ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE ENGINEERING AND TECHNOLOGY

DETERMINANTS OF GHANA'S TRADE FLOWS IN ECONOMIC COMMUNITY OF WEST AFRICAN STATES: APPLICATION OF THE GRAVITY MODEL

M.Sc. THESIS

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

BATI AFRİKA ÜLKELERİ EKONOMİK TOPLULUĞU İÇİNDE GANA TİCARETİNİ ETKİLEYEN FAKTÖRLER: GRAVİTE MODELİ UYGULAMASI

YÜKSEK LİSANS TEZİ

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Date of Submission: 15 December 2014
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To the memory of my late mother,

FOREWORD

The choice of this topic emanates from my interest and future research goal in regional development in Africa, especially in the West African sub-region.

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December 2014   Iddrisu SUMANI
                                                                                      (Regional Planning)

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ABBREVIATIONS

ACP	:	African Caribbean Pacific Group of States
AfDB	:	African Development Bank
B&FT	:	Business and Financial Times
BoG	:	Bank of Ghana
CES	:	Constant Elasticity of Substitution
CEPS	:	Customs, Excise and Preventive Service
CIA	:	Central Intelligent Agency World Factbook
CSO	:	Civic Society Organisations
DANIDA	:	Danish International Development Agency
ECOWAS	:	Economic Community of West African States
EEC	:	European Economic Community
EFTA	:	European Free Trade Area
EPA	:	Economic Partnership Agreements
EJN	:	Economic Justice Network
EU	:	European Union
GATT	:	General Agreement on Tariffs and Trade
GDP	:	Gross Domestic Product
GSS	:	Ghana Statistical Service
GNP	:	Gross National Product
GSGDA	:	Ghana Shared Growth and Development Agenda
IMF	:	International Monetary Fund
IRTG	:	Improved Road Transport Governance Initiative
ISI	:	Import Substitution Industrialisation
MOTI	:	Ministry of Trade and Industry
OECD	:	Organisation for Economic Cooperation and Development
REC	:	Regional Economic Communities
RTA	:	Regional Trade Agreements
SAARC	:	South Asian Association for Regional Co-operation
SADC	:	Southern African Development Community
SAP	:	Structural Adjustment Programmes
SSA	:	Sub-Saharan Africa
UNCTAD	:	United Nations Conference on Trade and Development
UNDP	:	United Nations Development Programme
WDI	:	World Bank's World Development Indicators
WTO	:	World Trade Organisation

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SUMMARY

Over decades now, regional economic collaborations have engaged the attention of nations, with the primary objective of attaining economic growth and development. One common area has been regional trade liberalisation through the formation of regional trade blocs. Tobler's first law of geography states that 'Everything is related to everything else, but near things are more related than distant things'. General theory of regional integration suggests that belonging to regional trade bloc presumably has positive effects on the economy of the membership.

Regional economic integration entails an agreement among neighbouring countries, which facilitates the free flow of goods and services, investment, technology and persons within a common geographical boundary where there is a single market with benefits of comparative advantage and economies of scale. Increased and sustained welfare gains from regional trade for example help economies to reduce poverty and subsequently achieving development. Regional relationships ease the recovery of developing regions, and also support them to cope gradually with the challenges of global competitiveness. Furthermore, larger regional markets make it possible for large companies to expand and prepare adequately for international competitiveness.

On the contrary regional economic integration leads to trade diversion, as member states may trade more with each other more than with non-members. This may lead to a situation where weaker and ineffective companies in the bloc are unconsciously or otherwise protected, creating new barriers to intra-regional trade. It also results in the loss of autonomy of member states as the decision-making process is determined by collective action rather than individual efforts; this may undermine the domestic economic policies of members.

Regional trade theories advanced that obtaining the maximum benefit from trade depends on the comparative advantage and factor endowments of individual countries. There is comparative advantage in trade when each member in the regional bloc concentrates on and exports goods that they can produce at lower opportunity cost than their trading counterparts. A nation's firms reaping the profits from regional trade is determined by their competitiveness in the global arena, in which the government has an important role to play by creating the enabling environment through prudent policies for such firms to strive.

Efforts at economic integration in Africa gained considerable momentum over the years partly as a strategy to overcome smallness of national economies, and to cope with rigorous global competition. Since 1975, Ghana has made giant strides towards regional economic integration with its neighbours in the West Africa sub-region by founding the Economic Community of West African States (ECOWAS). The fundamental goal of this regional bloc is to achieve free trade area and a common market. It aims at, eliminating custom duties and other charges of equivalent effect in respect of the exportation and importation of goods between member states; abolishing quantitative and administrative restrictions on trade among the member states; establishing a common customs tariff and a common commercial policy towards third countries; and abolishing between the member states the obstacles inhibiting free movement of persons, goods, services and capital.

