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2.3 The Scope of the EU-ACP Trade Agreement

The European Union over the years has adopted the use of preferential trade agreements as a key strategy in assisting the developing world catch up with global trade trends and to reduce poverty (Turkson, 2012). The EU is by far the largest contributor to the proliferation of trade agreements worldwide with more than 50 RTAs notified to the WTO (Candau and Jean, 2005).

The implementation of trade preferences by the EU dates back to about 30 decades ago through the inception of the GSP. Borne out of the traditional GSP are several non-reciprocal unilateral trade preferences for targeted regional blocs of developing and least developed nations. Most notable among these preferences are the Everything But Arms (EBA) initiative, the EU-ACP agreement, the GSP for LDCs, and the EU preferences to the Mediterranean. All EU preference schemes are fundamentally designed to improve trade with their beneficiaries. However, the potential usefulness of each trade preference differs in terms of quality (Persson and Wilhelmsson, 2007). Persson and Wilhelmsson (2007) in classifying selected EU preferences according to preference quality, used the preference margin, product coverage, rules of origin and safeguard clauses as the criteria for developing what they termed the "Pyramid of Privilege". This is shown in Figure 2-3 below.

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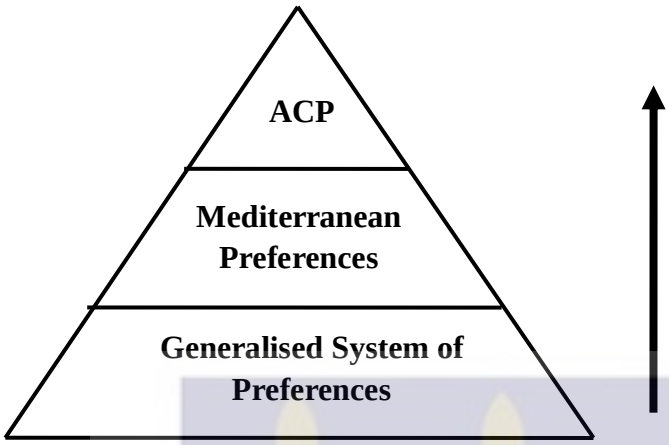
Figure 2-3: EU Trade Preferences: The "Pyramid of Privilege"



Source: Persson and Wilhelmsson (2007)

The arrow in the diagram shows that the quality of preferences increases moving from the GSP through the Mediterranean preference to the ACP agreement. It can be inferred that firms in ACP countries would undoubtedly request for preferential treatment under the EU-ACP agreement, although they may be eligible for the GSP as well. Similarly, Mediterranean firms would opt for the Mediterranean preference ahead of the GSP.[22]

2.3.1 Historical Overview of the EU-ACP Trade Relationship

The trade relationship between the group of African, Caribbean and Pacific (ACP) countries[23] and the European Union finds its ancestry from the Treaty of Rome signed in 1957 to establish the European Economic Community (EEC).[24] One of the rationales for the Rome Treaty was to enshrine the solidarity and commitment of the members of the EEC to their colonies and their overseas territories (Bartels, 2007). As part of the treaty of Rome, technical and financial aid was made available to ACP countries through the creation of the European Development Funds (EDFs) (Nolte, 2002). The first EDF lasted

[22] A country will not be eligible for both the EU-ACP and the Mediterranean preference. Hence there is no overlapping of their membership.
[23] The ACP group was founded in 1975 through the Georgetown Convention.
[24] Laaksonen et al (2007)

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for five years (1958 to 1963). Following this EDF, a much comprehensive trade arrangement that considered the migration of political colonies to independent states was necessary. This led to the establishment of the first Yaoundé convention in 1963. This convention, which lasted for six years, established financial, technical and trade cooperation between the EEC and 18 associated African States and Malgache (Madagascar) (Laaksonen et al., 2007). The Yaoundé I was replaced with the Yaoundé II convention, which also lasted for six years (1969 – 1975). In 1975, once the United Kingdom joined the European Community, other countries (mainly Commonwealth nations) were included in the arrangement (Haveman and Schatz, 2003). In effect, nine countries of the EEC concluded a trade agreement with 46 ACP countries in Togo. This arrangement was referred to as the Lomé I convention. The lomé convention has been considered as a highly innovative model of international cooperation (Laaksonen et al., 2007). According to Bartels (2007, p42),

> "The main flashpoint of the Lomé convention was the principle of reciprocity, which was initially defended by the EEC and a hard core of Yaoundé associates (especially Senegal) but strongly opposed by those joining the system. The opposition was successful: the EEC soon abandoned the principle and the 1975 Lomé convention enshrined the principle of non-reciprocal trade preferences".

The Lomé I introduced a system that sought to compensate ACP countries for shortfalls in their export earnings emanating from price fluctuations or fluctuations in the supply of commodities such as cocoa, coffee, tea and groundnuts. Successive amendments followed the 1975 convention. That is, the subsequent entry into force of Lomé II, III and IV conventions in 1980, 1985 and 1990 respectively. All these variants of the Lomé

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convention had their main policy fulcrum. Whereas the Lomé II introduced a system that was intended to assist ACP countries who are heavily dependent on mining for export, the Lomé III changed the policy focus from industrial development to self-sufficiency and food security with the final amendment laying much emphasis on the human right issues, democracy and governance. Within the Lomé IV convention, the scope of the EU-ACP agreement was widened to include human rights as an integral prerequisite for cooperation. It also made budgetary allocations for environmental consideration through the EDF budget. This was intended for the preservation of the vast rainforest in the ACP member states. The end of the Lomé conventions saw the inception of the Cotonou agreement which was signed in 2000 between the European Union (then 15 members) and 77 ACP countries.[25]

The objectives of the Cotonou Agreement as specified in the general provisions was to promote and expedite the economic, cultural and social development of the ACP states, with a view of contributing to peace and security and to promoting a stable and democratic political environment (European Commission, 2014). The establishment of the Cotonou Agreement was rooted on five main thematic areas;

- ✓ A comprehensive political dimension
- ✓ Participatory approaches (through institutional provisions)
- ✓ A strengthened focus on development based poverty reduction
- ✓ A new framework for economic and trade cooperation, and
- ✓ A reform of financial cooperation

[25] Heavily drawn from Laaksonen, et al. (2007)

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Other relevant facets of the Cotonou agreement included the respect for human rights and democratic principles, a special paradigm of anti-corruption, comprehensive stakeholder engagement in economic, social and institutional policy reforms which ought to be endorsed by the European Commission. Issues pertaining to development driven poverty alleviation agenda, intellectual property, and labour were extensively covered by the institutional requirements, for the consideration of beneficiary status in the Cotonou agreement.

Aside the extension of the conventional period from 5 to 20 years, other key innovations marked the period of the Cotonou convention. These included the inclusion of the civil society and the private sector as new actors. With all these reforms enshrined in the convention, the fulcrum remained fostering cooperation in trade related areas such as competition policy, trade and environment through trade liberalisation between the parties involved.[26]

2.3.1.1 Membership

The membership of the EU-ACP agreements have been progressively increasing with successive amendments to the agreements. For instance, migrating from Lomé I through to the Cotonou convention, 5, 2, 4, and 7 countries joined the successive conventions respectively. The initial Cotonou Convention comprised of 77 ACP countries (47 African countries, 15 Caribbean countries, 14 Pacific countries, and 1 CARIFORUM country) and the 15 member European Union. From 2000 up until 2013, about 13 other European countries have joined the EU. Also, Cuba and South Africa have joined the ACP

[26] This section is mainly referenced from Panagariya (2002).

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countries, making them number 79. Table 2-2 below shows the ACP membership of the respective agreements and their year of entry into force.

Table 2-2: EU-ACP agreements and their respective membership

Agreement	Signed	Entry into Force	Membership
Treaty of Rome	1957	1958	Belgian, French and Italian colonies
Yaoundé I	1963	1964	Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo (Rep), Congo DR, Ivory Coast, Gabon, Madagascar, Mali, Mauritania, Niger, Rwanda, Senegal, Somalia, Togo.
Yaoundé II	1969	1971	Yaondé I plus Mauritius (1943)
Arusha	1969	1971	Kenya, Tanzania, Uganda
Lomé I	1975	1976	Original Parties: Yaoundé II and Arusha plus Bahamas, Barbados, Botswana, Equatorial Guinea, Ethiopia, Fiji, Gambia, Ghana, Grenada, Guinea, Guinea Bissau, Guyana, Jamaica, Lesotho, Liberia, Malawi, Nigeria, Samoa, Sierra Leone, Sudan, Swaziland, Tonga, Trinidad and Tobago, Zambia Acceding Parties: Cape Verde (1977), Comoros (1976), Djibouti (1978), Dominica (1979), Kiribati (1979), Papau New Guinea (1977), Sáo Tomé and Principe (1977), Seychelles (1976), Solomon Islands (1978), St. Lucia (1979), St Vincent and the Grenadines (1980), Surinam (1976), Tuvalu (1979)
Lomé II	1979	1981	Lomé I plus Antigua and Barbuda (1982), Belize (1982), St. Kitts and Nevis (1984), Vanuatu (1981), Zimbabwe (1981)
Lomé III	1984	1986	Lomé II plus Angola (1986), Mozambique (1986)
Lomé IV	1989	1991	Lomé III plus Dominican Republic (1991), Eritrea (1993), Haiti (1991), Namibia (1990)
Cotonou	2000	2000	Lome IV plus Cook Islands (2000), Micronesia (2000), Marshall Islands (2000), Nauru (2000), Niue (2000), Palau (2000), Timor Leste (2005)

Source: Persson and Wilhelmsson (2013).

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2.3.1.2 Product Coverage

The migration of commodities onto the EU preferences for ACP countries increased under the Lomé IV. Under Lomé IV, nearly all the products from ACP countries qualified for entry into the EEC without any form of restrictions nor reciprocal obligations. Trade preferences in the Lomé convention covered about 99 percent of the industrial products of ACP countries without quantitative limits (Panagariya, 2002). One of the landmark adjustment the introduction of the Lomé conventions made to the Yaoundé II convention was the founding of the *Sugar, beef and veal, banana, and rum Protocols*. These Protocols refer to arrangements that require that the European Community imports a specific quota of the affected commodities each year from the ACP producers at guaranteed prices, which have to be higher than the world market prices (Laaksonen et al., 2007). The ACP producers are however, selected by the EEC. In 2006, the European Commission reported that under the Cotonou Convention (which succeeded the Lomé conventions), 97 percent of ACP exports to the EU are exempted from custom duties.

2.3.1.3 Rules of Origin (RoO)

The provisional requirements of EU's RoO have been modified through the several preferential schemes implemented by the EU. Brenton (2008) compares the RoO regarding vessels under the EBA and Cotonou Agreement. He succinctly observes that, the EBA required vessels to be registered and sailed under the flag of either the beneficiary country or EU. However, under the Cotonou agreement, the vessel could be registered and sailed under the flag of the EU or any ACP state. Again, the Cotonou agreement made amendments to the ownership and crew composition of vessels by

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allowing 50 percent of the crew, and the master and officers to be nationals of any ACP state or the EU, which under the EBA is allowed at 75 percent.

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CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter focuses on providing a theoretical review, which concentrates on identifying the theoretical basis of trade as well as presenting the theoretical framework that provides rational theoretical justification for trade preferences in international trade. Also, several existing literatures on preferential trade are perused and the key and trending arguments concerning the empirical veracity of trade preferences are uncovered and expounded.

3.2 Theoretical Review

Any theoretical discussion of preferential trade cannot be done without considering the theoretical foundations of international trade itself. A review of international trade theories is necessary to understanding the rigorous theoretical dimensions of preferential trade.

3.2.1 Models of International trade

The premier discussion of international trade is often attributed to Adam Smith owing to the publication of his book "The Wealth of Nations (1776)". However, much of international trade was discussed during the pre 1776 period. Whereas the discussion of international trade under the pre 1776 era and the Adams Smith regime focused on inter-industry trade, emerging trends in trade have highlighted the eminent significance of intra-industry trade. This has resulted in the theoretical development of several trade

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models that have been propounded in an attempt to provide explanations for intra-industry trade. Therefore, the discussion of international trade models could be analysed under the blocs of inter-industry trade and intra-industry trade. Among the inter-industry trade theories are the Ricardian Model and the Heckscher-Ohlin Model. Models that have been developed to explain intra-industry trade include the monopolistic competition theory.

3.2.1.1 The Ricardian Model

Based on Adam Smith's concept of absolute advantage, David Ricardo developed a comprehensive trade theory (often referred to as the Ricardian Model) based on sectoral comparative advantage. The Ricardian model postulates that a country should concentrate or specialize in the production of a commodity if the opportunity cost of producing that commodity is lower as compared to other countries. This stands as one of the very useful models in explaining inter-industry trade. Essentially, the Ricardian model implies that difference in the relative productivity of sectors is enough to explain why countries would trade among themselves.

David Ricardo, in propounding the comparative advantage theory, maintained the assumptions of Adams Smith. Thus, two countries, two goods, and one factor of production (labour). Also, perfect competition and constant returns to scale were assumed. The assumption of constant returns to scale explains the notion of constant opportunity cost as used exhaustively in the Ricardian Model. Other key explicit assumptions include, constant technology and full employment. The concept of complete specialization advanced by the Ricardian model suggests an increase in global output as a result of free trade. Also, the consumption possibilities of both trading partners increase.

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Following from the Ricardian Model, other theories have made adjustments to some assumptions underpinning the Ricardian model.

