from Africa.

However, there are studies such as Ignacio (2008), Jaffee and Henson (2005), Henson and Jaffee (2009), Henson and Humphrey (2008), Maertens and Swinnen (2009), etc., which opined that standards could serve as impetus for long run export growth in the agricultural and food sector. They are of the view that standard could act as a bridge between producers in Africa and consumer preferences in developed markets, which can serve as catalyst for improving, upgrading and modernizing food supply system in the continent that would enhance their competitive capacity. Put differently, McCullough, Pingali and Stamoulis (2008), Swinnen (2007), Henson (2006) opined that the trade impact of standards could be both restrictive and enhancing depending on the degree of adjustment of institutions regulating trade. It was argued that the rise in standards, both private and public, has led to sudden change in the organization of exports, especially food exports and thereby have effects on distribution of welfare not only across countries but also along supply chains and among rural dwellers (World Bank, 2005).

A further evaluation of standards literature indicates that majority of Africa studies were conducted on horticulture of which Kenya has comparative advantage (see Wilson and Abiola, 2003; Jafee, 2005). Wilson and Abiola (2003) reviewed the impact of standards on horticultural industry in Kenya and found that the major challenges apart from the changing consumer preferences are the inability to meet the maximum residual levels (MRLs) in the exporting markets and pest risk analysis. However, the cost of compliance varies with the type of intervention and crop grown. The ISEAL Alliance (2008) did a case study on Kenya and the KenyaGAP standard for good agricultural practice in horticulture with the use of government voluntary standards[8]. They discovered that creation of KenyaGAP and its benchmarking to GLOBALGAP has had several positive impacts on the Kenya horticultural sector. This created jobs, exposed farmers to international standards requirements and also increases the quality as well as the volume of Kenya's horticultural sector exports. Jaffee (2005) studies Kenya's fresh vegetable trade in the context of emerging food safety and other standards in Europe in the light of its challenges and opportunities. He examined the challenges of changing regulatory and market requirements and the coping strategy that Kenya horticultural exporters have adopted and found that exporters and growers have already presumed that standard compliance is a must, which is currently required by major importers and shall be demanded by other countries in the future. So, they have improved their products quality in line with these requirements.

A case study by Minten, Randrianarisen and Swinnen (2006) of a large contract-farming scheme with smallholder producers in Madagascar's vegetable export sub-sector with contract that involve on-farm assessment and extension services indicate that they have to assure conformity with standards in all their export produce. To buttress this point, Maertens and Swinnen (2009) gave an outcome of a shift from procurement strategy that was 95% based on contracting with small holders to a reliance on 50% on vertical integrated production on estate farm in vegetable exporting sector in Senegal due to rise in standard. Aside the above studies, research were conducted on other areas of agricultural exports in

[8] These are non-mandatory product standards that are not mandatory by law to exporters, but whose compliance might be required before market access.

Africa. ISEAL Alliance (2008) in conjunction with Trade Standards Practitioners Network (TSPN) in Tunisia examines the effects of organic standard on farmers. They discovered that the expansion of Tunisia's organic agricultural sector has significantly improved the commercial and trade performance. Henson and Mitullah (2004) investigate the effects of EU's food safety standards requirements on Kenya Nile Perch exports. The imposition of these food safety requirements gingered Kenya exporters to strive in order to meet these standards so that their exports could gain access to the market. However, the country's domestic food safety regulations remain weak and obsolete. Due to increased market access restriction especially in 1997-2000, efforts were made to upgrade facilities for processing export Nile Perch, which led to high cost of compliance while domestic legislation and control mechanism were enhance. They conclude that the Kenyan case is a case where loss of market access could propel concerted effort in complying to standard requirement and thus, illustrate the importance of responding to emerging food safety requirements in a proactive and effective manner.

Thus, the findings of these studies are influenced by the type of standards that were covered (see Henson, 2006; Henson and Northen, 1998; Henson and Reardon, 2005; Asfaw, Mithoefer and Waibel, 2008; Anders and Caswell, 2009; Disdier, Fontagne and Mimoun, 2008; Moenius, 2007; etc.) and harmonized or unharmonized (Shepherd and Wilson, 2010; Czubala, Shepherd and Wilson, 2007; Chgen and Matoo, 2008; Portugel-Perez, Reyes and Wilson, 2009). A meeting point in all these empirical studies relating to the effects of standards on the economies of Africa is that the measures would have its adverse effects on the continent's exports at the initial stage but the subsequent impact would depend on the transformation level that must have taken place in the quality of agricultural output due to standardization requirements at the trade partners' markets.