Since bilateral and regional trade liberalisation is becoming increasingly common, it is indispensable to comprehend the significance this may have for a country like Ghana, more especially in this period of fresh calls to promote deeper regional economic integration which enhances intra-regional trade in the face of the on-going negotiations between European Union and sub-regional groups like ECOWAS on the Economic Partnership Agreements.

Ghana's trade policy pays considerable attention to the importance of regional integration in the sub-region. It holds that proper integration with neighbours will provide access to larger regional market, where Ghanaian products can compete and make goods cheaper for her citizens. New trade theory suggests that when domestic consumers have high tastes, it creates pressure in the market for firms to meet high standard of quality demanded through innovation and investment in modern technology. Therefore increased regional market will stimulate industrialisation and further investment in the sectors of the Ghanaian economy.

This dissertation attempted to determine the factors that affect Ghana's bilateral trade flows in ECOWAS by employing the gravity model approach. Specifically this study investigated the factors that promote as well as hinder Ghana's trade activity in the economic union.

Ghana's trade activity in ECOWAS is more of import than export, and contributes very little to output. Generally, intra-regional trade of Ghana, aside with Nigeria (the largest economy in the bloc), is inconsistent and unsatisfactory. This may be linked to the challenges faced by countries in trade blocs on the continent of Africa. These barriers to intra-regional among others include; poor transportation network, cumbersome import and export procedures, border-crossing impediments, limited use of information and communication technology, ineffective involvement of the private sector in the design of programmes aimed to raise intra-regional trade; and poor trade settlement systems.

The number of controls, bribery and delays at checkpoints on the trade corridors of ECOWAS sub-region are found to be highly prevalence, and are major impediments inhibiting Ghana's trade in the bloc. For instance there are averagely a total of 23.3

control checkpoints existing on the trade route between Tema (Ghana) and Ouagadougou (Burkina Faso), with a distance of only 1,057 kilometres where about $39.1 is paid as bribe.

Despite Ghana's economic progress, the economy is largely dependent on the export of primary commodities. The economy is fundamentally agrarian, a characteristic of a developing economy. Apart from the service sector which remains fairly strong over the last few years, the growth of industry sector has been slow due to the decline in manufacturing activity. The contribution of manufacturing sector to output declined from 7.9% in 2008 to 6.9% by 2012. This is attributable to inadequate technology and innovation; and the dependent on light manufacturing. As a result the country is unable to add value to the primary products before export.

The gravity model specified for this study was estimated with a panel data ranging from 1999 to 2013 using the economic, demographic and geographic variables of Ghana and the other fourteen member countries. The pooled ordinary least squares technique was used for the statistical estimation and subsequent analysis. The choice of this methodology stemmed from its extensive application in trade analysis and the flexibility it offers the researcher to introduce other variables that facilitate or impede intra-trade activity.

The empirical results established that improvement in Ghana's gross domestic product and that of its trading partners, increase in partners' population, improved trade freedom of partners are positive and statistically significant factors that determine Ghana's bilateral trade flows in the bloc. With the basic gravity model approach, a bigger growth in the economic size proxied as gross domestic products of Ghana and the fourteen members in ECOWAS will yield significantly higher impact on Ghana's bilateral trade volume. A 1% improvement in the economic size of Ghana will lead to 0.57% increase in its bilateral trade. A 1% increase in partners' gross domestic product will produce 0.89% increase in Ghana's trade flows.

Trade openness of trade partners in the sub-region plays a pivotal role in the growth of Ghana's bilateral trade as a member of ECOWAS. Improvement in partners' open trade policies is found to have significantly positive effects on bilateral trade flows.

Factors such as contiguity and common official language affect Ghana's bilateral trade and highly significant. Sharing a common border has been projected to positively influence Ghana's bilateral trade as high as 200 percent; an indication for more collaboration on the artificial borders between Ghana and the rest of the Community. For common official language, it is predicted that bilateral trade between Ghana and those countries with whom it shares a common language could be higher by over 500 percent.

The challenge however is the colonial history of members as the bloc is made up of countries with varying colonial masters, with French colonies being dominant. The effect of this is projected to lower Ghana's trade with members with whom it does

not share the same coloniser by 45 percent. This is however measured statistically not significant.

Ghana's trade freedom or own policy measure towards openness is however a disincentive to its trade with the economic bloc, as it was found to be negative, but statistically insignificant

The distance as a measure of transportation cost, shipping and transaction costs on the borders between the commercial cities of Ghana and trade partners in ECOWAS negatively influence trade flows and highly significant.

Although growth in Ghana's population positively affects total trade volumes, it was revealed to be insignificant if combined with gross domestic product or if measured as economic mass.

This study demonstrates that gravity model framework is applicable to Ghana's regional trade analysis as a single-case with much emphasis on the potential effects of cross-border, language and economic growth on Ghana's bilateral trade flows. It underscores the relevance of promoting deeper regional integration and calls for further regional collaborations by all stakeholders.