3.2.1.2 The Heckscher-Ohlin (HO) Theory.

The traditional Heckscher-Ohlin model increases the factor assumption made under the Ricardian model to two. By so doing, holding onto the constant opportunity cost assumption is flawed. Hence, the HO model assumes increasing opportunity cost. Again, the HO model assumes incomplete specialization. The assumptions of the Ricardian model which are maintained in the HO model include constant returns to scale, perfect competition, no transportation cost, no barriers to trade and similarity of taste. Fundamental to the conclusion of the HO model is the notion of relative factor difference. With regards to the factor endowments, the HO model proceeds to assume that there exist different factor endowment ratios, perfect internal mobility of factors but complete immobility internationally, and no factor intensity reversals. In essence, the conclusion of the traditional two-factor, two-good, two-country version of the HO model states that each country exports the good that intensively uses its relatively abundant factor. It follows then that in this model, each country exports (embodied in goods) its relatively abundant factor and imports its relatively scarce factor (Baldwin, 2008).

3.2.1.3 The Specific Factors Model

This model differs slightly from the HO model. Unlike the HO model, the specific factors model assumes that each country is endowed with three distinct factors. One factor is assumed to be general (labour) whereas the other two are assumed to be sector-specific; that is, they are only used in particular sectors. This model leads to an important proposition which states that the structure of trade is determined by the relative

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abundance of the specific factors. This proposition is not significantly different from the foundations of the HO model. As a result, the specific factors model is often viewed by some trade economists as the short run scenario of the HO model. Notwithstanding the similarities, this model presents more insight into the income distribution effect of free trade. According to this theory, the effect of free trade on the owners of the general factor (i.e. workers) is ambiguous. The effect depends on the consumption bias of the workers. For workers whose consumption is biased towards the export commodity, they may become worse off while workers whose consumption preference is for the importing good become better off. However, the effect of free trade on the owners of the specific factors can be unambiguously determined. Owners of the factor specific to the production of the export good become better off, whereas owners of the factor specific to the import sector lose out.

The above mentioned classical trade theories are challenged by some empirical observations pertaining to the pattern of global trade. These empirical challenges are dominated by the observation of intra-industry trade. These trade theories do not necessarily explain explicitly the proliferation of intra-industry trade. Owing to this, other trade theories emerged to provide theoretical justification for the observed intra-industry trade trend. One of such models is the monopolistic competition model developed by Edward H. Chamberlin in 1933. According to this model, product differentiation combined with increasing returns to scale can easily explain intra-industry trade (Chacholiades, 1990). So, relaxing the constant returns to scale assumption in the classical theories forms the first step to explaining trade in similar commodities. The gains from trade under the monopolistic competition model is higher than those advanced

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by the classical theories. This is because of the presence of economies of scale in the monopolistic competition model. In addition to the monopolistic competition model, other models such as the Linder's thesis (also known as the spillover theory), the technological gap and product cycle theory have attempted to provide theoretical justification for intra-industry trade.

The international trade theories discussed in the preceding paragraphs advance a clear case for free trade. Core to these theories is the general conclusion that free trade is usually mutually beneficial. Hence, the need to encourage free trade. However, the realism of free trade is challenged by the empirical existence of restrictions to trade. These trade restrictions as observed in world trade impose huge costs to trade. So, to promote free trade, it is necessary to eliminate these trade costs or absorb them (through trade preferences).

3.2.2 Theoretical Framework of Trade Preferences

What forms the basis of trade preferences is the apparent need for the elimination of tariff and non-tariff barriers to trade. Trade preferences, be it reciprocal or non-reciprocal present the opportunity to trade in the face of minimum tariff and non-tariff costs. Aside the apparent reduction in tariff and non-tariff costs, Bora et al (2002) and Mold (2005) present a partial equilibrium analysis of the welfare effects of Preferential Trade Agreements. Their analyses present a three-country, one homogenous good static partial equilibrium framework. The three countries are basically A, B and C. Countries A and B are assumed to be the trade partners with country C being the rest of the world. A and B are assumed to sign a non-reciprocal preferential trade agreement in which A is the donor

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and B, the beneficiary. So A is the importer and B is the exporter. The supply from C is assumed to be too large to be influenced by changes in the import volumes in A. So, the exporter supply curve to A is perfectly horizontal. Given the horizontal nature of the supply curve, prices would not respond to any changes in import volumes after the preferential agreement, hence, import quantities would not change.

Other assumptions made to support this framework include perfectly substitutable homogenous good, and common world. Both studies also assume perfect competition and non-increasing returns to scale in both countries. With these assumptions, it can be established that preferential agreements reduce the cost of exporting commodities from B to A compared to from B to C. Consequently, there will be a shift in country A's demand from C to B. Mold (2005) advanced two arguments in favour of the purported increase in the supply of B. The first is what he terms the 'terms of trade effect' and secondly the 'displacement effect'. With the terms of trade effect, he argued that B will have better prices in the market of A because of the eliminated tariff cost compared to C. The displacement effect, he used to refer to the fact that all production of B will be sold in A in order to exploit the preferential advantage. Following the displacement effect, the export supply curve of B will be the same as its domestic supply curve. So in effect, preferential agreements increase the exports of the preference-receiving country. Also, Collier and Venables (2007) point that, the benefits of trade preferences accrue through two mechanisms. They cited the transfer of rent to recipient countries as the first mechanism. They argued that the removal of tariffs in trade preferences transfers the preference margin, which would have received by the developed country importer (either as tariff revenue or quota rent) to producers in the preference receiving country. The

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second mechanism they identified is an export supply response to the trade preferences. They argued that trade preferences present beneficiaries with the opportunity to increase the supply of their exports to also meet the foreign demand.

The brief theoretical model and arguments discussed above highlights the possible deterministic mechanisms through which trade preferences can affect bilateral trade flows under the specified assumptions. The empirical veracity of the theoretical expositions on trade preferences has been examined by several researchers. A snapshot of this wide array of empirical literature seems to confirm the inconclusiveness of the empirically observed impact of trade preferences on bilateral trade flow.

3.3 Empirical Review

The effects of trade agreements on trade flows, empirically, is not straightforward as the theoretical framework of trade preferences may seem to suggest. Many studies have been conducted in the SSA context and the results do not differ from the observed international trend. In reviewing the existing literature, the study considers primarily, studies that adopt the gravity approach in estimating the effects of preferential trade on the exports of developing or less developed countries (preferably, Sub-Saharan African Countries). In addition, some selected studies that employ descriptive measures would be reviewed as well. A brief review of the effects of Regional Trade Agreements precedes the perusal of studies that have considered the impact of either/both US or/and EU trade preferences on total exports as well as the exports of individual commodities.

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Considering SSA countries, several researchers have interrogated the possible effects Regional Trade Agreements (RTA) could have on bilateral trade. Turkson (2012) assessed the ex post bilateral trade effect of the EU-ACP PTA and sub-regional RTAs on bilateral trade involving SSA countries. Estimating a gravity equation through including the sub-regional RTAs and EU-ACP PTA as dummies, controlling for their endogeneity, as well as accounting for zero-valued trade flows and multilateral price resistance, the findings of the study indicated that EU-ACP PTA and RTAs within ECOWAS and SADC have a positive and significant impact on bilateral trade involving SSA countries. In another study, regarding the impact of RTAs on bilateral trade flows, Afesorgbor (2013) in an attempt to possibly explain the potential heterogeneity in the existing studies as well as compare the different results emanating from their distinct respective estimation methods, conducts a meta-analysis of previous empirical studies. Afesorgbor (2013) found that, the impacts of African RTAs are generally positive and highly sensitive to different estimation methods.

With regards to NRPTA in general, Agostino, Aiello and Cardamone (2007) concluded after considering all NRPTAs granted by 8 major OECD countries that NRPTAs have a positive impact on total exports from developing countries. A similar and much recent study conducted by Gil-Pareja, et al (2014) investigated whether and to what extent nonreciprocal preferential trade agreements in general have increased the exports of beneficiary developing countries. Also, in the same study, they investigated the extent to which specific NRPTA have affected the exports of developing countries. They considered 177 countries over the period 1960 to 2008 at four year intervals. Adopting a panel estimation technique, and accounting for zero trade flows, individual NRPTA trade

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effects, and firm heterogeneity, their study revealed robust evidence that, non-reciprocal preference agreements in general have had an economically significant positive effect on exports. Moving to the individual preference effects, the study revealed, after controlling for unobserved bilateral heterogeneity, that whereas some of the selected non-reciprocal preferential trade agreements have had a positive effect on developing countries' exports (although at varying confidence intervals), others did not exhibit any evidence of a positive effect on the exports of beneficiaries. Of the NRPTAs that revealed positive effects were AGOA and the EU-ACP.

Studies that have interrogated the impacts of unilateral preferential trade agreements on trade flows in SSA, have mainly focused on the preferential access offered by the United States and the European Union. In assessing the impacts the EU and US preferential trade agreements have had on bilateral trade flows in developing countries (often SSA), the analyses have mainly been targeted at either explaining if such preferences have been trade creating or trade diverting.

With respect to US non-reciprocal preferences, the results of existing literature have been quite contradictory. Whereas most studies find significant positive effects of US trade preferences; mainly the GSP and AGOA (e.g Mattoo et al., 2002; Shapouri and Trueblood, 2003; Keck and Lendle, 2012) others have concluded otherwise (e.g Özden & Reinhardt, 2004; Lederman and Özden, 2004; Mueller, 2008; Cooke, 2011). In what follows, the study briefly presents the results of each of these studies, beginning with those that do not find positively significant effect of AGOA on total exports. To begin with, Lederman and Özden (2004) found that the impact of AGOA on beneficiaries was significantly negative. Their study employed the gravity equation to conduct a Tobit

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estimation considering data for 173 countries and 98 product categories for 2001. In specifying their gravity equation, they included bilateral covariates such as distance to capture transport cost, sharing a common language or a border, and being landlocked to also represent elements of natural trade cost to trade. The outcome by Lederman and Ozden (2004) could possibly be due to the fact that they considered data at the very initial stages of AGOA. So, beneficiary countries may have now been putting in place infrastructural development to fully exploit the AGOA trade preference. Hence, concluding based on these results may not be necessarily a fair estimate of the impact of AGOA. Moving forward, Mueller (2008) used time series data from 2000 to 2004 to assess the impact of AGOA on the total non-oil imports of the US. Employing the gravity model, he found negative, yet insignificant results, implying that AGOA had no significant impact on the non-oil exports of beneficiaries. Seyuom (2007) on the other hand, interestingly, found positive, albeit non-significant effect of AGOA on beneficiaries. His analysis also employed the gravity model on SSA export data to the US up to 2004. In a much recent study, Cooke (2011) used a matching approach to study the impact of AGOA on SSA beneficiaries. The results from his study showed that AGOA beneficiaries tend to export a lesser share of their exports to the US. The results thus point to a negative significant impact of AGOA on SSA beneficiaries.

Contrary to these results, Shapouri and Trueblood (2003) estimated that countries' responses to the AGOA at its initial phase had increased in 2002 compared to 2001. This was in line with their estimation of 15.7 percent preference margins for all AGOA products. Again, they observed that the estimated elasticities for all the commodity groups almost doubled from 2001 to 2002. Shapouri and Trueblood (2003) further moved

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to qualify their conclusions by adding that the high response does not necessarily reflect a high total export growth for all countries. In that, the observed and envisaged impacts of AGOA will not be the same for all countries. These conclusions of Shapouri and Trueblood (2003) derived after a partial equilibrium analysis conform to the earlier conclusions by Mattoo et al. (2002). However, Mattoo et al. (2002) conceded that although their analysis estimated an improvement of SSA's exports owing to AGOA, their study could not estimate the resulting trade diversion or trade creation that underpin the observed export increase. In a study by Brenton and Ikezuki (2004), they found that the benefits of AGOA mainly accrue to countries who are beneficiaries of the clothing scheme under AGOA. As part of their findings, they assert that "the ability to export clothing products under preferences with liberal rules of origin is the key factor currently determining whether the African Growth and Opportunity Act has a significant impact on non-oil exporting African countries". This falls in line with the conclusion by Shapouri and Trueblood (2003) that the benefits of AGOA differed from country to country. Brenton and Hoppe (2006) and Dean and Wainio (2006) affirmed the results of Brenton and Ikezuki (2004) by concluding that, the value of AGOA preferences excluding apparel is minimal. Even with respect to the apparel benefits under AGOA, Nouve (2005) argued otherwise that the increase in apparel exports under AGOA could rather have dire repercussions on the economies involved. He premised his argument on the fact that, countries benefiting from increased apparel export under AGOA will focus more on the apparel sector resulting in the apparent reallocation of resources from other exports sector to the apparel sector. This would dwindle the performance of other sectors of the

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economy, and may not be entirely beneficial to the country experiencing the increased apparel exports.

Following up from the literary works at the initial phases of AGOA, Frazer and Van Biesebroeck (2007) used a triple difference in differences gravity model to analyse the effect of AGOA on the exports of AGOA beneficiaries from 2000 to 2006. Their study concluded that AGOA has had marginally positive and significant impact on beneficiaries. Keck and Lendle (2012) estimated that the ratio of imports claiming AGOA preference to imports of products eligible under AGOA in 2008 stood at 92 percent. This is representative of a high utilisation of the AGOA scheme by the beneficiary countries. This notwithstanding, previous works have highlighted the potential country and product differences in the utilisation rates in the face of a high aggregated or average utilisation rate. Brenton and Ikezuki (2004) noted that whereas the average utilization rate of US preferences (GSP plus AGOA) in 2002 was over 80 percent, 24 out of the 39 beneficiaries (about 62 percent) had utilization rates below the average. Quite outstanding was the fact that 13 of the beneficiaries (representing one-third) had utilisation rates below 20 percent. A similar pattern was observed by Brenton and Hoppe (2005) when they estimated the value of AGOA preferences on a country by country basis using data from 2005. They observed that for 26 out of the 37 AGOA beneficiaries, the value of preferences was less than 2 percent of the value of exports to the US in 2005.