Further, in relative term, literature in this area for other countries and regions are somewhat impressive, although, still scanty, given the importance and emergence of NTBs as major market access barriers to countries, especially the developing ones. The WTO (2012) report traced the genesis of the use of NTBs to the period of General Agreement on Tariffs and Trade (GATT), however, it is only in the recent years that its frequencies and incidences are pronounce, probably due to the continuous declining of tariffs and the recent global economic crisis, which affected most developed economies. A diagnostic analysis of literature on standards show that many of the studies were conducted in order to determine its impact on developing economies including some countries from Africa (see Chemnitz, Grethe and Kleinwechter, 2007; Shepherd and Wilson, 2010; Brobery, 2009; Henson and Humphrey, 2009; Rio and Jafee, 2008; Beghin, Disdier, Marette and Yengern, 2011; Crivelli and Groschi, 2012; Schlueter, Wiedk and Heckelei, 2009; Henson and Jaffee, 2006; Henson, 2006; etc.). Many of the studies concluded that standards are trade impeding and the reasons for this in part are due to relative poor development of science and technology, institutions, management, absorptive capacitive of producers, etc, in these countries that prevent them from conforming to the standards in their trading partners markets, particularly the developed markets.

According to Jaffee and Henson (2004), the developing countries perceived these standards as barriers to exports, either because they lack the technical and administrative capacities needed for compliance or due to the fact that the standards can be applied in a protectionist manner. Martinez and Poole (2004) opined that for the developing countries to sustain an international demand for their exports; will depend on the strategic, procedural and structural initiatives, which will solidify the confidence and trust of importing countries on the safety and quality of their export. In similar vein, Chemitz, Grethe and Kleinwechter (2007) developed an analytical framework that structure the problem of whether, how and the extent to which small producers in developing countries are at the receiving end due to the rise in the prevalence of food standards. They argue that small and medium producers hardly comply with the required standards without support from the downstream actors, while literate and wealthy farmers can easily integrate.

Thus, a perusal of the literature on standards shows that there are different indicators that have been used to measure standards (see Otsuki et al., 2001; Yua Yang and Findlay, 2008, Xiong and Beghin, 2011; Ferro et al, 2013). The convergence of all these studies that have used one measure of standards is that their conclusions are based on the fact that those measures of standards that they have used were the ones that impacted on the market access of the selected export products[9]. However, none of these studies have clearly shown that for each export item that they have considered, had more than the standards indicator (s) they have used. Most often the explanation these studies give is that the indicator (s) have they used are the most relevant product standards applied to such export items (see Fugazza, 2013, Shephaerd and Wilson, 2013; Czubala et al., 2007), however, UNIDO (2010) and RASFF (2013) show that all the applied standards are equally relevant and important that require compliance, of which non-compliance will lead to border rejection of the products.

To this end, it could be seen that using one or two measures of standards from all the applicable product standards will lead to selection bias, while the conclusions drawn would be unreliable and. At best, what ought to be done by these studies is to make their inferences and deductions with respect to the impact of the chosen product standards on the selected products and not on the market access of the products since other applied standards to the product are not considered[10]. The generalization of the impact of one product standard on market access of such product would be misleading and will not give us efficient information[11]. However, this study has documented the trend and stock of the time series of the applied product standards in the EU for some agricultural food products. Perinom dataset[12] were explored to document this time series of standards data. I have used all the applicable standards to each of the selected agriculture food exports to the EU as were reported by this source. The presentation and analysis of the incidences, number and value of border rejections of these exports originating from Africa are rarely done and has not been seen in any empirical study, which differentiate this study from the previous one

4. Empirical Strategy

Many of the studies in the literature that looked at the issue of bilateral and multilateral trade relations used gravity models in the determination and evaluation of the issues raised and in testing their various hypotheses. Major reasons that were adduced in the use of this model are the fact that it takes care of the political, spatial and temporal factors in the trade relations (see Head and Mayer, 2013). The simplest form of 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.

The theoretical underpinning the gravity model will occur in almost every trade model with full specialization, as shown by Evenett and Keller (2003). The theoretical framework for this study 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. Anderson (1979), Bergstrand (1990) and Helpman and Krugman (1985) have derived gravity equations from trade models based on product differentiation and increasing returns to scale. This model was also extensively used by Shepherd and Wilson (2013), Czubala, Shepherd and Wilson (2009), Portugal-Perez, Reyes and Wilson (2009), and Shepherd (2007) in the determination of the impact of non-tariff barriers on exports.

[9] That is, their inferences on market access for the selected products were based on the chosen standards, i.e. aflatoxin, pesticides, etc.

[10] Also, an explicit assumption ought to be made that other applied standards are held constant.

[11] Fallacy of hasten generalization.