This work is arranged into six chapters. First chapter is the introduction; second chapter reviews literature on main concepts and theories; third chapter reviews the methodology used; fourth chapter is the model estimation and data used; fifth chapter discusses the results of the study and finally the sixth chapter draws conclusion and policy recommendations.

BATI AFRİKA ÜLKELERİ EKONOMİK TOPLULUĞU İÇİNDE GANA TİCARETİNİ ETKİLEYEN FAKTÖRLER: GRAVİTE MODELİ UYGULAMASI

ÖZET

Uzun yıllardan bu yana, bölgesel ekonomik işbirlikleri, ekonomik büyüme ve kalkınmaya ulaşma temel amacıyla ulusların dikkatini çekmiştir. Bölgesel ticaret bloklarının oluşumu yoluyla, bir bölgesel ticaret serbestleştirilmesi ortak alanı oluşmuştur. Tobler, "Coğrafyanın birinci kanunu (First law of geography)" adlı eserinde her şeyin her şeyle ilgili olduğunu, ancak yakın şeylerin uzak şeylerden daha ilgili olduğunu belirtmektedir. Bölgesel bütünleşmenin genel teorisi, bölgesel ticaret bloğuna ait üyelik ekonomisi üzerinde muhtemelen olumlu etkilerin olduğunu öne sürmektedir.

Bölgesel ekonomik bütünleşme, komşu ülkeler arasında mal ve hizmetlerin serbest akışını kolaylaştıran, yatırımın, teknoloji ve kişilerin tek bir pazar ile karşılaştırmalı üstünlük yararları ve ekonomi ölçekleri olan ortak bir coğrafi sınır içinde bulunmasını sağlayan bir anlaşma gerektirir: Bölgesel ticaretten dolayı devamlı artan ve finans sağlayan refah kazançları. Örneğin, yoksulluğu azaltmak ve sonradan kalkınmayı sağlamak için yardım ekonomileri gibi. Bölgesel ilişkiler, gelişmekte olan ülkelerin iyileşmesine yardımcı olurken aynı zamanda git gide artan küresel rekabet zorlukları ile başa çıkmaları için onlara destek olur. Ayrıca, daha büyük bölgesel pazarlar uluslararası rekabet için büyük şirketlerin uygun biçimde hazırlanmasını ve yayılmasını mümkün kılar.

Diğer taraftan, bölgesel ekonomik bütünleşme, üye devletler birbirleriyle üye olmayan devletlerden daha fazla ticaret halinde olduğunda ticari saptırmalara yol açar. Bu bölge içi ticaret yeni engeller oluşturarak, bloktaki daha zayıf ve etkisiz şirketlerin bilinçsizce ya da tam aksi yönde korunduğu bir duruma neden olabilir. Ayrıca, karar alma süreci kolektif eylem yerine bireysel çabalar yoluyla belirlendiğinde, üye devletlerin özerklik kaybıyla sonuçlanır ve iktisadi politikalarına zarar verebilir.

Bölgesel ekonomi teorileri ülkelerin tek tek ticari üstünlüklerine ve faktör donatımlarına bağlı olan ticaretten maksimum fayda elde ettiklerini ileri sürmektedir. Her üye devlet bölgesel bloğa ve kendi ticari muadillerine göre daha düşük fırsat maliyetiyle üretilebilen ihracat mallarına yoğunlaştığında ticarette karşılaştırmalı üstünlükler mevcuttur. Bir ülkenin firmalarının bölgesel ticaretten kar sağlaması, onların küresel alanda rekabetleri tarafından belirlenir ki hükümet küresel alanda bu

tür firmaların mücadele etmesi için ihtiyatlı politikalar yaratma konusunda önemli bir rol oynar.

Afrika'da ekonomik bütünleşme konusundaki çabalar, ulusal ekonomilerin küçüklüğü sorununun üstesinden gelmek ve küresel rekabetle başa çıkmak adına yıllar sonra kısmen önemli bir ivme kazandı. 1975 yılından bu yana, Gana Batı Afrika Alt bölgesinde yer alan komşularıyla bölgesel ekonomik bütünleşme yolunda Batı Afrika Ülkeleri Ekonomik Topluluğu'nu kurarak (ECOWAS) önemli adımlar attı. Bu bölgesel bloğun temel amacı, serbest ticaret alanı ve ortak bir pazar elde etmektir. Blok, özel gümrük vergilerini ve üye ülkelerin ithalat ve ihracat açısından var olan diğer masrafları, ayrıca üye ülkeler arasındaki idari kısıtlamaları ortadan kaldırmayı, üçüncü ülkelere yönelik ortak bir ticaret politikası ve ortak gümrük tarifesi kurmayı ve üye ülkeler arasındaki kişiler, mal, hizmet ve sermayenin serbest dolaşımını engelleyici unsurları ortadan kaldırmayı amaçlar.