The perused literature above makes it very clear that the effects of AGOA on the exports of beneficiaries is not straightforward as may be suggested by the theoretical framework of trade preferences. Even in the face of positively significant effects, the majority of

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such studies holds the possibility of differing independent country effects of AGOA. That is, the effects of AGOA on independent beneficiaries may be entirely different from the effect obtained from aggregating the exports of all beneficiaries. Hence, the need to delineate the effect of AGOA on Ghana from the aggregate effect. The study, therefore adds to these literatures by trying to estimate the impact of AGOA specifically on Ghana's bilateral exports.

Some studies have also examined the viability of EU trade preferences. When it comes to preference utilisation, EU preferences are generally believed to be highly utilised (Keck and Lendle, 2012). On the contrary, other studies suggest that EU preferences are systematically under-utilised by exporters (Candau and Jean, 2005). Brenton and Manchin (2003) found that EU preference utilisation is much less in practice than on paper. In that, empirically, the degree of improved market access measured in terms of the exports of beneficiaries to the EU is less. They argued that, inasmuch as this finding is not a new finding, very little or nothing has been done to try and change this situation.

Brenton (2003), in a related study, showed that in spite of the generally low utilization of EU trade preferences (especially the EBA) among LDCs, there are considerable variations across beneficiary countries with regards to the impact of the EU preferences on bilateral exports. This, according to Brenton (2003) emanates from the differences in the export structures of countries. The study further identified that there is a group of LDCs for whom EU trade preferences do not have significant impacts on their exports. The reason advanced in defence of this observation is that the exports of these countries are mainly products with which zero MFN duty apply. In addressing the low utilisation problem, Brenton (2003) attributed the observed underutilisation to the restrictiveness of

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the rules of origin. As shown by Brenton and Manchin (2003), the precise impact of EU preferential trade agreements relies on the detailed rules that the EU imposes to govern the eligibility for preferential treatment; especially for small countries with narrow industrial base. This brings to bear the restrictions imposed by strict rules of origin on preference utilisation, and its astounding relevance in assessing the impact of trade preferences.

Strict Rules of Origin have been cited by recent researchers as one of the fundamental impediments to the potential utilisation of trade preferences. Brenton (2003) premised his scepticism about the actual benefit of the EPA mainly on the stringency of the Rules of Origin. Mattoo et al. (2003) similarly singles out Rules of Origin as the particular factor that contributes heavily to what they referred to as the "generosity" of AGOA. Mattoo et al. (2003) confirmed their assertion by modelling a general equilibrium framework and arguing that the potential benefit of AGOA in the absence of RoOs would have been five times greater. Similarly, Brenton and Ikezuki (2004) hinted that the benefits of AGOA under the clothing scheme appeared fragile under the considerations of tightening the apparel Rules of Origin in 2004.

The complexity and rigorous detailing of RoO make it virtually impossible to downplay the repressive effects of their strict enforcement on trade preferences. Candau and Jean (2005) do not mince words when they posit that "given the cost and sometimes the complexity of these constraints, the benefit of preferential agreements cannot be considered as automatic, costless nor unconditional". This claim informed their research agenda of assessing specifically, the extent to which EU trade preferences are used by exporters, and their value therein. Candau and Jean (2005) found that on average the

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utilisation of EU tariff preferences turns to be strong with the exception of the of the EBA for LDCs in South Asia. They cited the strict RoO on textiles and clothing as the main reason for the observed underutilisation. Krueger and Krishna (1995) in their analysis of trade preferences demonstrated how rules of origin can act as "hidden protectionism" and induce a switch in demand in free trade partners from low-cost external inputs to higher-cost partner inputs to ensure that final products actually receive duty free access.[27]

The analyses of RoO have taken a whole new dimension. Current research analyses of RoO have adopted a cost-benefit approach. The envisaged benefits of implementing a comprehensive RoO in any preferential trade agreement have been echoed through the efforts of preference granting countries in justifying the enforcement of the respective RoOs. The primal relevance of RoOs is to avoid trade deflection. By so doing, ensuring that the full benefits of trade preferences accrue solely to targeted beneficiaries. Another complementary advantage as hinted by existing literature in this respect[28] is the branding of preference-receiving countries as investment hubs through an uncompromising enforcement of the RoO. Candau and Jean (2005) described the positive side of Rules of Origin as creating an indirect, yet significant incentive to invest in preference-receiving countries in order to benefit from preferential market access granted to those beneficiaries.

Along the lines of restricting the utilisation of preferential trade agreements, a contributory factor is the usage of quality standards. In a study focused on India, Jayasuriya et al. (2006) employed the gravity model in investigating the impact of

[27] As cited in Brenton and Manchin (2003)
[28] See Candau and Jean (2005); Brenton (2003); Kipe (2003); Inama (2003)

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increasingly stringent and differing standards set by developed countries on exports by India's food processing industries, and found that high quality standards undermined India's exports of processed food. Their study also showed that food exported from India to EU countries and the US faced extremely restrictive standards. Concentrating on food safety standards, Baboola, et al. (2008) analysed data for processed food exports from 15 developing countries over 17 years using a gravity equation, and estimated that a percent increase in food safety standards decreased exports by approximately 0.5 percent. In spite of the identified underutilisation of trade preferences by beneficiaries, many researches have continually emphasized the relevance of trade preferences to DCs and LDCs. According to Persson and Wilhelmsson (2006), low trade flows which account for the underutilisation of trade preferences would have been exacerbated in the absence of trade preferences.

Dwelling on the effects of EU trade preferences on the exports of beneficiaries, Verdeja (2006) estimated cross section regressions using both Fixed Effects (FE) and Random Effect (RE) models over the period 1973 to 2000. He found that ACP countries gained substantially from non-reciprocal preferential trade preferences granted by the EU. Thus, the EU-ACP agreement greatly influences the exports of beneficiaries positively. Specifically, the estimated ACP variable was significant and positive in 8 out of the 10 periods covered, with coefficients ranging from 0.525 to 1.271. This outcome followed from the study by Nilsson in 2002. Nilsson (2002) employed the gravity equation in estimating a cross-section regression from 1973 to 1992. He found that the effects of the GSP and Lomé conventions on EU imports are significant for most of the years. But, the GSP effects are consistently smaller than the effects of the Lomé conventions. Some

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studies have also identified negative effects of EU preferential schemes on exports of beneficiaries. For instance, Langhammer (1983) focused on estimating the effect of the EU GSP on the bilateral export of manufactured products of beneficiaries for the 1978-1980 period. His analysis revealed that the binary variable representing GSP status was negative and significant in the period considered. He alluded to the use of quantitative restrictions against beneficiaries as one factor that explained the yielded results. Similarly, Golhar (1996) employed a gravity model and estimated a negative effect of the EU GSP. Özden and Reinhardt (2004) in a related study found that beneficiaries of the GSP perform better once they become ineligible for the program. The findings of Özden and Reinhardt (2004) support the results obtained by Golhar (1996). Specifically, Özden and Reinhardt (2004) estimated that the export-to-GDP ratio of countries removed from the EU GSP was 2.6% higher, compared to beneficiaries. Using the OLS estimation technique, Özden and Reinhardt (2004) estimated the coefficient of the GSP dummy to be - 0.252 and statistically significant. Thus, removal of the GSP is associated with a 22.3% $(1 - \exp^{-0.252})$ difference in exports.

Nilsson (2007) compared the effects of EU and US trade policies on developing country exports using the gravity equation. Estimating yearly cross-sections for 2001-2003, he found quite significant and positive effects of EU trade policies on exports of beneficiaries. Nilsson estimates the effects to be about 30 percent for all developing countries and 50 percent for low income countries. Again, the results indicated that the Cotonou Agreement had increased exports to the EU relatively more compared to exports to the US under AGOA. This outcome is supported by Haveman and Schatz (2003) who estimated that EU preferences have increased exports from LDCs by about 45 percent as

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compared to 10 percent in the case of the US. Davies and Nilsson (2013) conducted a similar comparative analysis of EU and US trade preferences for their respective beneficiaries. Their analysis showed that a larger share of EU imports benefited from duty-free MFN tariffs compared to the US. All these studies that compare the EU and US trade preferences adopted the gravity equation in estimating the effect of the trade preferences.

The estimation of the trade preference effect has been one of the econometric issues grappling the minds of trade analyst. The issue has been the determination of a most appropriate model that captures and accurately estimates the effects of trade preferences. A key issue of concern in this regard has been the measurement of trade preferences. Many studies in analysing and estimating the effects of trade preferences have adopted the gravity model which was first used in the bilateral trade analysis by Tinbergen (1962) and Pöyhönen (1963). Other studies, however, adopt a partial equilibrium modelling framework (for instance Shapouri and Trueblood, 2003).

The explanatory variables used by Tinbergen in explaining bilateral trade flows were the income levels of the importing and exporting countries as well as the bilateral distance between the trading partners. Income was used as an indication of the economic size (mass) of the trading countries whereas distance was used as a proxy of transport costs. Since the pioneering studies by Tinbergen and Pöyhönen, different variants of the gravity model have been adopted in estimating the trade effects of numerous preferential trade schemes. These variants of the gravity model basically depend on the a broader definition of what constitutes trade cost. For instance, Agostino et al (2007) in using the gravity model introduced population to augment the income measure of the economic size of the

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trading countries. Also, country-specific bilateral variables such as common border, language, colonial ties and landlocked were included to measure the effect of natural cost (cost associated with how countries are spread globally and the natural nature of countries).

In the estimation of trade preferences, a common approach adopted in capturing preferences in the gravity model is to include them as independent dummy variables. Among studies that capture trade preferences as dummies are Turkson (2012), Persson and Wilhelmsson (2013), Davies and Nilsson (2013), Agostino, et al. (2007), Aiello and Demaria (2009), Laaksonen et al. (2007), Nilsson (2002), Verdeja (2005). For example, Turkson (2012) in estimating the effects of non reciprocal preferential trade agreement between SSA and the EU introduced two dummies (EUSSA to capture the non-reciprocal nature of the PTA and SSAEU PTA to capture the preferential treatment offered). Persson and Wilhelmsson (2013) used a large set of preference dummies which covered the MED, GSP, LDC GSP, and the ACP conventions by the EU. Similar to this, Agostino et al (2007) used three non-reciprocal preference dummies, that is, GSP, LDC GSP and other preferences.

Agostino, et al. (2007) identified two inconsistencies in using the existing gravity equation to assess the impact of non-reciprocal preferential trade policies (NRPTPs). The bias they identified are the use of of the aggregate export flows at country level and also the econometric approach adopted in estimating the NRPTPs. In addressing these two inconsistencies, their study adopted bilateral export data at several aggregate levels. They considered total exports, total agricultural exports and export data, at the 2-digit level. In this respect, they concluded after considering all NRPTPs granted by 8 major OECD

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countries that NRPTPs have a positive impact on total exports from developing countries. However, using the export data at 2-digit level, it emerged that the effect of ordinary GSP, GSP for LDCs and other preferences is not always positive and statistically significant (Agostino, et al., 2007- page 30). Concerning the econometric estimation, they took into account the unobservable country heterogeneity as well as the endogeneity of trade preferences. Addressing the problem of unobserved country heterogeneity, Agostino, et al. (2007) used the Least Squares Dummy Variables (LSDV) approach. This approach, as used by the study decomposed the error term of the gravity specification into comprising time-invariant import and export-country fixed effects. This study would, instead, adopt the fixed and random effect models to account for the heterogeneity bias. Furthermore, their study tested for the endogeneity of trade preferences by using the Durbin-Wu-Hausman (DWH) endogeneity test, that compares the Ordinary Least Square and Instrumental Variable estimations. The results from the DWH test allowed for the rejection of the hypothesis that the preferential variables are endogenous in all estimations. The estimation also addressed the selection bias posed by zero-trade values.

Turkson (2012) addressed the problem of possible endogeneity of preference dummies by adopting the Hausman-Taylor panel method. The Hausman-Taylor estimator assumes that some explanatory variables are correlated with the individual level random effects, but none is correlated with the idiosyncratic error. This estimator thus uses the average values of the time-variant exogenous variables and the deviations from these averages as instruments for the time invariant endogenous variables (Turkson, 2012). Egger and Pfaffernayr (2003) also noted that the Hausman-Taylor panel method incorporates time invariant variables that are correlated with bilateral specific effects in the estimation.

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Laaksonen et al. (2007) placed a spotlight on the Lomé conventions and thoroughly described the components and requirements of these agreements between the European Union and ACP countries. This study, however, focuses on the Cotonou Agreement. Laaksonen, et al further employed the gravity model to estimate the impact of the lomé convention on the disaggregated exports (at the product level) of 20 Lomé and 12 non-Lomé countries; focusing on cocoa, coffee and sugar. In modelling their gravity equation, they considered the real GDPs and populations of both the importing and exporting countries. Following Agostino, et al (2007), the study also addressed the problem of endogeneity by using the method of 2 Stage Least Square (2SLS) Instrumental Variable to estimate the gravity equation. They employed the 2SLS method after conceding that the potential two-way feedback between a country's exports and its GDP could account for the presence of endogeneity. Again, to capture the effects of the Lomé Conventions, dummy variables were introduced into the models to represent each convention. The results of the study suggested that broadly, the Lomé preferences had a positive impact on the exports of beneficiaries. Notwithstanding, the product level aggregation analysis showed that cocoa and sugar exports seemed to have benefited from the Lomé preferences, whereas the effects on coffee exports was ambiguous.

In a quite similar paper, however, expanding the trade preferences under scrutiny, Cardamone (2011) uses monthly data at HS8-digit level in a gravity equation to evaluate the impact of trade preferences on fruits and vegetables (focusing on five products; fresh grapes, apples, pears, oranges and mandarins). The study concludes that the impact of EU trade preferences is commodity-specific. In that, the impact differs according to the commodity concerned. In this regard, she particularly identified that the GSP has a

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positive impact on the export of fresh grapes only to the EU whereas, the EU-ACP preference (specifically, the Cotonou agreement) is much more effective in increasing the exports of oranges.