[12] Perinorm has the most reliable and comprehensive standards database for the EU

Recently, studies such as Shepherd (2012), UNCTAD-WTO (2011), Baldwin and Taglioni (2007, 2011), Westerlund and Wilhelmsson (2006), Helpma, et al. (2008), Santos Silva and Tenreyro (2009), Martinez-Zarzoso (2013) have shed light on the appropriate specification, including variables and types of data to be used in gravity models' estimation. Although, Anderson and Wincoop (2003) gave a sound theoretical micro-foundation to the use of gravity model, however, the study uses a cross sectional data which is not the type of data this study used. Mayer and Zignago (2006) use a panel data covering both developed and developing counties with the imports, GDPs and prices in relative terms; however, Baldwin and Taglioni (2006) show the importance of using the nominal values of these variables at unidirectional trade and GDPs levels, in an aggregated trade level. Haveman and Thursby (2000) specified a gravity model in unidirectional trade with nominal values of imports and GDPs at a disaggregated product levels and with the inclusion of trade policy variables; however, it is cross sectional for two years, 1994 and 1998. A critical examination of all these studies and current ones was recently carried out by Head and Mayer (2013) where they review existing facts on gravity modeling and established sound estimation and interpretation of gravity equations for bilateral trade. They argued against the reliance on one particular method to modeling gravity equation and instead they advocate a workhorse, toolkit and cookbook approach.

Thus, to investigate the agricultural export effects of product standards in the trade relations between Africa and the EU, I adapted the two – stage Helpman, Melitz and Rubinstein (2008, hereafter called HMR) model. It was Heckman (1979) that first developed a gravity model that correct for sample selection bias and specification error with nonrandom zero trade. However, a new dimension was brought to the Heckman model with the contribution of Helpman, Melitz and Rubinstein (2008) when they argued that there will be estimation bias whenever only positive trade flows are considered in trade relations without considering countries that do not trade due to the fact that vital information in data must have been lost. They also opined that there is symmetry in standard gravity model specifications, which is inconsistent with the data and thereby, bias the estimation there-from. Thus, HMR model corrects these biases by developing a theory with positive and zero trade flows among trading countries, while also deriving estimation procedures that make use of available information in the dataset of trading and non-trading countries. Building on Anderson and van Wincoop (2003) gravity model, HMR developed an estimable trade effect of trade barriers at the extensive and intensive margins of trade in line with Melitz (2003) model. HMR model shows the heterogeneity of firms in the industry, while arguing that any model of firm level export effects of trade barriers without consideration for the heterogeneity of firm and zero trade would be liable to selection bias. The inclusion of firm level heterogeneity in the correction of sample selection distinguishes HMR model from Heckman model. Hence, importance of the model in determining the extensive and intensive margins of trade have been emphasized in recent studies (see Ferro, et al., 2013; Munasib and Roy, 2013; Crivelli and Groschl, 2012; Helpman et al., 2008). I would make use of mostly unexploited standards data from the Perinom database. Specifically, this study shall test the null hypothesis that the EU standards are trade impeding to Africa's agricultural exports. Thus, to test this hypothesis, a Helpman et al. (2008) gravity model is specified as follows:

$$T_{ijt} = \beta_1 + \gamma_{it} + \rho_{jt} + C_{ij}\vartheta + \pi E_{ijt} + \alpha STD_{t-1ijt} + \varepsilon_{ijt} \quad (1)$$

$$V_{ijt} = \beta_2 + \gamma_{it} + \rho_{jt} + \pi STD_{t-1ijt} + C_{ij}\vartheta + \varphi\sigma_{ij} + \varepsilon_{ijt} \quad (2)$$

Where T_{ijt} is a binary variable that equals 1 if the export from country i to j at time t is nonzero, otherwise it is 0, and V_{ijt} is the export value from country i to j at time t. The intercept are $\beta_1$and β_2; the importer and exporter time fixed effects are γ_{it} and ρ_{jt}, respectively; C_{ij} is a vector of pair – varying control variables such as distance, language, colonial affiliation, regional trade agreement (RTA) and others included. E_{ijt} is the exclusion variable that does not enter the second – stage regression; and σ_{ij} is

the inverse mills ratio from the first stage regression. Standards in the equation are the STD_{t-1ijt}; which are the EU harmonized standards.

4.1 The Data

The data sources for this shall come from the following sources: Perinom database provided the product standards data; import refusal were sourced from the Rapid Alert for Foods and Feeds (RASFF) and United Nations Industrial Development Organisation (UNIDO) standards compliance database; while other trade data were sourced from the World Integrated Trade Solution (WITS) database. The control variables such as the gross domestic products (GDPs) were from the World Development Indicators (WDI). This study shall cover the period from 1995 to 2012 for 52 African countries as exporters in all the estimations. The EU countries are the importing countries and they are all considered in this study. The inclusion of the EU countries in the dataset is based on their year of accession to the regional organisation. For instance, in 1995, 15 countries were included, which later increased to 25 in 2004 and 27 in 2007 to 2012. The technical regulation vis a vis, product standards were not in usable form when obtained, as they were in written form of directives, rules and regulations. I coded these rules and regulations in their number of occurrence. Cumulative standards data were used with the deduction of any withdrawal and addition of new regulations[13]. I have the following simple formulae for the calculation of the cumulative standards:

$$Z_{t-1}\beta + \rho_t - \omega_t \qquad \text{---- (3)}$$

Where β are the initial standard requirements in the first year of the study periods, Z_{t-1} is the previous cumulative number of standards, ρ_t stands for the number of additional standards in time t, while the number of standards withdrawn in time t is represented by ω_t. The formula is applicable from the second year. This study selected four commodities; two of them are high value, while the remaining are traditional cash crops. The high value commodities are fish and vegetables while cocoa and coffee are the traditional cash crops. They were obtained from WITS at the HS-6 digit level. The economic size or mass variables are the GDPs (as enunciated in any standard gravity model and amplified by Baldwin and Taglioni, 2007) of the importing and exporting countries that are obtained from the WDI.