İkili ve bölgesel ticaretin serbestleştirilmesi git gide yaygınlaştığından bu yana, özellikle, Ekonomik Ortaklık Anlaşmaları üzerinde Avrupa Birliği ve ECOWAS gibi alt bölge- gruplar arasında devam eden müzakerelerin karşısında bölge içi ticareti arttıran daha kapsamlı bölgesel ekonomik bütünleşmenin teşvikini sağlayan çağrıların var olduğu bu dönemde, bunun Gana gibi bir ülke için olan önemini kavramak vazgeçilmez bir durumdur.

Gana'nın ticaret politikası, bölgesel bütünleşmeye ciddi bir önem atfeder. Bu politika, komşuları ile daha etkin bütünleşmenin, kendi ürünlerinin vatandaşlarına daha ucuz mal edildiği ve rekabet edilebilir daha geniş bölgesel pazarlara erişimi sağlayacağını savunmaktadır. Yeni ticaret teorisi, yerli tüketicilerin yüksek zevkleri varsa, talep edilen yüksek kalite standardını karşılamak için modern teknolojideki yenilik ve yatırımlar yoluyla firmalara piyasada baskı oluşturduğunu öne sürmektedir.

Bu tez, çekim/gravite modeli yaklaşımı kullanılarak Gana'nın ECOWAS içindeki ikili ticaret akışını etkileyen faktörleri belirlemeyi amaçlamaktadır. Özel olarak bu çalışmada, Gana'nın ekonomik birlikteki ticari faaliyetlerini engelleyen faktörlerin yanı sıra ticari faaliyetlerini teşvik eden faktörler de araştırılmıştır.

Gana'nın ECOWAS içindeki ticari faaliyeti olarak ithalat ihracattan daha fazladır ve çıktıya çok az bir katkı sağlar. Genel olarak, Gana'nın bölge içi ticareti bloktaki en büyük ekonomiye sahip olan Nijerya karşısında yetersiz kalmaktadır. Bu durum, Afrika kıtasındaki ticaret bloğu ülkelerinin karşılaştıkları zorluklara bağlı olabilir. Bölge içi ülkelerin karşılaştıkları bu engeller arasında; kötü ulaşım ağı, hantal ithalat ve ihracat işlemleri, sınır ötesi engeller, bilgi ve iletişim teknolojisinin sınırlı kullanımı, bölge içi ticaretin arttırılmasını amaçlayan programların tasarımında özel sektörün yetersizliği ve kötü ticari yerleşim sistemleri sayılabilir.

ECOWAS alt bölgesi ticari koridorları üzerindeki kontrol noktalarındaki kontroller, rüşvet ve gecikme sayıları son derece yaygın görülmüştür ve bunlar Gana'nın bloktaki ticaretini olumsuz etkilemektedir. Örneğin, Tema(Gana) ve

Ouagadougou(Burkina Faso) arasındaki 1.057 kilometrelik ticaret rotası üzerinde yaklaşık 39.1 dolar rüşvet ödenen toplam 23.3 kadar kontrol noktası vardır.

Gana'nın ekonomik ilerlemesine rağmen, ekonomi büyük ölçüde birincil malların ihracatına bağlıdır. Ekonomi, temelde tarıma dayalı, gelişmekte olan bir ekonomi özelliği taşımaktadır. Son birkaç yıldır hizmet sektörünün güçlü olması dışında, sanayi sektörünün büyümesi imalat aktivitesindeki düşüş nedeniyle yavaşlamıştır. İmalat sektörünün üretime katkısı 2008 yılında yüzde 7.9'luk bir orandan 2012 yılında yüzde 6.9'luk bir orana gerileme göstermiştir. Bu durum, yetersiz teknoloji ve yeniliğe atfedilebilir ve hafif imalata bağlıdır. Sonuç olarak ülke, ihracat öncesi birincil ürünlere değer katmada yetersizdir.

Bu çalışma için seçilen çekim/gravite modeli, 1999 yılından 2013 yılına kadar panel veri ile Gana ve diğer on dört üye ülkenin ekonomik, demografik ve coğrafi değişkenleri kullanılarak oluşturulmuştur. İstatiksel tahmin ve sonraki analizler için en küçük kareler tekniği kullanılmıştır. Bu yöntemin seçimi ticaret analizinde büyük ölçüde kullanılmasından ve iç ticaret faaliyetini engelleyen ya da kolaylaştıran diğer değişkenleri araştırmacıya tanıtmayı kolaylaştırmasından kaynaklanmaktadır.