Aiello and Demaria (2009) complemented this analysis by focusing on the EU GSP. They evaluated the impact of trade preference in enhancing the exports of developing countries' exports to the EU. Considering 769 products from 169 developing countries, their study estimated a gravity model and concluded that the EU GSP has a positive and significant impact on the agricultural exports of beneficiary countries. The treatment of the GSP in this study follows the dummy representation as in the reviewed literature above.

3.4 Conclusion

The economic effects of trade preferences on preference receiving nations are captured by the free trade analysis of international trade. The theoretical literature seems to justify a positive effect of trade preferences on beneficiaries. However, the perused empirical studies show that the effects of EU and US trade preferences, as well as Non-Reciprocal Preferential Trade Agreements in general on beneficiaries (mainly SSA), could be either positive or negative. Most of the studies have investigated the effects of these trade preferences on regional blocs, ignoring the differing impacts on individual countries. In estimating the effects of trade preferences on the regional blocs, most of these studies adopted a gravity equation which included bilateral covariates such as distance, common currency, language and colonial history. Few of these studies have included a multilateral

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resistance term to capture the influence of the relative positioning of trading partners. This study adds to existing literatures by bridging these identified gaps.

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CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter begins by giving a detailed overview of the theoretical foundations of the gravity model. The chapter continues to present a discussion of the exact methodology, highlighting the specific estimation techniques employed and describes the data used for the estimation. Major econometric issues pertaining to panel regression are discussed. At the same time, evidence of how the study addresses these identified problems are discussed and justification provided.

4.2 Theoretical Foundations of the Gravity model

The gravity model was introduced by Tinbergen (1962) and developed by Linneman (1966) to establish and explain the relationship between the trade flows of two countries. From international trade theory, the volume of trade between two different countries basically hinges on two broad factors. That is, the size of the countries involved and the costs associated with the trade. The size of the countries can be segmented into economic size, geographical size and population size. The trade cost is known to consist of tariff and non-tariff barriers to trade. The theoretical analysis of the tariff cost is somewhat straightforward compared to the non-tariff cost. Notwithstanding the outcome of several studies, which suggest that free trade agreements increases trade flows through reducing

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trade costs, it is still unclear as to which element of these trade agreements plays a significant role.

The concept of the gravity model emerged from Newton's law of universal gravity, which states that the attractive force between two objects is dependent on the gravitational constant, the masses of the two objects and the distance between the objects. Newton's result was that, there exists a positive relation between the attractive force between two objects and the masses of the objects. However, the distance between the two objects is inversely related to the attractive force.

Similar to Newton's gravity, the gravity model as used in economics seeks to provide explanations to some of the factors that explain the "trade force" between countries. That is, what factors are responsible for influencing international trade? Just as Newton's law of gravity predicts, the gravity model predicts an inverse relationship and positive relationship between the volume of trade and the distance between countries and the sizes of the countries respectively.

The theoretical justifications of these hinted relationships border greatly on trade cost. All variables that reduce trade cost would tend to foster trade. Distance, according to the model, imposes trade costs through transportation cost. That is, the more countries are separated by way of geographical distance, the lesser the trade flows between those countries. The larger the distance between countries, the higher the transport cost involved in trading between the countries. An increase in transportation cost increases trade cost. As a result, it becomes very costly for such nations to trade. Hence, a fall in the trade between such countries.

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Several researchers have tried to provide theoretical justification for the conclusions of the gravity model. However, the much referenced justification was by Anderson (1979). Anderson (1979) developed a gravity equation based on the micro foundations of monopolistic competition. In analysing the gravity model, Anderson (1979) assumed the heterogeneity of goods. He differentiated goods based on their respective countries of origin.[29] Anderson (1979) proceeded to identify that individuals reveal their preferences over all of the differentiated goods. This suggests that countries, to say the least, would consume at least some of every good from every country. So, Anderson (1979) supported the rational behind trade between countries on the basis of the differentiation of goods. Hence, one key conclusion that can be inferred from Anderson (1979) is that, all countries trade someway somehow. He eventually concluded that larger countries export and import more. This conclusion followed the premises that all goods are traded, and that all countries trade. This work formed the groundbreaking piece to pave way for the development of other gravity-related theories.

Bergstrand (1985 and 1989) adopted a monopolistic competition approach in justifying the gravity equation.[30] In his work, Bergstrand further developed the work by Anderson (1979) in understanding the microeconomic underpinnings of the gravity model. He went about his analysis in a general equilibrium framework with optimizing behaviour. Bergstrand's approach suggested that the gravity equation depended on the size of the respective countries, transport cost, preferences for differentiated goods, and endowment. The unique characteristic of the Bergstrand approach is the incorporation of what seems to be Hecksher-Ohlin (HO) conclusion in the gravity model. Deardorff (1997)

[29] This assumption is popularly known as the "Armington assumption" (see Armington, 1969).
[30] The monopolistic competition framework was developed by Paul Krugman. See Krugman (1980).

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emphasizes the incorporation of the HO model with the gravity equation. From his work, Deardorff (1997) shows that the gravity model is consistent with the HO model where each country specializes in a distinct good.

Anderson and Wincoop (2003) in a follow up to the work of Anderson (1979), derived a gravity model which equated the bilateral trade between two countries to the product of their respective national incomes, and the bilateral trade barrier between these two countries. The work of Anderson and Wincoop (2003) is widely seen as the standard reference for the theoretical foundation of the gravity model (Nilsson & Matsson, 2009). The derivation of the gravity model was based on the assumptions of identical homothetic consumer preferences, market clearance and symmetric trade costs, among others. Anderson and Wincoop (2003) identified that the gravity model is grounded on certain main assumptions. They referred to these as the building blocks of the gravity model. According to them, the first building block is that all goods are differentiated by place of origin. They proceed to assume that each region is specialized in the production of only one good. Hence, supply of each good is fixed. The second building block they emphasize is identical, homothetic preferences, approximated by a Constant Elasticity of Substitution (CES) utility function.

The research community has expressed keen interest in defining and including several variables that prove to be empirically useful to trade determination in the specification of the gravity equation. Aside the traditional independent variables identified by the gravity theory, there are other new variables that have been identified and introduced as contributing greatly to trade flows. They include cultural and political affinity (such as colonial ties, currency similarities), trade preferences, and population. Over the past

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decade, the gravity equation has emerged as the empirical workhorse in international trade to study the ex-post effects of trade preferences on bilateral trade flows (Cipollina, et al., 2013).

4.3 Model Specification

For the purpose of estimating the trade effects of AGOA and EU-ACP trade agreements on Ghana's bilateral exports, the study adopts the gravity model. The gravity model has demonstrated an excellent empirical robustness in describing trade flows (Kepaptsoglou et al., 2010). Also, the gravity model is the most popular among simulation and econometric approaches mainly because of its robust performance and limited need for parameter assumptions (Philipin and Molini, 2003).[31] The study adopts the traditional variables of the gravity model as introduced by Tinbergen (1962). Other variables are, however, introduced into the model to satisfy new developments in international trade theory as well as to help explain developments in Ghana's bilateral exports. This section begins by specifying the gravity model in its simplest original form and eventually, augmenting it to suit the principal objective of the study.

The gravity equation relates bilateral trade flows to Gross Domestic Product (GDP), distance and other factors that affect trade barriers (Anderson and Wincoop, 2003). Agostino, et al. (2007) also noted that a gravity model represents trade flows as being determined by variables that describe the demand of importing countries, the supply conditions of exporting countries, and the bilateral trade barriers. In the gravity model,

[31] As cited in Kepaptsoglou, et al. (2010)

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the independent variables enter the equation multiplicatively. The traditional gravity equation following from Tinbergen (1962) and Anderson (1979) is of the form;

$$X_{ij} = A \cdot Y_i^{\beta_1} \cdot Y_j^{\beta_2} \cdot Z_{ij}^{\beta_3} \cdot \varepsilon_{it} \quad (4.3.1)$$

X_{ij} is trade flow from country i to j; Y_i and Y_j measure the economic size (GDP) of country i and j respectively. For the purpose of this study, the land area of the trading countries and their respective populations are included to further gauge the economic masses of the trade partners (e.g Afesorgbor, 2013; Turkson, 2012). Z_{ij} is a set of observable bilateral variables that impose trade cost and ε_{it} is the error term.

The simple specification of the gravity model uses distance as a proxy of trade cost. The distance measure is expected to be negatively correlated to trade. This is because distance increases the cost involved in trading, especially transport cost. Also, it is observed that countries tend to trade less with partners who are geographically distant. Chaney (2011) confirmed this by succinctly stating that "as long as firms engage in direct communication with their client and suppliers, and information permeates through these direct interactions, one ought to expect that aggregate trade is inversely proportional to distance".

For econometric purposes, a log-linearized form of equation (4.3.1) is often estimated. However, several studies have pointed out the possible flaws with this procedure. Often cited is the study by Silva and Tenreyro (2006). In their study, they found overwhelming evidence that suggested that the variance of the error terms in the normal log-linear representation of the gravity equation are not zero. That is, using the log-linear

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specification, least square estimates would suffer from heteroskedasticity. In spite of this, the study adopts the log-linear specification and corrects for heteroskedasticity in the model. The log-linear specification of (4.3.1) is presented below as;

$$\ln X_{ij} = \alpha_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln Z_{ij} + \varepsilon_{it} \quad (4.3.2)$$

Decomposing the set of bilateral variables (Z_{ij}) in equation (4.3.2) forms the basis for the observed difference in the specification of the gravity model used by existing literature. Fundamentally, several studies separate distance from this set of bilateral variables in the model specification. This is simply because whereas the other bilateral variables are introduced as dummies, distance is not a dummy variable. So, in the log specification, the natural log of the distance is taken whereas the dummy variables are not logged. The inclusion of these variables depends essentially on how broad trade cost is defined.

Trade costs have been classified as primarily emanating from two sources; natural sources and artificial sources. The natural costs encapsulate all costs incurred as a result of the geographical location of countries. These include transportation cost, costs associated with the landlocked nature and contiguity of countries. The artificial trade cost, on the other hand, refers to "man-made" costs. They are mainly tariff and non-tariff costs. With regards to the natural costs, several literatures have included different measures of these costs in their gravity specification. McCallum (1995) estimated a traditional gravity equation with two measures of natural cost (i.e. bilateral distance and a 'same-country' dummy). The 'same-country' dummy was included to determine the extent to which internal trade outweighed cross-border trade in terms of trade volumes. McCallum (1995) after estimating his augmented gravity equation for US states and

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provinces in Canada, and controlling for distance and size, found that trade between provinces were twenty-two times more than trade between states and provinces. This highlighted the presence of substantial cross-border trade cost. Following this study, Anderson and Wincoop (2003) refined the theoretical basis of the gravity model by including "Multilateral Trade Resistance (MRT)" variable. The inclusion of this variable was motivated by the proven belief that the overstated impact of national borders, as found by McCallum (1995) could be alluded to an artificial trade cost. This resistance was not captured by McCallum's specification of the gravity model which assumed free trade (Verdeja, 2006). Studies such as Wei (1996), Evans (2003), and Anderson and Wincoop (2003) have also contributed to the studies that seek to estimate the effect of border-related trade costs in the gravity model. Anderson and Wincoop (2003) specified their augmented gravity equation as;[32]

$$X_{ij} = Y_i^{\alpha} Y_j^{\beta} \left(\frac{t_{ij}}{\Pi_i P_j} \right)^{33} \qquad (4.3.3)$$

Where, Π_i and P_j are the exporter and importer MRT, and t_{ij} is the bilateral trade cost between the two countries. Van Bergeijk and Brakman (2010) argued that the MRT is relevant in determining bilateral trade, as the relative position of two countries influences the trade between the two countries. The method proposed by Anderson and Wincoop (2003) in estimating the MRT was computationally demanding (Afesorgbor, 2013). As a result, some studies proposed alternative estimation methods. Wei (1996) developed proxy variables (ie. exporter and importer remoteness index) as measures of the MRT.

[32] This section draws heavily from chapter 2 of Turkson (2012).
[33] As cited by Afesorgbor (2013)

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Baier and Bergstrand (2007) also suggested the use of time varying bilateral fixed effects to control for the MRT. Rose and Wincoop (2001) also used country specific binary variables to account for the MRT. In line with the difficulty in measuring the MRT proposed by Anderson and Wincoop (2003), the study adopts the approach by Baier and Bergstrand (2007) and Wei (2008) by adopting a remoteness index to proxy the MRT.

Other variables that measure natural costs and country differences such as being landlocked, sharing a common currency, border or language, and past colonial ties have been considered by some studies (see among others Agostino et al., 2007; Feenstra et al., 2001, Lederman and Ozden, 2007). The study includes country-specific and bilateral variables such as Contiguity, landlocked, common language, common colonial history and common currency. The contiguity, Landlocked and common language bilateral variables are included to account for major time-invariant factors that affect exports. The dummies for common colonial history and language are used to capture information costs. Countries with a common language and colonial history are likely to know and understand each other well compared to countries without a common history. For this reason, countries are more likely to trade with partner countries who share a similar culture (with respect to language and colonial history). It can be shown that without incorporating these effects into the gravity specification, the parameter estimates of the model can lead to incorrect inference as their values may artificially be inflated or deflated by this misspecification (Mátyás, 1997). These variables have zero within variations and remain constant over time.

Hummels (1999), Hutchinson (2002) and Dunlevy (2006) identified common language as an important determinant of trade flows in the gravity model. Also, Radelet and Sachs

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(1998) found that landlocked countries suffered transport cost which was twice as high as that for coastal countries.