5. The Research Findings

The results of two-step HMR model are present in this section. All the extensive margins of trade results are shown in the first part, while the other part shows the intensive margins of trade. I used common language as the exclusion variable in the model, although HMR used common religion but acknowledged that common language and colonial affiliation can also serve same purpose. The robust cluster errors have been corrected in the first-step estimation that often arises in this type of model. The multilateral trade resistance variables were included in the estimation of intensive margins of export but not reported in the table due to the large size of the cross-sections; however, they were not estimated in the extensive margins due to the incidental parameter problems (see Neyman and Scott, 1948). I have estimated the extensive model using the probit regression since the dependent variable in the model is binary. This estimation corrects the robust cluster errors and distils the inverse mills ratio from the first-step regression, which was used in the second-step regression (intensive margins estimation) as an explanatory in order to correct any selection bias that can be induced by the firms' heterogeneity. The second-step equation was estimated with the nonlinear least square regression as required by the HMR technique.

[13] That is, in 1995 if there are 2 regulations for a product and in 1996, another 2 is added, then I added them together to give total regulations for the product as 4. And if by the following year, which is 1997 no addition to the regulation but a withdrawal of a regulation previously in existence, then for the year the total regulation for the product is 3,and so on.

5.1 Extensive Margin of Export: Fish

Table 6 presents the results of the selected agricultural products, vis a vis, fish, vegetable, coffee and Cocoa, in the extensive margins of export estimations. The economic mass of the trading partners (exporters and importers' GDPs) propel the probability of exporting African fish to the EU. There was increased probability of exporting fish by new exporters, those that have exported in the past but are no longer exporting (disappearing exporters) and would want to export in the future as well as those that are currently exporting with the probability of expanding their exports for every economic growth witnessed. It could be seen that economic growth in the exporting countries enhances the possibility of new firm entry into exporting of fish such that a percentage increase in GDP would raise the probability of new exporters, disappearing exporters and existing exporters' fish export to the EU by 0.29%. Similarly, the expenditure on Africa's fish, measured by the GDPs of importing countries, shows that this commodity is normal good such that an additional percentage increase in expenditure on this commodity will enhance the probability of exporting by 0.65%. The EU standards on fish did not hinder the extensive margins of exporting fish, which means that the standards were not restrictive to the fact that they will prevent export of fish at the extensive margin and this is statistically significant. This implies that many of the exporters at this margin of trade often beforehand considered the standard requirements for market access and they ensure adequate compliance prior entering the market, which is in conformity with Maertens and Swinnen (2007), Mangelsdolf et al. (2012), Xiong and Beghin (2011), Lui and Yue (2011), Reyes (2011), Jaffe and Henson (2004), Henson and Humphrey (2009) and Henson and Jaffee (2008). More so, some importers have assisted many of their exporters and potential exporters technologically in order to comply with the technical regulations, which is in line with the thought and findings of Okello and Roy (2007). The trade costs proxy by distance does not inhibit export of fish at this margin of trade; although, it is statistically insignificant, while the regional trade agreements did not significantly propel trade. However, common language and price are significant factors to consider at the extensive margins of export. Inverse relationship exists between price and extensive margins of fish export, while language is directly related to it.

Table 7: Extensive Margin of Trade

Variable	Fish	Vegetable
Exporter GDP	0.2940*** (0.0494)	0.4590*** (0.0399)
Importer GDP	0.6524*** (0.0547)	0.0053 (0.0289)
EU Standard	0.1463*** (0.0328)	-0.0730*** (0.0610)
Distance	0.0018 (0.2298)	-0.0350 (0.0778)
RTA	0.1060 (0.2048)	-0.3949*** (0.1458)
Price	-0.0124*** (0.0030)	-0.0171*** (0.0051)
Language	0.5341*** (0.2084)	0.1839 (0.1709)
Constant	-22.8174*** (3.0708)	-8.0966*** (1.6202)
Wald Chi-sq	291.81 (0.0000)	205.36 (0.0000)
Observation	7650	8922

Source: Estimated.
Note: All variables are in log form except the dummy variables. The equations were estimated without the multilateral trade resistance variables due to the incidental parameter problem. *, ** and *** denote significant level at 10%, 5% and 1%, respectively.