Ampirik sonuçlar, Gana'nın ve ticari ortaklarının gayri safi milli hasılasındaki iyileşme, ortakların nüfus artışı ve ticari ortakların ticaret özgürlüğünün Gana'nın bloktaki ikili ticari akımını istatistiki yönden anlamlı ve olumlu yönde etkileyen faktörler olduğunu göstermiştir. Temel çekim/gravite modeli yaklaşımı ile Gana'nın ve diğer on dört üye ülkenin gayri safi milli hasılasındaki önemli bir artış, Gana'nın karşılıklı ticaret hacminde önemli bir etkiye sahiptir. Buna göre, Gana ekonomisindeki yüzde 1'lik bir artış ikili ticaretinde yüzde 0,57'lik bir artışa neden olacaktır. Ticaret ortaklarının gayri safi milli hasılasındaki yüzde 1'lik bir artış Gana'nın ticaretinde yüzde 0,89'luk bir artış gösterecektir.

Alt bölgedeki ticari ortakların ticaret serbestliği, bir ECOWAS üyesi olarak Gana'nın ikili ticaretinin gelişmesinde önemli bir rol oynamaktadır. Ortakların serbest ticaret politikalarındaki iyileştirmenin ikili ticaret akımları üzerinde önemli ölçüde olumlu etkilere sahip olduğu görülmüştür.

Ülkelerin komşuluğu ve ortak resmi dil gibi faktörler Gana'nın ikili ticaretini istatistiksel olarak yüksek anlamlılık düzeyinde etkilemektedir. Ortak bir sınırın paylaşımının, Gana'nın ikili ticaretini yüzde 200 olumlu bir biçimde etkilemesinin, Gana ve topluluğun geri kalanları arasındaki suni sınırlar üzerinde daha fazla işbirliği için bir gösterge olduğu varsayılmaktadır. Ortak resmi dil bağlamında, Gana ve bu ortak resmi dili paylaşan diğer ülkeler arasındaki ikili ticaretin yüzde 500 oranından daha yüksek olacağı tahmin edilmektedir.

Bununla beraber, blok çeşitli sömürgeci ülkelerden oluşan bir geçmişe sahiptir, ancak Fransa'nın baskınlığı ön plandadır. Bunun bir etkisi olarak, Gana'nın kendisi ile aynı ülke sömürgesi olmayan ülkelerle ticaretinin yüzde 45 oranında düşeceği tahmin edilmektedir. Ancak, bu durum istatiksel olarak anlamlı değildir.

Gana'nın ticaret serbestliği ya da serbest ticarete yönelik politikasında almış olduğu önlemler ekonomik blok ile olan ticaretinde teşvik edici çıkmamıştır, ancak istatiksel olarak anlamlı değildir.

ECOWAS bünyesindeki ticari ortaklar ile Gana ticaret şehirleri arasındaki sınırlar üzerinde bulunan taşıma maliyeti, nakliye ve işlem maliyetinin bir ölçümü olarak mesafe, ticaret akımlarına olumsuz etki etmektedir ve yüksek düzeyde anlamlıdır.

Gana'nın nüfusundaki artış toplam ticaret hacminde olumlu bir anlam taşımasına rağmen, ekonomik kitle olarak ya da gayri safi milli hâsıla olarak ölçüldüğünde önemsiz olduğu ortaya çıkmıştır.

Bu çalışma, çekim/gravite modelinin, sınır ötesi etkiler, dil ve Gana'nın ekonomik büyümesinin, Gana'nın karşılıklı ticaret akımı üzerindeki ekonomik büyümede potansiyel etkilerine yapılan vurgu ile Gana örneği için uygulanabilir olduğunu göstermektedir.

Bu çalışma altı bölümden oluşmaktadır. İlk bölüm çalışmanın giriş kısmını oluşturmakta; ikinci bölüm ana kavram ve kuramlar üzerinde literatür çalışmasını oluşturmaktadır. Üçüncü bölümde kullanılan yöntem değerlendirilmiştir. Dördüncü bölüm kullanılan veriler ve tahmin modelinden oluşmakta; beşinci bölümde çalışmanın sonuçları tartışılmış ve son olarak altıncı bölümde ise genel sonuç ve politika önerilerinin altı çizilmiştir.

1. INTRODUCTION

With globalisation and the growing discovery of new business frontiers, the world has seen the proliferation of regional trade agreements with the ultimate aim of promoting trade and economic integration. New regional theories have been shaping global economy, where relationship and partnership are seen as tools to promote economic growth. The influence of global systems on national economies and on regions of the world has been on the rise, particularly in the last few decades. Nations around the world have actively engaged in regional trade arrangements to strategically position themselves to reap the benefits of trade and promote economic growth and development.

From an economic perspective, regional trade arrangements provide clear advantages in terms of location of trade and investment, saving in transport and economy of scale. Moreover regional relationships ease the recovery of developing regions, and also support them to cope gradually with the challenges of global competitiveness. Furthermore, larger regional markets make it possible for large companies to expand and prepare adequately for international competitiveness.