Still on trade cost, studies that seek to capture artificial cost have mainly focused on the cost associated with tariff barriers. Notwithstanding, studies such as Head and Mayer (2000), Chen (2004) paved the way for further interrogations into the effects of Non-Tariff Barriers (NTBs) on trade as their results sparked controversies. The results of these studies showed that NTBs have little effect on trade.

Tariff barriers are generally represented in the gravity specification by including dummies for the existence of regional trade agreements, and preferential trade agreements. These trade preferences, either reduce or eliminate the tariff barriers to trade. Hence, trade is expected to increase in the presence of these preferences. Now, most preferential trade agreements are being made to cover both tariff and non-tariff costs. So, recent literatures have sort to include these trade preferences to cater for artificial cost and at the same time estimating the significance of these preferences. Quite a number of studies that consider trade preferences have been reviewed in chapter three. In the case of this study, two main preferential trade agreements (that is AGOA and EU-ACP) which entail unilateral reductions in tariff and non-tariff barriers granted by the US and EU respectively are considered.

Incorporating all these adjustments into the traditional gravity equation, the model to be estimated is specified in a log-linear form as opposed to the non-linear specification by some studies (e.g Coe et al, 2002; Ewing and Battersby, 2005) as;

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$$\ln X_{ijt} = \alpha_0 + \beta_1 \ln(Y_{it}) + \beta_2 \ln(Y_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4 \ln(POP_{it}) + \beta_5 \ln(POP_{jt}) + \beta_6 \ln(AREA_i) + \beta_7 \ln(AREA_j) + \beta_8 REMOTE_{ijt} + \beta_9 CONT_{ij} + \beta_{10} LANG_{ij} + \beta_{11} COMCUR_{ijt} + \beta_{12} COL_{ij} + \beta_{13} LLCK_j + \varphi_1 EUACP_{jt} + \varphi_2 AGOA_{jt} + \varepsilon_{it} \quad (4.3.4)$$

Where; j = destination of exports from Ghana; t = time; and ε_{it} is a log-normally distributed error term with $E(\ln\varepsilon_{it}) = 0$.

From equation (4.3.4), bilateral exports at time t, X_{ijt} is expressed as a function of GDP (Y_{it} and Y_{jt}), the distance between Ghana and export destinations (D_{ij}), a set of control variables that are used as proxies for some bilateral and country characteristics, and the idiosyncratic error term (ε_{it}). The country-specific variables include Population (POP_{it} and POP_{jt}) which is time-variant. Area ($AREA_i$ and $AREA_j$) and the landlocked nature of the importing countries ($LLCK_j$) are time-invariant. The bilateral characteristics included in the model are remoteness of both countries ($REMOTE_{ijt}$), sharing of a common border ($CONT_{ij}$), usage of a common language ($LANG_{ij}$), common currency ($COMCUR_{ijt}$), and common colonial ties (COL_{ij}). Dummy variables for the EU-ACP agreement and AGOA are included as $EUACP_{jt}$ and $AGOA_{jt}$ respectively. The subscripts i and j refer to Ghana and the importing countries respectively.

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4.4 Data and Variables

The dependent variable is the bilateral exports of Ghana to 192 destination countries[34] (Africa-52, America-40, Asia-46, Europe-43, Pacific-11). The explanatory variables consist of the traditional gravity variables (that is GDPs and Distance), and population. Remoteness is also included to proxy the Multilateral Resistance Term. Other covariates of the gravity model such as the common colonial ties, common currency, contiguity, common language, and the landlocked nature of export destinations are added.

4.4.1 Description of Variables

The explained variables often used in trade gravity models are bilateral exports and bilateral trade flows. Quite a significant number of studies have treated the average of two-way bilateral trade as the dependent variable (e.g Tomz, et al., 2007; Glick and Rose, 2002; and Rose, 2004). However, almost all theories that underlie a gravity-like specification yield predictions on unidirectional bilateral trade rather than two-way bilateral trade (Gil-Pareja et al., 2014). This informs the choice of bilateral exports as the explained variable used in the analysis. Most importantly, the study chooses bilateral exports instead of bilateral trade flows basically because the focus of the study is to investigate how the trade preferences have impacted Ghana's export capacity.

The explanatory variables employed can be broadly categorised as demand and supply variables, and trade obstructing variables. The mass variables that connote the supply and demand conditions of the trading countries are primarily measures of a country's economic and market size; proxied by GDP, population and area size. Some studies have

[34] See Appendix VII for the list of importing countries considered.

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explicitly included GDP per capita to measure the purchasing power of both importing and exporting countries (e.g Nilsson, 2002; Verdeja, 2006). This study, however, does not include the per capita measure of GDP. This is to avoid the presence of possible multicollinearity among the variables. The specified model in equation two is likely to suffer multicollinearity should GDP per capita be included as a complementary measure of economic size in addition to the GDP. Verdeja (2006) dropped the GDP per capita variable on grounds that it added no useful information to the equation since size is already being measured by GDP. In addition, a remoteness variable is included to capture the MRT identified by Anderson and Wincoop (2003). The other explanatory variables considered are distance, landlocked, common border, common currency, common language, and common colonial ties.

Bilateral Exports (X_{ijt}): This refers to the total value of exports from Ghana to respective export destinations. Owing to data availability, the total bilateral imports of the importing countries from Ghana, denominated in US dollars, are used in place of the bilateral exports. Since a domestic country's exports are the same as the foreign countries' imports from the domestic country; accounting for data measurement differences, there is no problem with the data used. According to Head, Mayer and Ries (2010), import reports are more reliable than export reports possibly because governments track imports closely because they are subject to customs duties. The bilateral import statistics were sourced from the UN COMTRADE. Data retrieved from the UN COMTRADE are reported according to the Harmonised System (HS).

Gross Domestic Product (Y_{it} and Y_{jt}): Y_{it} and Y_{jt} are used to represent the economic size of Ghana and the export recipients. The variant of GDP used is the GDP measured at

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current US dollar (millions), sourced from the World Bank's World Development Indicators (WDI).

Distance (D_{ij}): D_{ij} is a time-invariant measure of the geographical distance between Ghana (i) and the respective importing countries (j). Data for the distance measure is sourced from the CEP II gravity database on distance measurement. D_{ij} as computed by CEPII follows the great circle formula which uses the longitudes and latitudes of centers, and captures the weighted distance measure.

Remoteness ($REMOTE_{ijt}$): This is included to capture the multilateral resistance to trade. Following Baier and Bergstrand (2002) and Turkson (2012), the study calculates remoteness by taking an average of the weighted mean of the distance from Ghana to all trading partners except country j. The resulting average is log-transformed. The weights refer to the proportions of world GDP held by the trading partners. The share of world GDP is computed as the ratio of partner countries' GDP to the world GDP.

Population (POP_{it} and POP_{jt}): POP_{it} and POP_{jt} are used to represent the total population of Ghana and the respective bilateral import countries over time (measured in millions).

Area ($AREA_i$ and $AREA_j$): $AREA_{it}$ and $AREA_{jt}$ measure the geographical land size measured in square kilometers of Ghana and the importing countries respectively.

$AGOA_{jt}$: This is a dummy variable, assuming the value of 1 if both Ghana and the importing country are members of the African Growth and Opportunity Act at time t. It assumes a value of 0 if otherwise.

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$EUACP_{jt}$: This is a dummy representation of the trade preference agreement between the European Union, and the African Caribbean and Pacific countries. EU-ACP is simply denoted by 1if both Ghana and a member of the EU 28 belong to the EU-ACP agreement at time t. The value of the dummy variable is 0 if otherwise.

Other bilateral dummy variables included in the model include $CONT_{ij}$ assuming a value of 1 if the two countries involved share a common land border and 0 otherwise. Also, $COMCUR_{ijt}$, COL_{ij}, and $LANG_{ij}$ assume a unitary value if both importing and exporting countries use a common currency, share a colonial history, and share a common official language respectively. Otherwise, the variables assume a value of 0. LLK_j measures the landlocked nature of the importing country. It assumes a value of 1 if the importing country is landlocked, and 0 if the importing country is not landlocked.

4.5 Estimation Techniques

The study estimates the gravity model specified in equation (4.3.4) using an unbalanced bilateral export panel of about 7449 data observations collected for 192 countries, for the period 1960 to 2013. After eliminating zero export flows from the data, the importing countries and observations used for the analysis reduced to 181 and 4671 respectively. The study adopted a panel estimation in order to capture both between and within variations. Also, panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom and more efficiency (Gujarati, 2004 4ed). Again, panel data allow us to collate data on Ghana's bilateral exports and at the same time make it possible to account for certain unobserved individual variables that affect

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Ghana's bilateral exports but not addressed in the traditional gravity model. For instance, Rault et al (2007) noted that the impacts of historical, cultural and linguistic links in trade flows, if not considered, can lead to biased estimates. Also, the presence of common bilateral relationships, such as past memberships in common trade area could yield similar results. For this matter, the study chooses panel data over cross-section or time series data, because, panel data can enrich empirical analysis. This view is supported by Mátyás (1997), Egger (2000), Ghosh and Yamarik (2004), and Kepaptsoglou, et al. (2010). Matyas (1997) argued that the appropriate specification of the gravity model is a three-way model. Egger (2000) added that, there is the temptation of interpreting coefficient in a cross-section analysis in a conceptually inappropriate manner (ie. interpreting coefficients in the same way) as opposed to the ideal way of interpreting as a composite of within and between effects. Panel analysis, interprets the parameters as elasticities of the influence of the regressors on the regressand. Panel analysis is employed to appreciate the within-country and between-country dynamics of the trade preferences and to control for certain unobserved characteristics of the countries (Wooldridge, 2012).

The study begins by running a simple OLS regression. The estimated simple regression equation suffers from omitted variable problems. One way of resolving this problem is by introducing more factors that may affect the dependent variable. This approach may not be reliable as it may be essentially difficult to identify all factors that could affect the dependent variable. As a result, the study introduces time dummies and an additional variable to cater for the time-invariant unobserved variables. Introducing these control variables, we re-specify equation (4.3.4) as;

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$$\begin{aligned}\ln X_{ijt} = {} & \alpha_0 + \beta_1 \ln(Y_{it}) + \beta_2 \ln(Y_{jt}) + \beta_3 \ln(D_{ij}) + \beta_4 \ln(POP_{it}) \\ & + \beta_5 \ln(POP_{jt}) + \beta_6 \ln(AREA_i) + \beta_7 \ln(AREA_j) \\ & + \beta_8 REMOTE_{ijt} + \beta_9 CONT_{ij} + \beta_{10} LANG_{ij} \\ & + \beta_{11} COMCUR_{ijt} + \beta_{12} COL_{ij} + \beta_{13} LLCK_j + \varphi_1 EUACP_{jt} \\ & + \varphi_2 AGOA_{jt} + \delta_i + \phi_t + \varepsilon_{it} \qquad (4.3.5)\end{aligned}$$

From (4.3.5), the unobserved country heterogeneity (δ_i) captures all unobserved factors that affect X_{ijt} but are constant over time. This is why the variable has no 't' subscript, to show for its constancy over time. The coefficient of the unobserved effect is set to one. This is because δ_i is unobserved and virtually has no natural unit of measurement. So it would be meaningless to try to estimate its partial effect (Wooldridge, 2002). In addition, the time dummies (ϕ_t) are constant across countries, but vary over time.

The pooled OLS estimation technique is used to estimate the parameters in equation 4.3.5. One of the advantages of using pooled regression is its ability to explain the past while simultaneously predicting future behaviour of exogeneous variables in relation to endogeneous variables (Moon, et al, 2004). Under the pooled OLS regression of (4.3.5), the parameter estimates would be consistent and unbiased when the covariance of the unobserved heterogeneity and the explanatory variables is assumed to be zero. Hence, the unobserved country heterogeneity is uncorrelated with the explanatory variables. Also, for the pooled OLS estimation to be valid the mean of the error term has to be zero, the variance of the error terms across observations has to be constant, and there should be no correlation between the error terms of different time periods (Moon et al, 2004). According to Moon, et al (2004), the accuracy of the regression model is inevitably

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measured by the error term. There are a number of methodological disadvantages associated with using the pooled regression.

According to Stimson (1985), the basic assumptions underlying traditional OLS regression are violated in a pooled model, and such departures may exhibit severe consequences for the reliability of the estimators. With regards to heterogeneity bias, when the unobserved effect is combined with the idiosyncratic error term to form the composite error term, assuming that the idiosyncratic error term is uncorrelated with the regressors alone does not guarantee an unbiased and inconsistent parameter estimate of the pooled OLS. This is true because any possible heterogeneity bias (ie. correlation between the country-specific unobserved effect and the explanatory variables) would render the parameter estimates biased and inconsistent. Therefore, allowing for a possible correlation between the unobserved effect and the explanatory variables does not make the pooled OLS estimator ideal for the estimation. Egger and Pfaffermayr (2003) argued that the omission of specific country pair effects can bias the estimated coefficients. To overcome this problem of serial correlation, the method of "First Differencing" is often recommended to remove the time-invariant effects. With this, data in adjacent periods are differenced after which pooled OLS is used to estimate the parameters of the differenced equation, given that the error terms of the differenced equation are homoskedastic and serially uncorrelated.