Vegetable

Africa's GDP significantly impacted positively on the extensive margins of vegetable export to the EU such that for every percentage rise in growth there will be 0.45% improvement in propensity of vegetable export. Given the fact that vegetable is a high value commodity, many African countries often promote and encourage export of the commodity through improve and investment friendly domestic policies. Vegetable is an economically insignificant normal good in the EU, given the direct relationship between this margin of export and income. There is virtually negligible magnitude and marginal propensity to consume this commodity from additional level of income accruing to the consumers. This means that tastes and preferences in this market did not really encourage the propensity to export. Thus, the trade extensity effect of EU expenditure on vegetable is indistinguishable from zero. Ganslandt and Markusen (2001) got a significant propensity to consume. The result also shows that the EU standards on vegetable have adverse effects on the extensive margin of export, although insignificant. This could be due to the nature of the commodity, which is perishable. Given the fact that commodity needs to be exported same day it is harvested affect exporters that did not have such science and technology to easily access this market. Similar findings were discovered in Chen, et al. (2006), Chevassus-Lozza, et al. (2008), Disdier and Marette (2010). The trade cost does not hinder the flow of this trade, although economically and statistically insignificant, which implies that trade costs are not important factors that determine the extensiveness of this export, but the improvements in trade facilitations will enhance exports. Trade agreements within these trade relations significantly did not contribute to the extensive margin of export of the commodity, while common language seems to significantly encourage this export at the extensive margins.

Thus, the result for vegetable shows that the GDP of the exporters, regional trade agreements, the price level are the relevant and determining factors of vegetable export at the extensive margins to the EU.

5.2 Intensive Margins of Exports: Fish

The results of the intensive margins of exports are presented in table 8, where it could be seen that Africa's income growth has not translated into increased export of fish. This imply that the promotion of fish export from the growth being experience by Africa has been discouraging such that, as more income is accruing, there is neglect of expanding export of fish at the intensive margin of trade despite the demand for the commodity in the EU. Xiong and Beghin (2011) conclude that the trade potential of African exporters is more constrained by domestic supply issue rather than the limited market access. The absorptive capacity of this commodity in the EU is relatively encouraging, which depicts the fact that there is demand for this commodity. In other words, expenditures on Africa fish in this market are very encouraging if only supply of the commodity could be expanded and improved upon. This is as a result of the compliance to the EU standards in which the product quality meets the taste in this market at the extensive margins. To this end, the EU standards at the intensive margins of fish export are insignificant, though with negative sign, indicating that the compliance at the extensive margins has help trade at the intensive margins. This reason for this insignificant impact of these standards is due to the supports and assistance rendered by the EU importers (particularly through global good agricultural practice, GLOBALGAP) and United Nations Industrial Development Organisation (UNIDO) in complying with the standards. This is in tandem with Asfaw, etal. (2007), Mangelsdolf et al. (2012), Xiong and Beghin (2011), Lui and Yue (2011), Reyes (2011) conclusions.

The trade costs associated with the flow of export of this commodity significantly affects the flow of trade, which probably might be due to bottles in the trade facilitation. Regional trade agreements did not

contribute meaningfully to enhancement of export of this commodity, while price is significantly not an economical inhibiting factor. The results show that the selection bias in the model has been adequately corrected going by the significant value of the inverse mills ratio. Thus, at the intensive margins of Africa's fish export to the EU, the economic mass variables, trade costs and price are the important and main determinants of the volume of export.

Vegetable

This is another high value commodity considered in this study a part from fish. Incomes or outputs in African countries significantly enhanced export of vegetable to the EU, which in fact was more than a one-to-one proportional relationship. This implies that there is high volume of vegetable export to the EU for every percentage increase in the income level. However, the absorptive capacity in the importing countries for this commodity is insignificant and indistinguishable from zero. Put differently, the propensity to consume this commodity from Africa in the EU is very inadequate at the intensive margins. This could be associated with the standards compliance level that affects the intensity of the export. The standard requirements need to be comply with before market access could be assured, in which from the result the product standards have adverse effects on the intensity of export. Wilson and Otsuki (2004), Ganslandt and Markusen (2001), and Anders and Caswell (2009) got similar result. Distance, though not significant, but negatively related to this intensive margin of export. Price has an inverse association with the intensiveness of the export and it is also an important factor that determines the flow of vegetable export. The inverse mills ratio indicates that the selection bias in the estimation has been rectified and the results are robust.

A further examination of the results shows that the GDPs of the exporting countries are important to vegetable export at this intensive margin. Aside this, product standards, price and regional trade agreements between the trading partners are relevant factors determining the intensiveness of Africa's vegetable export to this market.