Regional trade liberalisation and cooperation arrangements are therefore seen as necessary intermediate steps, enabling nations and companies to cope with the risks and opportunities of the global market. As a result the world has witnessed arise in regional trade relationships.

As bilateral and regional trade liberalisation is becoming increasingly common, it is imperative to ascertain what implications this may have for Ghana's regional trade. Over the last three decades, West African economies have engaged in some form market integration, and have gained world attention as regional economic hub. Since 1975, Ghana has been advancing closer region-wide economic integration with its neighbouring countries in Economic Community of West Africa States, including free trade area and a common market. Its trade policy states that the integration of the Economic Community of West African States (ECOWAS) into a full customs union

will provide access to a larger market, thereby promoting investment and industrialisation.

In more general term, economic integration refers to economic regionalism. Deblock and Brunelle (1993) noted that economic regionalism refers to a form of compromise which reconciles the legitimate desire of neighbouring countries to move closer economically and cooperate more closely on a regional basis through the liberalisation of international trade. International trade as argued is beneficial to all. It provides national economies the opportunities to earn foreign income to support their growth process; and enhances the diffusion of goods and services across unlimited borders.

Since independence in the 1960s, countries of Sub-Saharan Africa (SSA) have engaged in some sort of regional economic integration through the formation of trade blocs to promote partnership, limit barriers to trade and ensure free flow of goods and services with the ultimate aim of ensuring economic development. One of such regional trade blocs is the Economic Community of West African States (ECOWAS) comprising fifteen countries in West Africa, which Ghana is a member.

It has also been advanced that,

Well-functioning local and regional markets are important steps on the road towards greater integration in the global economy, and there is great potential in liberalising regional trade. Increased regional integration will create larger domestic markets and increase the competitiveness of the regions in the global markets. However, the local interstate trade between, for example, African countries is extremely limited at present (DANIDA, 2010, p. 18). The United Nations Conference on Trade and Development (UNCTAD) further notes that regional trade carries a large potential in areas with little hope of reaching agreements on a global level (UNCTAD, 2007).

With the on-going negotiations and obvious signing of the Economic Partnership Agreements (EPA) between the European Union and the African, Caribbean and Pacific (ACP) groups, there is a renewed call to promote deeper regional economic integration in the ECOWAS sub-region. The EPA is a key element of the Cotonou Agreement signed in June 2000 by seventy-eight (78) ACP countries[1] and fifteen (15) European Union (EU) member states. Economic Partnership Agreements are a

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[1] See appendices for the map of ACP groups

[2] Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia,

scheme to create a free trade area between the EU and the African Caribbean Pacific Group of States (ACP). These agreements are in the direct response to the criticisms that the non-reciprocal and discriminating preferential trade agreements offered by the EU, which were incompatible with the standards of reciprocity and non-discriminatory in trade set by the World Trade Organisation (WTO). The scheme involves the phasing-out and removal of all trade preferences which have existed between the EU and the ACP countries as well as the progressive elimination of barriers to trade between the parties involved. The principle of the treaty or the scheme includes differentiation and regionalisation which encourages that countries enter the EPAs in regional groupings with the EU. So far seven regional groupings have been formed by ACP countries. Economic Community of West African States (ECOWAS) is one of such groupings, who are in the process of signing and committing member states. Civil Society Organisations (CSOs) and analysts have however given the indication that EPAs will not be beneficial to the West African countries. The Economic Justice Network of Ghana (ENJ), Christian faith based civic society organisation and one of the most vocal critics of the EPA, noted ECOWAS must analyse other workable alternatives before agreeing to the controversial trade deal, which it warns will cripple domestic industries if accepted in its current form (Essabra-Mensah, 2014). It added that the current agreement on the table has the potential to undermine government revenue mobilisation, eliminate jobs, destroy local production, jeopardise the industrial prospects of members, constrain south-south cooperation, and undermine sovereign capacity to make policy to enhance development. It noted that since most EU goods enjoy better conditions of production, signing the EPA will destroy the domestic markets of these signatories, and as these sophisticated goods from the EU can out-compete domestic products which are similar or substitutable.

McDonald *et al* (2013) noted that, the Economic Partnership Agreements are legally binding bilateral contracts between EU and individual African countries; and once signed EPAs warrant that within a decade, about 80% of that country's market should open to EU goods and services. This the CSOs see as a detrimental to the survivor of West African countries, who are dependent on peasant agriculture and light manufacturing sectors and thus calling for proper negotiations of the scheme. The clarion call therefore is that member states improve regional integration which

enhances intra- regional trade so as to make them more competitive and more attractive to better deals in the global economy.

The theoretical justification behind economic integration is that participating countries are able to improve their competitiveness. According to Acclassato (2013) countries which are economically integrated are able to expand their market and utilise economies of scale in order to reduce cost. These aforementioned reasons provide the motivation for further studies into the theory of regional economic integration and intra- regional trade, particularly for a lower middle income country like Ghana as a member of the ECOWAS.