Another way to address the unobserved effect which is adopted in the study, is to employ the fixed effects transformation. This approach assumes that there is correlation between the unobserved heterogeneity and the explanatory variables and hence transforms the data into deviations from individual means. By doing so, the fixed effect estimator, also

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referred to as the within estimator eliminates the time-invariant effects. Basically, fixed effects transforms data into their time-demeaned forms[35] and eventually pooled OLS is used to estimate the time-demeaned variables. One disadvantage of the Fixed Effect Model (FEM) is that it trades consistency for efficiency. This is so because, using only within variation ignores the effect of the between-unit variations and hence results in large standard errors. Another disadvantage of using this fixed effect estimation is that, all time invariant variables in the specified model are omitted. As a result, if the variables of interest are constant over time, another estimation technique referred to as the Random Effect Model (REM) is prescribed. The REM assumes that there exist zero correlation between the unobserved effects and the explanatory variables so as to estimate the parameters of any time-invariant and time-variant variable in the model.

The selection between random and fixed effects relies on the interests of the analysis, the country sample, the data properties and the underlying theoretical model used. Fixed effects are better for short term prediction purposes. Random effects should be considered if they are adequately consistent and there is an interest in estimating time-invariant effects. For this analysis, the study employs the Hausman (Chi^2) test to decide between which of these two estimation techniques to use for final interpretation. The Hausman test tests for the hypothesis that the unobserved country heterogeneity is uncorrelated with the explanatory variables. Thus, a rejection of the null hypothesis of the Hausman test suggests that the fixed effect model is the appropriate estimator for equation (4.3.5). Essentially, the Hausman χ^2 statistic tests for the orthogonality of the random effects and the regressors, this is thus a test for misspecification (Egger, 2000).

[35] That is the difference between the variables and their individual means. See Wooldridge (2002)

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One problem confronted in estimating the gravity equation is the exogenous specification of the AGOA and EU-ACP preferences (Baier and Bergstrand, 2002). In the specified model AGOA and EU-ACP are represented as right hand exogenous dummy variables. However, Baier and Bergstrand (2005) showed that trade agreement dummies are not strictly exogenous owing to omitted variables, simultaneity bias, and measurement error. Magee (2005) found that two countries are most likely to sign an agreement the closer their geographical locations, the more similar their economic sizes are and the more they trade. GDP, which is a function of exports and imports is potentially endogenous to bilateral trade flows (Baier and Bergstrand, 2002). However, Frankel (1997) reported that the endogeneity of income makes little difference. This study, therefore, focuses on the endogeneity of the AGOA and EU-ACP dummies. In resolving this problem, the study adopts the Hausman-Taylor (HT) estimation technique proposed by Hausman and Taylor (1981). The HT estimator controls for endogeneity by using the average values (and their deviations) of the time varying exogeneous variables as instruments for the time invariant endogeneous variables (Turkson, 2012). Egger and Pfaffermayr (2003) also indicated that a fixed effect model can be used to control for the endogeneity of trade agreements. This study, therefore, compares the results of the Fixed effects with the results from the Hausman-Taylor estimation. The FEM assumes that the regressors are correlated with the unobserved specific effects, whereas the REM assumes that there exists no correlation between the regressors and the individual heterogeneity. However, the Hausman-Taylor model assumes that some regressors are correlated with the heterogeneity bias. The usefulness of the Hausman-Taylor over the REM and FEM is that, the HT allows for

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controlling the variables that are correlated with bilateral effects in the estimation (Turkson, 2012).

The expected signs of the estimated parameters are based on traditional arguments. Typically, we expect a positive sign for the parameter estimates of the economic size variables, common language, and common colonial history. The distance variable together with the landlocked dummy are expected to have negative parameter estimates.

4.6 Diagnostic tests

The study tests mainly for the presence of serial correlation and heteroskedasticity in the model. Also, the significance of time effects is tested for. The study, does not focus much on the test for multicollinearity since one advantage of panel data is that they contain less multicollinearity (Hsiao, 2007).

4.6.1 Serial Correlation and Heteroskedasticity

The standard error component panel data model assumes that constant serial correlation through the random individual effects and homoskedastic variance of the disturbance (Baltagi, et al., 2008). These assumptions place econometric restrictions on the empirical applications of panel data models.

Serial correlation is often an estimation problem associated with time series data. Since Panel data comprise of time elements, panel data is by extension not insulated from the problem of serial correlation. The presence of serial correlation also referred to as autocorrelation in a model simply suggests a mis-specification of the model. This could

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arise from either the omission of relevant variables, or the inclusion of irrelevant variables, or a combination of both possibilities (Granger and Newbold, 1974). Three well-known major consequences of autocorrelated errors in regression analysis identified by Granger and Newbold (1974) are that;

(i) Estimates of the regression coefficients are inefficient.

(ii) Forecasts based on the regression equations are sub-optimal.

(iii) The usual significance tests on the coefficients are invalid.

Owing to these statistical problems identified with serial correlation, the study adopts the test for serial correlation in linear panel models derived by Wooldridge (2002). We employ this test ahead of other tests such as the Baltagi-Wu test. This is because, as proven by Drukker (2003), the Wooldridge test is much robust and has good size and power properties. The Wooldridge test is ideal for this study in testing for serial correlation also because Drukker (2003) found that its tremendous size and power properties is much profound with samples of moderate size, of which the sample for this study is no exception.

Another major methodological problem with panel data analysis is the correlation between error terms of different periods. That is, a violation of the constant variance of the error term assumption [i.e var $(\varepsilon_{it}) \neq \sigma^2$, thus heteroskedasticity]. The constant variance assumption (homoskedasticity) is very important for the pooled OLS regression to yield parameter estimates with minimum variance. Hence, the study conducts a post estimation test of this assumption so as to determine the efficiency of the pooled regression parameter estimates. Given that, parameters are rendered inefficient in the presence of heteroskedasticity, it follows that inferences from the F and t tests are no

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longer reliable (Wooldridge, 2003). In as much as the presence of heteroskedasticity affects the efficiency of the estimated parameters, it does not render the OLS estimator biased and inconsistent if all the other assumptions of the classical OLS holds. The pooled regression would yield usable estimates only if the assumption of homoskedasticity holds along side the other assumptions. To test for the presence of heteroskedasticity, the study adopts the Breuch-Pagan (BP) test. Aside the BP test, the study conducts a modified Wald test to test for heteroskedasticity in the fixed effects regression model.

To correct for the presence of serial correlation and heteroskedasticity, the study runs a robust command as part of the panel estimation techniques to be compared (that is pooled regression and random and fixed effect; depending on the Hausman test). Another panel estimation technique that corrects for heteroskedasticity and serial correlation compared in the analysis is the Hausman-Taylor panel estimation technique.

4.7 Conclusion

This chapter discussed the theoretical foundations of the gravity model and further specified an augmented gravity equation that would be estimated by the study. The method of analysis as well as preliminary diagnostic checks employed were clearly outlined with estimation variables properly defined. Also, the estimation techniques adopted to control for some identified econometric problems are explained in detail in this chapter.

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CHAPTER FIVE

DATA ANALYSIS

5.1 Introduction

This chapter presents and discusses the issues relating to the econometric estimation of the panel model specified in the previous chapter. The study uses STATA ahead of SPSS to carry out the regression analysis. This is partly because many scholars have argue that using SPSS to compute time-series related regression analysis is limited in dealing with the problems of autocorrelation or serial correlation, heteroskedasticity, and multicollinearity (Moon, et al, 2004). The analysis begins by conducting a descriptive analysis of the non-binary variables used in the study. We proceed to perform the diagnostic checks discussed in the previous chapter. Finally, the results of the actual estimations are presented and discussed.

5.2 Descriptive Analysis

This section briefly discusses the basic statistical properties of the non-binary variables included in the model for the period 1960 to 2013. The summary statistics perused include the mean, standard deviation, minimum and maximum values. This is shown in Table 5-1 below:

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Table 5-1: Summary Statistics of Dependent and Independent Variables, 1960 - 2013

Variables	Mean	Standard Deviation	Minimum	Maximum
Exports	9197339	1.22e+08	0	4.59e+09
GDPi	8904.279	11000.37	1217.153	47928.72
GDPj	173008.9	815783.5	18.43202	1.68e+07
Distance	6324.417	3656.332	257.2679	19110.09
POPi	15.53727	5.614252	7.130545	25.9046
POPj	34.53568	120.1783	0.030861	1357.38
AREAi	238538	0	238538	238538
AREAj	889743.3	2220108	7	1.71e+07

Source: Author's Computation using STATA

From Table 5-1, total bilateral exports from Ghana averaged about $9.2 million. The maximum value of bilateral exports was approximately $4.6trillion with zero minimum value. The average of Ghana's GDP for the period averaged $8.9 billion, whereas the GDPs of all the importers for the period recorded an average of $193billion. Comparing the real GDP of Ghana to the importing countries, it suffices to conclude that on the average, an importing country is economically larger than Ghana. Exports of Ghana travelled on average, a weighted-distance of about 6,324 km to their destinations.

The standard deviation column measures the dispersion of the variables from their means. Large standard errors reflect the presence of outliers that significantly influence the data. Another means of determining the spread is to consider the difference between the maximum and minimum values of the variables. The larger the range of a variable, the greater the standard deviation of the said variable. The variable with the largest standard deviation reported in Table 5-1 is the GDP of the importing countries.

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5.3 Diagnostic Tests

In order to determine the appropriate estimation technique for the analysis, the study tests for the preference of multicollinearity, time effects, heterogeneity bias, heteroskedasticiy and serial correlation. To begin with, the Variance Inflation Factor (VIF) test for multicollinearity shown in Appendix XI revealed a generally minimal correlation among the regressors. In that, the VIF of most of the individual variables is less than 10. This outcome is relevant to the study because it purges the estimation results of any suspicion of severe multicollinearity among the independent variables.

5.3.1 Time Effects

To test for time effects, the study introduces year dummies (with 1960 as the base year) into the pooled regression. After estimating the regression using OLS, the study tests for the joint significance of the year dummies. The result of the test shows that the year dummies are jointly significant.[36] Therefore, the model with time effects is more appropriate.

5.3.2 Heterogeneity Bias

One of the major problems of using the pooled regression for Panel analysis as discussed in chapter four is the problem of heterogeneity bias. Thus, there is the need to test for the presence of individual of heterogeneity. Table 5-2 reports the test for individual heterogeneity using the Breusch and Pagan Lagrangian Multiplier test for random effects. This test is also a test for random effects because it forms the basis for choosing between the REM and the pooled regression model.

[36] F(51, 4606) = 67.29
Prob > F = 0.0000

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Table 5-2: Breusch and Pagan LM test for random effects

	Var	Sd = sqrt (Var)
lnX	41.79352	6.464791
e	6.663591	2.581393
u	3.378487	1.838066

Test : Var (u) = 0

Chibar2 (01) = 2914.94

Prob > chibar2 = 0.0000

Source: Author's Computation using STATA

From the test statistic above, the null hypothesis is rejected and the Random Effect Model is chosen over the Pooled Regression.

5.3.3 Serial Correlation

The assumption of no correlation between the regressors and the error term is one of the important assumptions that make parameter estimates consistent. To test for serial correlation, the study uses the Wooldridge test. The results from the Wooldridge test shown in Table 5-3 below, confirms the presence of serial correlation in the panel model.

Table 5-3: Wooldridge test for Serial Correlation in Panel data

H0: No first-order autocorrelation

F(1, 152) = 22.084

Prob > F = 0.0000

Source: Author's computation using STATA

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5.3.4 Heteroskedasticity

For regression estimates to be efficient, the error terms must have equal and constant variance. The study tests the null hypothesis of a constant variance using the Breusch-Pagan test. The test results displayed in Table 5-4 reject the null hypothesis of constant variance and clearly confirms the presence of heteroskedasticity. Also, a test of heteroskedasticity in the fixed model using the Modified Wald test (Appendix IX) confirmed the presence of heteroskedasticity in the fixed effect model.

Table 5-4: Breusch-Pagan test for Heteroskedasticity

Ho: Constant variance
Variables: fitted values of ln X
chi2 (1) = 13.26
Prob > chi2 = 0.0003

Source: Author's computation using STATA

To correct for the observed autocorrelation and heteroskedasticity, a robust estimation of the pooled regression and fixed effects model is presented. Also, the study employs the Hausman-Taylor estimation technique to correct for the heteroskedasticity and serial correlation.

5.4 Empirical Results and Discussion

The results as shown in Table 5-5 and Appendix X are obtained from estimating the gravity equation (4.3.5) using the pooled regression, random effect, fixed effect and

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Hausman-Taylor estimators. The result of the Hausman test in Appendix X rejects the null hypothesis of no correlation between the regressors and the individual heterogeneity. This renders the random effect model inappropriate. The results of the Hausman test confirm similar outcome of Turkson (2012). Therefore, the study concentrates on the parameter estimates obtained under the fixed effects and the Hausman-Taylor estimators.

The performance of the models employed was fairly satisfactory as most of the core gravity covariates had significant coefficients with expected signs. The coefficient of determination (0.86) indicates that the regressors satisfactorily explains variations in Ghana's bilateral exports. The importer and exporter GDP, and bilateral distance are highly significant and have their expected sign across all regressions. Importer population, remoteness of importer and exporter, common language, border and currency, as expected, exert positive effects on Ghana's bilateral exports. Land size of importer, and the landlocked nature of importer countries as expected, exert a negative impact on bilateral exports of Ghana. Area of Ghana is omitted due to collinearity.

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Table 5-5: Estimates of gravity model using FE, RE and HT, 1960-2013.