Table 8: Intensive Margin of Trade

Variable	Fish	Vegetable	Coffee	Cocoa
Exporter GDP	-0.9832*** (0.1678)	2.1454*** (0.2553)	0.6346*** (0.1224)	-0.4378** (0.2164)
Importer GDP	0.4703*** (0.2148)	0.0018 (0.0220)	0.0807 (0.0601)	0.0492 (0.2748)
EU Standard	-2.8467*** (2.0021)	-0.3356*** (0.1088)	2.7105*** (0.4151)	-12.1616*** (3.8684)
Distance	-2.0975*** (0.2653)	-0.0350 (0.1016)	1.1005 (0.7416)	0.1669 (0.6882)
RTA	-0.0487 (0.1640)	13.7949*** (4.8108)	-18.2043*** (4.7258)	4.2514*** (1.6541)
Price	0.0171*** (0.0047)	-0.0744*** (0.0125)	-0.2751*** (0.0874)	0.1426 (0.2095)
Inverse Mills	0.8708*** (0.1878)	-28.1910*** (1.0053)	3.3143*** (0.0273)	0.3727*** (0.0816)
Constant	14.4764*** (4.2196)	-17.2420*** (6.0493)	-0.2625 (5.3257)	-28.8076*** (8.4192)
Adjusted R-square	0.6291	0.5767	0.6487	0.9493
Observation	2848	5574	6479	1394

Note: All variables are in log form except the dummy variables. The equations were estimated with the multilateral trade resistance variables. *, ** and *** denote significant level at 10%, 5% and 1%, respectively.

6. Conclusion

The issue of technical regulations of global trade among the non-tariff barriers is very vital to most countries, especially the developing ones and Africa in particular, where it compliance has been seen as the necessary condition in accessing importing markets. Further, the standard requirements in the EU market, which I called 'hurdle to pass' prior to accessing this market were evaluated. The analysis indicates that there were many applicable standards on every product, although, at any point in time, a particular standard requirement might dominate the reasons for border rejection, e.g. pesticide residue in fruits and vegetables; mycotoxins in nuts and seeds. The HTP for food products of relevant to Africa were analyzed for some countries.

An empirical review of previous studies suggest three strands of conclusions in the literature; first strand argues that standards are trade inhibiting, while the other opined that they are trade enhancing, however, the last strand are of the view that it could either be trade enhancing or inhibiting depending on the compliance level, stage of development in exporting countries and the choice of standards used in the empirical analysis. This study gives supports to the fact that the impact of standards on trade is product-specific and the generalization of conclusion on market access from analysis of a product is not appropriate. Besides, when all the applicable standards to products of interest are not use in the empirical estimations, it will be inappropriate to make inference (s) on the market access from such selected standard. To this end, the empirical analysis in this study used all the applicable standards in the two high valued commodities; fish and vegetable in a HMR model. At the extensive margins of export, standards are trade enhancing in fish, while inhibiting the propensity to export vegetable. In the intensive margins, standard requirements did constitute restriction to the flow of fish and vegetable. The export of fish was not encouraging as Africa income increases, while vegetable exports were enhanced.

Therefore, this study concludes that the impact of standards on trade is product-specific. Hence, Africa must ensure adequate standards compliance not only in the EU market, but in all its export markets. Efforts must be engineered towards partnering and engaging in alliances with institutions, both local and international, and development partners across the globe to providing technological, institutional and human capacity development supports and assistance to the agricultural sector, particularly to commercial and smallholder farmers. Enabling institutional, regulatory and domestic policies that will stimulate quality outputs for export must be design and adequately implemented.

References

Anders, S. and J., Caswell (2009) "Standards as barriers versus standards as catalysts: assessing the Impact of HACCP implementation on U.S. seafood imports", American Journal of Agricultural Economics. 91(2):310–321.

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

Anderson, J.E. and E., van Wincoop (2003), "Gravity with Gravitas: A Solution to the BorderPuzzle," American Economic Review, vol. 93(1), pages170-192, March.

Asci, S., Ali Koc, A. and M., Sukru Erdem (2013) "The Impact of Non-Tariff Barriers on Trade: The Gravity Model of Turkish Agri-Food Producers", Poster Prepared for Presentation at the Agricultural and Applied Economics Association's 2013 AAEAA and CAES Joint Annual Meeting, Washington, D.C., August.

Asfaw, S., Mithofer, D., and H., Weibet (2007) "What Impact Are EU Supermarket Standards Having on Developing Countries Export of High – Value Horticultural Products?: Evidence from Kenya", Contributed Paper Prepared for Presentation at the 105th EAAE Seminar "International Marketing and International Trade of Quality Food Products", Bologna, Italy, March.

Baldwin, R., Taglioni, D. (2007) "Trade effects of the Euro: A Comparison of Estimators", Journal of Economic Integration 22, 780–818.

Baldwin, R. and D. Taglioni (2011), "Gravity Chains: Estimating Bilateral Trade Flows when Parts and Components Trade is Important", NBER Working Paper 16672, National Bureau of Economic Research, Inc.

Belenkiy M. (2009) "Robustness of the extensive margin in the Helpman, Melitz and Rubinstein (HMR) model". Munich Personal RePEc Archive Paper 17913. University Library of Munich. Munich.

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.

Burger, M. J., Van Oort, F. G., and G.J., Linders (2009) "On the Specification of the Gravity Model of Trade: Zeros, Excess Zeros and Zero-Inflated Estimations", *Spatial Economic Analysis*, *4*(2), 167–190.