1.1 Research Objectives

The overall objective of thesis is to investigate the determinants of Ghana's intra-trade flows as a member of regional economic bloc (ECOWAS) using gravity model approach.

Specific objectives are to;

- Identify the factors that determine trade flows of Republic of Ghana as a member of regional economic bloc,
- Ascertain the trade attractiveness of Ghana from other member countries of the regional bloc based on its economic capacity,
- Identify barriers to intra-regional trade and what impacts they have on Ghana's trade in the economic bloc.

This study seeks answers to the following questions;

- How advantageous is Ghana in the regional economic bloc of ECOWAS?
- How do its economic, demographic and geographic indicators such as GDP, per capita income, population, location and trade policy influence and impact its trading potential in the trade bloc?
- Does lack of a common language serve as a barrier to trade of Ghana with other members of the regional trading bloc?

The choice of Ghana as case stems from its role in Sub-Saharan Africa. Ghana has been in the forefront of regional economic integration since independence and its trade policies have offered considerable opportunities for trading, which makes it the preferred destination of goods and services in the sub-region. Furthermore, the current debates in the European Union as a regional bloc on its economic

sustainability and future relations with other regions of the world provide the justification of this study to comprehend the impact of regional integration on an economy. The relevance of this study is first, to sets the stage for further empirical analyses to explore the benefits of economic integration and trade in the sub-region. Secondly, to serve as a reference for policy makers in regional trade policies as well as issues relating to negotiations of deep economic integration in the regional bloc.

1.2 Methodology

A gravity model of international trade has been empirically tested to investigate the relationship between the volume and direction of foreign trade and the formation of regional trade blocs where members are in different stages of economic growth and development. Tinbergen (1962) and Pöyhönen (1963) pioneered the gravity model to analyse international trade flows. Since then, the gravity model has become a popular workhorse in empirical foreign trade analysis. According to Krugman *et al* (2012), the gravity model works because large economies tend to spend large amounts on imports because they have large incomes.

Kepaptsoglou et al (2010) note that exports and bilateral trade flows are the most common dependent variables found in trade flow gravity models, while their explanatory variables can be distinguished into the following two groups:

- factors indicating demand and supply of trading countries,
- factors representing the impedance imposed on a trade flow between countries.

Common proxies for demand and supply are measures of a country's economic and market size; income level, population, area size and GDP per capita are variables included in most gravity model specifications. In particular, GDP per capita indicates the purchasing power of importing and exporting countries (Sohn, 2005). The gravity model approach will be used to estimate the magnitude of Ghana's bilateral trade with members of ECOWAS. The use of the gravity model is to explore the degree of trade attractiveness of Ghana as well as the factors that affect its trade with members of the trading bloc.

1.2.1 Hypothesis

Based on the aforementioned variables, the following hypotheses are to be tested and generalisation made;

- Economic and market size measured by gross domestic product, and population are significant determinants of trade of Republic of Ghana in ECOWAS.
- Distance between Ghana and other member states has negative effect on its trade, and as such the main barrier to intra-regional trade
- Common language between trading partners promote easy transactions and reduce trade costs. Since the regional bloc is made up of different language speaking countries, the lack of a common language negatively affect successful trading and integration of Ghana with the rest of the community.

1.3 Thesis Structure

The rest of the thesis is organised as follows: Chapter two (2) reviews literature on regionalism, regional economic integration and trade theories. Chapter three (3) reviews the methodology used in the thesis- gravity model; whereas chapter four (4) presents the model estimation and data used. Chapter five (5) discusses the results of the study and chapter six (6) conclusion drawn and policy recommendations suggested.

2. LITERATURE REVIEW

Nowadays the world is described as a 'global village' where countries and regions are connected through technological progress and through international trade. The importance of trade to growth and development is well grounded in theory. Both developed and developing countries are making extraneous efforts through the establishment of regional economic blocs to eliminate trade bottlenecks or barriers to promote and enhance the exchange of goods and services across borders. The questions that however arise in the literature include; what is the impact of regionalism on trade? Why do countries trade with each other? How large are their trade flows? Do all countries profit from trade? To obtain answers to these questions, it is ideal to explore international trade theories such as the classical trade theory, new trade theory and regionalism. These theories will be used to explain the 'why' countries trade with others, and gravity model will be employed to explain the degree of trade between countries. This chapter reviews the literature on regionalism and trade theories.