Independent Variables	Dependent Variables: Log ($Exports_{ijt}$)			
	(1) **OLS**	(2) **RE**	(3) **FE**	(4) **Hausman-Taylor**
Log of GDP_{it}	1.852***	-2.427*	2.257***	2.839***
	(0.143)	(1.242)	(0.212)	(0.145)
Log of GDP_{jt}	1.177***	0.721***	0.501***	0.499***
	(0.100)	(0.0588)	(0.157)	(0.0707)
Log of $Population_{it}$		16.62***		
		(3.603)		
Log of $Population_{jt}$	0.173	1.072***	2.576***	2.172***
	(0.122)	(0.0992)	(0.346)	(0.160)
Log of $Distance_{ij}$	-1.422***	-1.483***		-1.720***
	(0.241)	(0.192)		(0.597)
Log of $Area_{j}$	-0.386***	-0.703***		-1.322***
	(0.0852)	(0.0784)		(0.200)
$Remoteness_{ijt}$	7.614***	0.424**	8.031***	4.568***
	(0.300)	(0.215)	(0.321)	(0.203)
$Contiguity_{ij}$	1.258	0.871		0.0538
	(0.982)	(0.994)		(3.208)
Common $Language_{ij}$	0.815*	1.170***		1.289
	(0.420)	(0.324)		(1.056)
Common $Currency_{ijt}$	0.536	0.162	0.316	0.289
	(0.487)	(0.408)	(0.353)	(0.395)
Colonial $History_{ij}$	-1.134**	-1.474***		-1.880*
	(0.536)	(0.351)		(1.125)
$Landlocked_{j}$	-0.462	-0.836***		-1.003
	(0.353)	(0.315)		(1.010)
$EUACP_{jt}$	0.227	-0.290**	**0.108**	**-0.0168**
	(0.351)	(0.141)	(0.349)	(0.145)
$AGOA_{jt}$	-0.217	-0.931	**-0.769*** **	**-0.840**
	(0.417)	(0.574)	(0.154)	(0.557)
Constant Included	Yes	Yes	Yes	Yes
Time Effect	Yes	Yes	Yes	Yes
No. of Observations	4,671	4,671	4,671	4,671
R-squared	0.867			
Number of importing countries	181	181	181	181

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; i and j refer to Exporter (Ghana) and importer country respectively. The coefficients for the year dummies are not reported for brevity.

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5.4.1 Economic Size

From column 4, a percentage increase in Ghana's GDP increased Ghana's bilateral exports by about 2.8 percent. Also, Ghana's bilateral exports increased by about 0.5 percent with a percent increase in the GDP of importers. This result suggests that the import demand for Ghana's exports is fairly income inelastic. Again, the positive coefficient of importer GDP suggests that exports from Ghana can be considered in general to be normal goods. This outcome conforms to the results of Afesorgbor (2013), Turkson (2012) who considered the effects of trade preferences on bilateral trade of SSA countries. Afesorgbor (2013) adopted a Pseudo Poison Maximum Likelihood (PPML) estimation technique and found that importers GDP positively affects the bilateral trade of SSA countries.

The population of importers exerts a positive and significant effect on Ghana's bilateral exports. Hence, the larger the population of the importing countries, the higher the value of Ghana's bilateral exports. It is observed that the fixed effects and HT estimations dropped Ghana's population due to probable collinearity. This is evident in the VIF test for multicollinearity.

5.4.2 Distance

Distance exerts a significantly negative impact on Ghana's bilateral exports. Such that a percentage increase in the distance between Ghana and its trade partners reduces Ghana's exports by approximately 1.7 percent. This supports the literature that concludes that transport cost negatively affect trade. A survey by Leamer and Levinsohn (1994) identified bilateral distance as one of the clearest and most robust empirical findings in economics.

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The parameter estimate of the remoteness variable supports the conclusion by Anderson and Wincoop (2003) that a multilateral resistance terms significantly explains bilateral trade flows. The results indicate that countries that are remote with Ghana from the rest of the world trade more. The coefficient is positive as expected and statistically significant. Turkson (2012) found similar effects of the remoteness of trading partners from all trading partners.

5.4.3 Control variables

The variables, contiguity, common language and common currency have expected coefficient. However, the results are not significant. The landlocked nature of importing countries exerts a negative, albeit insignificant effect on exports from Ghana. The results from column 4 indicate that Ghana exports less to countries with which it has a common colonial history compared to the countries it has no colonial history with. The estimated results show that Ghana's bilateral export to countries it has a common colonial history significantly reduces by 85 percent $[100(1 - \exp^{-1.880})]$ compared to countries it shares no common colonial history with.

5.4.4 EU-ACP

In line with the main aim of the study, it is estimated that the EU-ACP preference dummy has a negative and insignificant impact on Ghana's bilateral exports. Column 3 however, estimates a positive, yet insignificant effect of the EU-ACP preference dummy. The estimate obtained under column 3 suggests that bilateral exports from Ghana to the EU, in the presence of the EU-ACP, increased on average by 11 percent $[100(\exp^{0.108} - 1)]$, holding the other factors constant. Going by the Hausman-Taylor estimates, it shows that Ghana's membership in the EU-ACP agreement has a negative impact on export

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performance towards the EU. That is, Ghana's bilateral exports under EU-ACP decreased by 1.7 percent $[100(1-\exp^{-0.0168})]$ compared to bilateral exports to the EU in the absence of the EU-ACP. The results, however, reveal that these estimates are not statistically significant. Therefore, Ghana's exports to the EU have not been significantly influenced by the EU-ACP trade preference. The outcome in column 3 seems to support the results obtained by Nilsson (2007). Nilsson (2007) estimated the coefficient of the impact of EU trade policy on lower middle income groups to be positive and insignificant.

5.4.5 AGOA

The AGOA dummy was estimated to be negative in both columns 3 and 4. That is, AGOA reduced Ghana's bilateral exports by 54 percent and 57 percent respectively.[37] The coefficient was significant in the former and insignificant in the latter. This shows that irrespective of the estimation technique used in this study, the result remains that AGOA has had no positive effect on Ghana's exports to the United States.

Comparing the effects of EU-ACP and AGOA, the results show that under the fixed effect estimation, although the EU-ACP preference yield insignificant result, Ghana's bilateral exports to the EU have increased under the EU-ACP whereas exports to the US suffered significant decline under AGOA. Going by the Hausman-Taylor estimation, the results indicate that both AGOA and EU-ACP trade preferences have had negative, howbeit insignificant effect on Ghana's bilateral exports. In spite of the common insignificant result, the negative effect of AGOA (57 percent) is greater than that of the EU-ACP (2 percent).

[37] $100(1-\exp^{-0.769})$ and $100(1-\exp^{-0.840})$ respectively

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Testing for the joint significance of the EU-ACP and AGOA dummies revealed that both preferences do not jointly influence the bilateral exports of Ghana.[38] This suggests that Ghana's concurrent involvement in both preferences has not had any significant effect on its bilateral exports.

5.5 Conclusion

The study contributes to the empirical literature which uses gravity models to assess the impact of NRPTPs on bilateral exports. The results of the study show that the exports from Ghana to the EU 28 and US have not been significantly affected by the EU-ACP and AGOA preferences. In the case of a significant effect for AGOA, the results indicated that exports to the US under AGOA reduced compared to exports to the rest of the world in the presence of AGOA.

[38] Prob > chi2 = 0.3210

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CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary and conclusion of the study and further provides some policy measures based on the findings of the study.

6.2 Summary and Conclusion

The proliferation of preferential trade agreements has attracted the attention of several researchers. The focus of most of these researchers has been to investigate the ex-post effect of existing trade preferences on the trade performance of developing countries. Among such preferences that have been largely researched are AGOA and EU-ACP agreement.

Though several studies have been undertaken to identify the effects of AGOA and EU-ACP on their beneficiaries. The results of these studies seem to be inconclusive. Whereas some estimate positive effects of AGOA and EU-ACP, others have found either a negative or insignificant effect. In addition, only a few of these studies have been identified by the study to have considered the effects of these preferences on beneficiaries individually. Therefore, the principal objective of the study was to investigate the effect of the AGOA and EU-ACP trade preferences on Ghana's bilateral exports. This study, therefore delineates the effect on Ghana from the effect on SSA as a whole.

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Using an augmented gravity equation, the study estimated an unbalanced panel model of bilateral export data of Ghana to 181 countries. AGOA and EU-ACP trade preferences were introduced into the gravity model as dummy variables. The study estimated the effects of these preference dummies using the pooled OLS, FE and RE estimation techniques. However, the Hausman test rejected the null hypothesis of no correlation between the unobserved heterogeneity and the regressors. This result suggested the appropriateness of the Fixed Effect Model over the Random Effect Model. Subsequently, a robust estimation of the FE estimation was conducted and reported to control for serial correlation and heteroskedasticity. Controlling for any possible endogeneity in the model using the Hausman-Taylor estimation technique, the study found that both AGOA and EU-ACP do not independently exert any significant effect on Ghana's bilateral exports. Also a test of the joint significance of both preferences revealed that both trade preferences do not have any significant joint effect on Ghana's bilateral exports.

6.3 Recommendations

Following the results obtained from the study the following recommendations are suggested. The recommendations suggested follow no particular order.

To begin with, the study recommends that the EU and US extend their product coverage under the AGOA and EU-ACP respectively. Some of the perused literature in the study showed that with the exception of textile and clothing, most of the products covered under AGOA suffered strict Rules of Origin. For the EU-ACP, rules of origin were noticed to be relatively stricter on other commodities compared to bananas, sugar and

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beef. It is also noticed that Ghana does not have a comparative advantage in the production of all these commodities compared with the main SSA exporters of the commodities. So, for the AGOA and EU-ACP trade preferences to have significant effects on Ghana's total bilateral exports, Ghana must negotiate for the extension of the product coverage and a relaxation of the RoO on commodities Ghana has a comparative advantage. Again, with the provision by the EPA to support the development of export capacities of beneficiary countries, Ghana has enough reasons, with the results of this study, to request for funds for the development of its export sector so that it can gainfully benefit from the EPA. For instance, Ghana has enough arable land that can support the cultivation of banana and cotton. So, Ghana can present proposals to the European Commission seeking for funding to help the nation develop the banana and cotton sub-sectors.

Moving forward, it is recommended that neighbouring countries who share similar characteristics with Ghana should undertake similar studies to determine the extent to which their exports have benefited from the AGOA and EU-ACP preferences. The results (which I believe would be similar) could provide a good reason for such countries to come together as a group and collectively negotiate with the preference donors, rather than negotiating in regional economic blocs, which may not be universally beneficial. This can help influence the terms of the agreements to their advantage.

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6.4 Delimitation of Study

The study is limited in dealing with the zero export flows in the estimation due to the sophisticated nature of the estimation technique, which is beyond the scope of this study. Also, owing to the unavailability of data on price terms, the study used a remoteness index to proxy for the multilateral resistance term. The study, therefore, recommends that future studies in this area can look at estimation techniques that capture zero trade flows. Also, in order to determine the product with which Ghana's benefit under the preferential schemes is profound, future studies can consider a similar analysis using disaggregated export data of Ghana. Notwithstanding these limitations, the results of this study are valid.

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APPENDICES

I : List of GATT/WTO Rounds of Negotiation

No.	ROUND	HOST	START YEAR	GATT/WTO	PERIOD (months)
1	Geneva I	Switzerland	1947	GATT	7
2	Annecy	France	1949	GATT	5
3	Torquay	England	1950	GATT	8
4	Geneva II	Switzerland	1956	GATT	5
5	Dillon	Switzerland	1960	GATT	11
6	Kennedy	Switzerland	1964	GATT	37
7	Tokyo	Japan	1973	GATT	74
8	Uruguay	Uruguay	1986	GATT	87
9	Doha	Qatar	2001	WTO	

II : List of SSA countries under AGOA

Eastern Africa	Western Africa	Central Africa	Southern Africa
Burundi*	Benin*	Angola*	Botswana*
Comoros*	Burkina Faso*	Cameroon*	Lesotho *
Djibouti*	Cape Verde*	Central African Republic	Namibia*
Eritrea	Cote D'Ivoire*	Chad*	South Africa*
Ethiopia*	Gambia	Republic of Congo*	Swaziland
Kenya*	Ghana*	DR Congo	
Madagascar*	Guinea*	Equatorial Guinea	
Malawi*	Guinea-Bissau*	Gabon*	
Mauritius*	Liberia*	Sao Tome and Principe*	
Mozambique*	Mali*	South Sudan**	
Rwanda*	Mauritania*		
Seychelles*	Niger*		
Somalia	Nigeria*		
Tanzania*	Senegal*		
Uganda*	Sierra Leone*		
Zambia*	Togo*		
Zimbabwe			

*Current beneficiary

**South Sudan technically belongs to the northern Africa, but has been included in the SSA under AGOA. South Sudan was added after the 112th Congress when the amendments of the AGOA were effected.[39]

[39] http://www.whitehouse.gov/the-press-office/2014/06/26/presidential-proclamation-agoa

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III : List of SSA countries, and their AGOA eligibility status

Country	Gained eligibility	Lost eligibility	Regained eligibility
Angola	30th Dec. 2003	N/A	
Benin	2nd Oct. 2000	N/A	
Botswana	2nd Oct. 2000	N/A	
Burkina Faso	10th Dec. 2004	N/A	
Burundi	1st Jan. 2006	N/A	
Cameroon	2nd Oct. 2000	N/A	
Cape Verde	2nd Oct. 2000	N/A	
Central African Republic	2nd Oct. 2000	31st Dec. 2003	N/A
Chad	2nd Oct. 2000	N/A	
Comoros	30th June, 2008	N/A	
Cote D'Ivoire	16th May, 2002	1st Jan. 2005	25th Oct. 2011
Djibouti	2nd Oct. 2000	N/A	
DR Congo	1st Jan. 2003	1st January, 2011	N/A
Equatorial Guinea	N/A		
Eritrea	2nd Oct. 2000	31st Dec. 2003	N/A
Ethiopia	2nd Oct. 2000	N/A	
Gabon	2nd Oct. 2000	N/A	
Gambia	28th March 2003	1st Jan. 2015	N/A
Ghana	2nd Oct. 2000	N/A	
Guinea	2nd Oct. 2000	23rd Dec. 2009	25th Oct. 2011
Guinea-Bissau	2nd Oct. 2000	20th Dec. 2012	1st Jan. 2015
Kenya	2nd Oct. 2000	N/A	
Lesotho	2nd Oct. 2000	N/A	
Liberia	29th Dec. 2006	N/A	
Madagascar	2nd Oct. 2000	23rd Dec. 2009	26th June, 2014
Malawi	2nd Oct. 2000	N/A	
Mali	2nd Oct. 2000	20th Dec. 2012	1st Jan. 2014