Chen, M.X., Otsuki, T. And J.S., Wilson (2006) "Do Standards Matter for Export Success?", World Bank Policy Research Working Paper 3809, January.

Chevassus-Lozza, E., Latouche, K., Majkovic, D., and M., Unguru, (2008) "The importance of EU-15 borders for CEECs Agri-food exports: The role of tariffs and non-tariff measures in the pre-accession period", *Food Policy*, *33*(6), 596–606.

Crivelli, P. and J., Groschl (2012) “The Impact of Sanitary and Phytosanitary Measures on Market Entry and Trade Flows”, *IFO Working Paper* No. 136, August.

Czubala, W., Shepherd, B. and J.S. Wilson (2009) "Help or Hindrance? The Impact of Harmonised Standards on African Exports," Journal of African Economies, 18, 711-44, 2009.

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

Disdier, A. C., Fontagné, L., and D., Mimouni (2008) “The impact of regulations on agricultural trade: evidence from SPS and TBT agreements”, *American Journal of Agricultural Economics*, *90*(2), 336–350.

Ferro, E., Wilson, J.S. and T., Otsuki (2013) “The Effects of Product Standards on Agricultural Exports from Developing Countries”, World Bank Policy Research Working Ppaer G518, June.

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

Fugazza, M. (2013) “The Economics Behind Non-Tariff Measures: Theoretical Insights and Empirical Evidence”, UNCTAD Policy Issues in International Trade and Commodities Studies Series, No. 57.

Ganslandt M and Markusen JR (2001). Standards and related regulations in international trade: a modelling approach. In: Maskus K and Wilson JS, eds. Quantifying the Impact of Technical Barriers to Trade: Can It Be Done? University of Michigan Press, Ann Harbor.

Grundke, R. and C., Moser (2013), “Developing Countries and the Costs of Regulation in International Trade: the Role of Product Standards”, Paper Presentation at the IO and Trade Seminar, LMU Munich.

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

Heckman, J. (1979) “Sample Selection Bias as a Specification Error”, *Econometrica* (47): 153-161.

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

Head, K and T., Mayer (2013)“Gravity Equations: Workhorse, Toolkits and Cookbook”, In: Gropinath, Helpman, and Rogoff (Ed.), Handbook of International Economics. Vol. 4.Elsevier.

Helpman, E., Melitz, M. and Y., Rubinstein (2008), “Trading Partners and Trading Volume”, *Quarterly Journal of Economics*, 123 (2), 441-487.

Henson, S. And P., Loader (2001) “Barriers to Agricultural Exports from Developing Countries: The Role of Sanitary and Phytosanitary Requirements”, World Development, vol.29, no.1, 85-102.

International Organisation for Standards (ISO) and International Trade Centre (ITC) (2010), Building Linkages for Export Success: Trade Promotion Organisations and National Standards Bodies Working Together, Geneva.

International Organisation for Standards (ISO) and United Nations Industrial Development Organisation (UNIDO) (2010), Building Trust: The Conformity Assessment Toolbox, Geneva.

International Trade Centre (2011), The Interplay of Public and Private Standards: Literature Review Series on the Private Standards-Part III, Technical Paper, Doc. No. Mar-11r-215-E, Geneva

Jaffee, S., Henson, S., (2004) "Standards and Agri-food Exports from Developing Countries: Rebalancing the Debate", World Bank Policy Research Working Paper 3348. World Bank, Washington, D.C: The World Bank.

Jongwanich, J. (2009) "Impact of Food Safety Standards on Processed Food Exports from Developing Countries", ADB Economic Working Paper Series, No. 154.

Jun Yang, C. C. and C., Findlay (2008) "Measuring the Effects of Food Safety Standards on China's Agricultural Exports", Review of World Economics, vol.144(1), 83-106.

Kareem, O.I. (2011) "The European Union Trade Policies and Africa's Exports", World Economics, volume 12, no 2

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

Kareem, O.I. (2012) "Protective Trade Policy Instruments in the Global Economic Crisis: An Impact Analysis from Africa – EU and Africa – USA Trade Relations" A Paper Presented at the GTA – CEPR – ACET Conference on "Trade Protectionism: An Analysis of Contemporary Issue in the Wake of the Global Economic Crisis", held in Accra, Ghana, 19 – 20th June, 2012.

Liu, L. and C., Yue (2011) "Investigating the Impact of SPS Standards on Trade Using a VES Model", European Review of Agricultural Economics, 1-18.

Mangelsdorf, A., Portugal-Perez, A., and J., Wilson (2012) "Food Standards and Exports: Evidence from China", World Bank Policy Research Working Paper 5976.

Maertens, M., Swinnen, J.F.M., (2009) "Trade, Standards, and Poverty: Evidence from Senegal", World Development 37, 161–178.

Martinez-Zarzoso, I. (2013) "The log of Gravity Revisited", Applied Economics, Volume 45, Issue 3.

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.