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Country	Gained eligibility	Lost eligibility	Regained eligibility
Mauritania	2nd Oct. 2000	1st Jan. 2006	23rd Dec. 2009
Mauritius	2nd Oct. 2000	N/A	
Mozambique	2nd Oct. 2000	N/A	
Namibia	2nd Oct. 2000	N/A	
Niger	2nd Oct. 2000	23rd Dec. 2009	25th Oct. 2011
Nigeria	2nd Oct. 2000	N/A	
Republic of Congo	2nd Oct. 2000	N/A	
Rwanda	2nd Oct. 2000	N/A	
Sao Tome and Principe	2nd Oct. 2000	N/A	
Senegal	2nd Oct. 2000	N/A	
Seychelles	2nd Oct. 2000	N/A	
Sierra Leone	23rd Oct. 2002	N/A	
Somalia	N/A		
South Africa	2nd Oct. 2000	N/A	
South Sudan	20th Dec. 2012	1st Jan. 2015	
Swaziland	17th Jan. 2001	1st Jan. 2015	
Tanzania	2nd Oct. 2000	N/A	
Togo	17th April, 2008	N/A	
Uganda	2nd Oct. 2000	N/A	
Zambia	2nd Oct. 2000	N/A	
Zimbabwe	N/A		

N/A: Not applicable

Source: Table was prepared by author from a combination of sources.[40]

[40] African Growth and Opportunity Act Implementation Guide (October 2000).
Leo, B., and Ramachandran, V. (2014).
http://trade.gov/agoa/eligibility/
Proclamation 7350 of October 2, 2000; Federal Reserve.
http://agoa.info/about-agoa/country-eligibility.html

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IV : List of ACP countries in the Cotonou Agreement

AFRICA		CARIBBEAN	PACIFIC
Angola	Liberia	Antigua & Barbuda	Cook Islands
Benin	Madagascar	Bahamas	Fiji
Botswana	Malawi	Barbados	Kiribati
Burkina Faso	Mali	Belize	Marshall Islands
Burundi	Mauritania	Dominica	Micronesia
Cameroon	Mauritius	Dominican Republic	Nauru
Cape Verde	Mozambique	Grenada	Niue
Central African Republic	Namibia	Guyana	Palau
Chad	Niger	Haiti	Papau New Guinea
Comoros	Nigeria	Jamaica	Samoa
Congo, Rep	Rwanda	St. Kitts and Nevis	Solomon Islands
DR Congo	Sao Tome and Principe	Saint Lucia	Timor Leste
Ivory Coast	Senegal	St. Vincent and the Grenadines	Tonga
Djibouti	Seychelles	Suriname	Tuvalu
Equatorial Guinea	Sierra Leone	Trinidad & Tobago	Vanuatu
Eritrea	Somalia		*Cuba
Ethiopia	South Africa		
Gabon	Sudan		
Gambia	Swaziland		
Ghana	Tanzania		
Guinea	Togo		
Guinea-Bissau	Uganda		
Kenya	Zambia		
Lesotho	Zimbabwe		

*Not a signatory to Cotonou Agreement
Source: ACP website (http://www.acp.int/node/7)

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V : Members of the EU 28 with the year they joined the EU in parenthesis

EU 28	
Belgium (1952)	Sweden (1995)
France (1952)	Cyprus (2004)
Germany (1952)	Czech Republic (2004)
Italy (1952)	Estonia (2004)
Luxembourg (1952)	Hungary (2004)
Netherlands (1952)	Latvia (2004)
Denmark (1973)	Lithuania (2004)
Ireland (1973)	Malta (2004)
United Kingdom (1973)	Poland (2004)
Greece (1981)	Slovakia (2004)
Portugal (1986)	Slovenia (2004)
Spain (1986)	Bulgaria (2007)
Austria (1995)	Romania (2007)
Finland (1995)	Croatia (2013)

VI : Ghana's major trading partners and their share of trade

Exports		Imports	
Destination	*Share*	*Source*	*Share*
South Africa	27%	China	20%
UAE	9.9%	United States	9.6%
Switzerland	7.9%	Belgium-Luxembourg	5.2%
France	7.3%	United Kingdom	5%
Italy	6.7%	Netherlands	5%

Source: Observatory of Economic Complexity (OEC)
http://atlas.media.mit.edu/profile/country/gha/

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Appendix VII: List of Countries considered in the Analysis

AFRICA	Namibia	Costa Rica	Bangladesh	Syria	Luxembourg
Angola	Niger	Cuba	Bhutan	Taiwan, China	Macedonia, FYR
Algeria	Nigeria	Dominica	Brunei	Tajikistan	Malta
Benin	Reunion	Dominican Republic	Cambodia	Thailand	Moldova
Botswana	Rwanda	Ecuador	China	Turkmenistan	Netherlands
Burkina Faso	Sao Tome and Principe	El Salvador	Georgia	United Arab Emirates	Norway
Burundi	Senegal	Greenland	Hong Kong, China	Uzbekistan	Poland
Cameroon	Seychelles	Grenada	India	Vietnam	Portugal
Cape Verde	Sierra Leone	Guadeloupe	Indonesia	**EUROPE**	Romania
Central African Republic	Somalia	Guatemala	Iran, Islamic Rep.	Andorra	San Marino
Chad	South Africa	Guyana	Iraq	Albania	Slovak Republic
Congo, Dem. Rep.	Sudan	Haiti	Israel	Austria	Slovenia
Congo, Rep.	Swaziland	Honduras	Japan	Belarus	Spain
Cote d'Ivoire	Tanzania	Jamaica	Jordan	Belgium	Sweden
Djibouti	Togo	Mexico	Kazakhstan	Bosnia Herzegovina	Switzerland
Egypt, Arab Rep.	Tunisia	Netherlands Antilles	Korea, Democratic Republic	Bulgaria	Turkey
Equatorial Guinea	Uganda	Nicaragua	Korea, Rep.	Croatia	Yemen
Ethiopia(excludes Eritrea)	Western Sahara	Panama	Kuwait	Cyprus	United Kingdom
Gabon	Zambia	Paraguay	Lao PDR	Czech Republic	Yugoslavia, FR (Serbia/Montene
Gambia, The	Zimbabwe	Peru	Lebanon	Denmark	**PACIFIC**
Guinea	**AMERICA**	St. Kitts and Nevis	Macao	Estonia	Australia
Guinea-Bissau	Antigua and Barbuda	St. Lucia	Malaysia	Faeroe Islands	Cook Isds
Kenya	Argentina	St. Vincent and the Grenadines	Maldives	Finland	Fiji
Lesotho	Bahamas, The	Suriname	Myanmar	France	French Polynesia
Liberia	Barbados	Trinidad and Tobago	Nepal	Germany	Nauru
Libya	Belize	United States	Oman	Gibraltar	New Caledonia
Madagascar	Bermuda	Uruguay	Pakistan	Greece	New Zealand
Malawi	Bolivia	Venezuela	Philippines	Hungary	Norfolk Isds
Mali	Br. Virgin Isds	**ASIA**	Qatar	Iceland	Papua New Guinea
Mauritania	Brazil	Afghanistan	Russian Federation	Ireland	Samoa
Mauritius	Canada	Armenia	Saudi Arabia	Italy	Wallis and Futuna Isds
Morocco	Chile	Azerbaijan	Singapore	Latvia	
Mozambique	Colombia	Bahrain	Sri Lanka	Lithuania	

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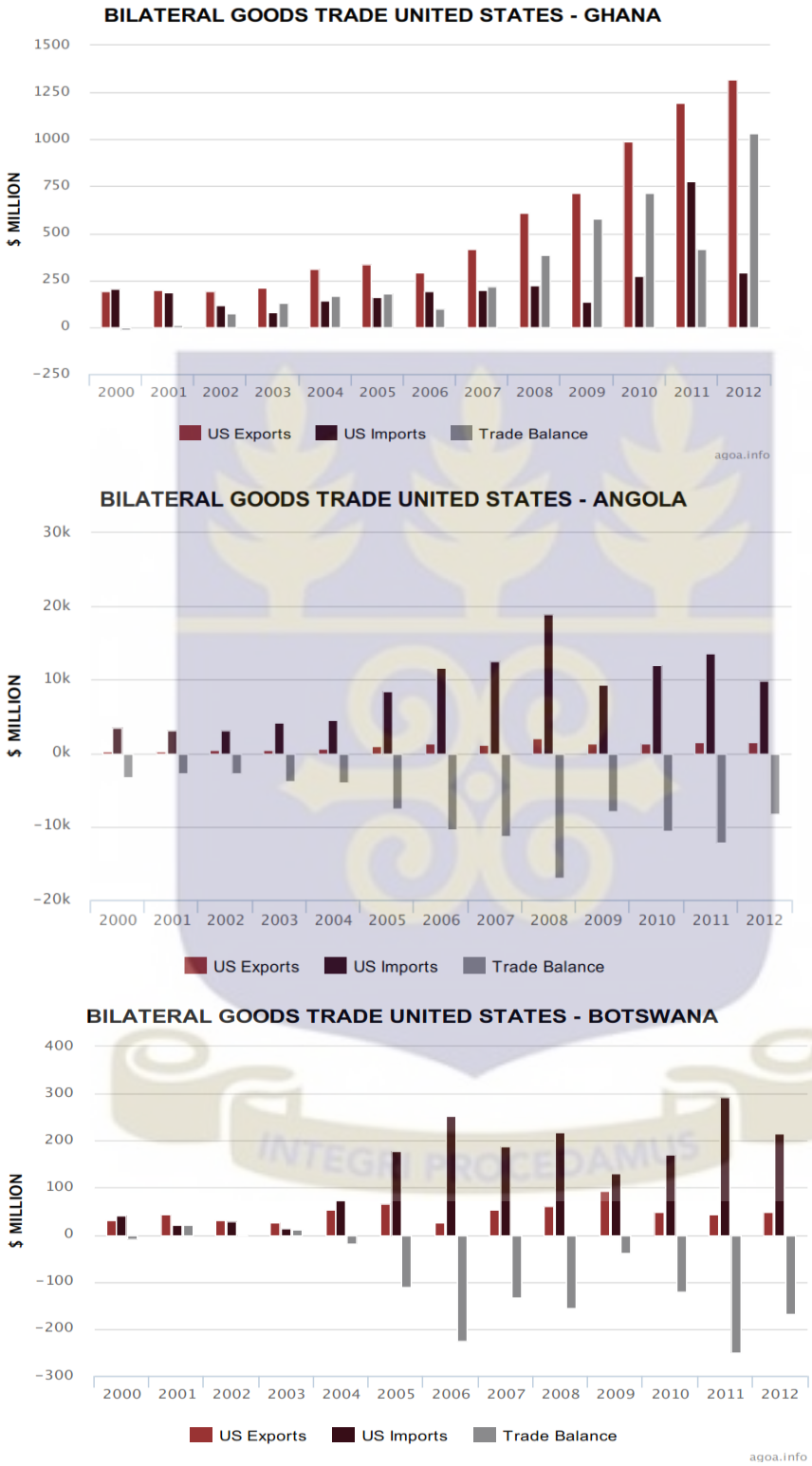
VIII : Bilateral trade of the US with Ghana, Angola and Botswana (2000-2012)



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IX : Modified Wald test for groupwise heteroskedasticity in fixed effect model

Ho: σ_i^2	$= \sigma^2$ for all i
chi2 (181)	= 30779.43
Prob > chi2	= 0.0000

X : Hausman Specification Test

	Coefficients		Difference	Standard Errors
	Fixed Effects (b)	Random Effects (B)	(b – B)	Sqrt(diag(V_b-V_B)
Log of GDP_{it}	2.257212	-2.427184	4.684396	
Log of GDP_{jt}	0.5013135	0.7211574	-0.2198439	0.453479
Log of $Population_{jt}$	2.57592	1.071742	1.504177	0.1547397
$Remoteness_{ijt}$	8.030801	0.423902	7.606899	0.2137648
$Common\ Currency_{ijt}$	0.3157595	0.1622375	0.153522	
$EUACP_{jt}$	0.1079525	-0.2899332	0.3978857	0.0501571
$AGOA_{jt}$	-0.7694312	-0.9312034	0.1617722	

b = consistent under H_0 and H_a; obtained from xtreg

B = inconsistent under H_a, efficient under H_o; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(57) = (b-B)'[(V_b-V_B)^(-1)](b - B) = 575.70

Prob>chi2 = 0.0000

Therefore (V_b-V_B is not positive definite)

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XI : VIF test for Multicollinearity

VARIABLE	VIF	1/VIF
Log of $Population_{it}$	11.19	0.089366
Log of GDP_{it}	9.40	0.106383
Log of GDP_{jt}	4.52	0.221239
Log of $Population_{jt}$	4.10	0.243902
$Remoteness_{ijt}$	3.73	0.268097
Log of $Area_{j}$	2.83	0.353357
Log of $Distance_{ij}$	2.11	0.473934
Colonial $History_{ij}$	1.96	0.510204
Common $Language_{ij}$	1.59	0.628931
$Contiguity_{ij}$	1.48	0.675676
$EUACP_{ijt}$	1.46	0.684932
$Landlocked_{j}$	1.08	0.925926
Common $Currency_{ijt}$	1.05	0.952381
$AGOA_{ijt}$	1.05	0.952381
Mean VIF	3.40	