Maskus, K.E., Otsuki, T.and J.S., Wilson (2005), "The Cost of Compliance with Product Standards for Firms in Developing Countries: An Econometric Study", *World Bank Policy Research Working Paper*, 3590.

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

Melo, O., Engler, A., Nahuelhual, L., and J., Barrena (2012), "Does Sanitary and Phytosanitary regulation stringency affect developing countries exports? Evidence from Chilean fruit exports", Paper presented at the International Conference of Agricultural Economists 2012, Foz do Iguacu, Brazil.

Minten, B., L. Randrianarison, and J.F.M. Swinnen (2009) "Global Retail Chains and Poor Farmers: Evidence from Madagascar", *World Development* 37: 1728–1741.

Moise, E. And F., Le Bris (2013) "Trade Costs – What Have We Learnt: A Synthesis Report", OECD Trade Policy Paper, No.150, OECD Publishing.

Munasib, A., and D., Roy (2013), "Non-Tariff Barriers as Bridge to Cross" Selected Paper Prepared for Presentation at the 2013 AAES & CAES Joint Meeting, Washington D.C., August.

Okello, J.J. and D., Roy (2007) "Food Safety Requirements in Africa Green Bean Exports and Their Impact on Smal Farmers", IFPRI Discussion Paper 00737, December.

Otsuki, T., Wilson, J., and M., Sewadeh (2001) "Saving two in a billion: quantifying the trade effect of European food safety Standards on African exports", *Food Policy*, *26*(5), 495–514.

Peterson, E., Grant, J., Roberts, D., and V., Kanu (2013) "Evaluating the Trade Restrictiveness of Phytosanitary Measures on US Fresh Fruit and Vegetable Imports", America Journal of Agricultural Economics, 95(4), 842-858.

Portugal-Perez, A., Reyes, J. and J.S. Wilson (2009), "Beyond the Information Technology Agreement: Harmonization of Standards and Trade in Electronics," Policy Research Working Paper 4916, World Bank.

Reyes, J. (2011) "International Harmonization of Product Standards and Firm Heterogeneity in International Trade", World Bank Policy Research Working Paper, WPS5677, June.

Santos Silva, J.M.C. and Tenreyro, S. (2006) "The log of gravity", The Review of Economics and Statistics, (88):641-658.

Santos Silva, J.M.C. and Tenreyro, S. (2009) "Trading Partners and Trading Volumes: Implementing the Helpman-Melitz-Rubinstein Model Empirically", CEP Discussion Paper No 935.

Santos Silva, J.M.C.,and S.Tenreyro (2011) "Further Simulation Evidence on the Performance of the Poisson Pseudo-Maximum Likelihood Estimator", *Economic Letters* 112 (2): 220–222.

Schlueter, S., Wieck, C., and T., Heckelei (2009) "Regulatory policies in meat trade: is there evidence for least trade-distorting sanitary regulations?", *American Journal of Agricultural Economics*, *91*(5), 1484–1490.

Shepherd, B. (2007), "Product Standards, Harmonization, and Trade: Evidence from the Extensive Margin," Policy Research Working Paper 4390, World Bank.

Shepherd, B. And N.L.W., Wilson (2013) "Product Standards and Developing Countries Agricultural Exports: The Case of the European Union", Food Policy, 42, 1-10.

Swann, P., Temple, P., Shurmer, M. (1996) "Standards and trade performance: the UK experience", Economic Journal 106, 1297–1313.

Swann, P. (2010), "International Standards and Trade: A Review of the Empirical Literature", *OECD Trade Policy Papers 97*, OECD Publishing.

Wei, G., Huang, J. & Yang, J. (2012). The impacts of food safety standards on China's Tea Exports. *China Economic Review*, *23*(2), 253-264.

Westerlund, J. and F., Wilhelmsson (2006), " Estimating the Gravity Model Without Gravity Using Panel Data," www.nek.lu.se/nekfwi/Estimating%20the%20gravity%20model.pdf.

Wilson, J.S., Otsuki, T. And B., Majumba (2003) "Balancing Food Safety and Risk: Do Drug Residue Limits Affect International Trade in Beef", Paper Prepared for Presentation at the American Agricultural Economics Association Annual Meeting, Montreal, Canada, July.

World Bank. (2005) Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports (Report No. 31027).Washington, DC: Poverty Reduction and Economic Management Trade Unit, Agriculture and Rural Development Department.

World Trade Organization. (2012) World Trade Report 2012. Geneva, Switzerland: WTO.

Xiong, B., and J., Beghin. (2011) "*A*flatoxin redux: Does European Aflatoxin regulation hurt groundnut exporters from Africa?", Iowa State University Department of Economics Staff Research Paper.

UNCTAD (2013), "Non-Tariff Measures to Trade: Economic and Policy Issues for Developing Countries", United Nations Publications ISSNN 1817-1214.

UNCTAD and WTO (2011), "A Practical Guide To Trade Policy Analysis", United Nations Conference on Trade and Development and the World Trade Organization Joint Publication, Geneva, Switzerland.