2.1 Theory of Regionalism

The theory of regionalism is both economic and political and not a new concept in the literature. Winters (1996) defined regionalism as any policy designed to reduce trade barriers between a subset of countries regardless of whether those countries are actually contiguous or even close to each other. Initiatives towards a closer regional integration date back to the centuries. Regionalism, in the context of our study, is the proclivity of countries to trade with each other with which a common geographical region is shared. During the 1990s, a renewed interest in regionalism emerged and this led to the rapid emergence of global systems of regions with economic and political undertones. Since the 1990s Regional Trade Agreements (RTAs) have become increasingly prevalent in the world. As of June 2014, some 585 notifications

of RTAs (counting goods, services and accessions separately) had been received by the GATT/World Trade Organisation (WTO, 2014). Of these, 379 were in force.

What all RTAs in the WTO have in common is that they are reciprocal trade agreements between two or more partners. One obvious reason for regionalism is that it overcomes distance as a hindrance to trade. In the literature distance is commonly referred to as a 'friction to trade', and as a result, distance is viewed from both intuitive and economic perspectives, as having a negative impact on trade volumes. One concept associated with regionalism, is the regional integration.

According to Lombaerde and Langenhove (2007) regional integration is a worldwide phenomenon of territorial systems that increases the interactions between their components and creates new forms of organisation, co-existing with traditional forms of states-led organisation at the national level. Other scholars see regional integration as the process by which a particular regions increase their level of interaction with regard to economic, security, political, or social and cultural issues. In effect, regional integration involves joining individual nations within a region into a larger and broader territory. The magnitude of integration (economic or political) depends on the willingness as well as the commitment of states to share their sovereignty. It can therefore be concluded that regional integration is both economic and political concept.

According to Reddy (2010) regional integration initiatives should meet at least eight (8) important functions, as follows:

- the strengthening of trade integration in the region;
- the creation of an appropriate enabling environment for private sector development;
- the development of infrastructure programmes in support of economic growth and regional integration;
- the development of strong public sector institutions and good governance;
- the reduction of social exclusion and the development of an inclusive civil society;
- contribution to peace and security in the region;
- the building of environment programmes at the regional level; and
- the strengthening of region's interaction with other regions of the world.

2.1.1 Regional Economic Integration and Trade

In recent years, countries have increasingly opened their economies to international trade, whether through the multilateral trading system, increased regional cooperation, or as part of domestic reform programmes, which have brought enormous benefits to many countries and citizens (WTO, 2007).

Regional economic integration is the process by which countries agree to reduce or eventually remove tariff and non-barriers to promote the free flow of goods and services among them. The process involves joining together different economies into larger economic area for the ultimate purpose of free trade. It involves also the elimination or reduction of restrictions to trade among the participant economies. Trade between two countries is about decreasing their bilateral trade barriers relative to average barrier of the two countries to trade with all their partners. This average trade barrier is referred to as the "multilateral resistance". If a country has a relatively high average trade barrier, it will trade more with a country with which it has a low bilateral barrier. The rationale is that, *ceteris paribus*, two countries surrounded by other large trading economies, will trade less between themselves than if they were surrounded by oceans (or by vast stretches of deserts and mountains) (Bacchetta *et al.*, 2012).

There are several levels of regional economic integration, but often cited in the literature include free trade, customs union, common market and economic union.

1. *Free trade area*: this is considered the most elementary form of cooperation. Member countries remove all barriers to trade between themselves but have the freedom to independently determine trade policies with non-member nations.

2. *Customs union*: this form provides for economic cooperation as in free-trade zone. Restrictions to trade are removed between member countries. The primary difference from free trade area is that members agree to treat trade with non-member countries in similar manner.

3. *Common/single market*: this level allows for the creation of economically integrated markets between member countries. Trade restrictions are removed, as are any barriers on the movement of factors of production such as labour and capital between countries. Like in customs union, there is a common trade policy for trade with non-member nations. The primary advantage to workers is that they no longer require a visa or work permit in another member country of a common market

4. *Economic union*: this form is created when countries enter into an economic agreement to remove barriers to trade and adopt common economic policies. It is considered as the advanced form of economic cooperation. An example is the European Union. These levels of regional economic integration can be summarised as shown in Table 2.1 below.

Table 2.1: Dimensions of Regional Economic Integration.

Characteristic Types	Tree Trade between Member states	Common External Tariff	Free movement of production factors	Harmonisation of economic policy	Centralisation of economic & monetary policy
Free TradeArea	Yes	No	No	No	No
Customs Union	Yes	Yes	No	No	No
Common Market	Yes	Yes	Yes	Yes	No
Economic &Monetary Union	Yes	Yes	Yes	Yes	Yes

Source: Adapted from Anadi, 2005.

The argument in favour of regional blocs is that, regional cooperation are the most appropriate means to improve weak intra- trade as well as domestic trade, since it affords the possibilities of generating large economies of scale from activities typically associated with expanded trade and overall economic growth in a country. This has led to the creation of increased number of trading blocs around the world. A trade bloc is basically a free-trade zone, or near free-trade zone, formed by one or more tax, tariff and trade agreements between two or more countries. Figure 2.1 highlights some regional trade agreements (RTAs) in the world.
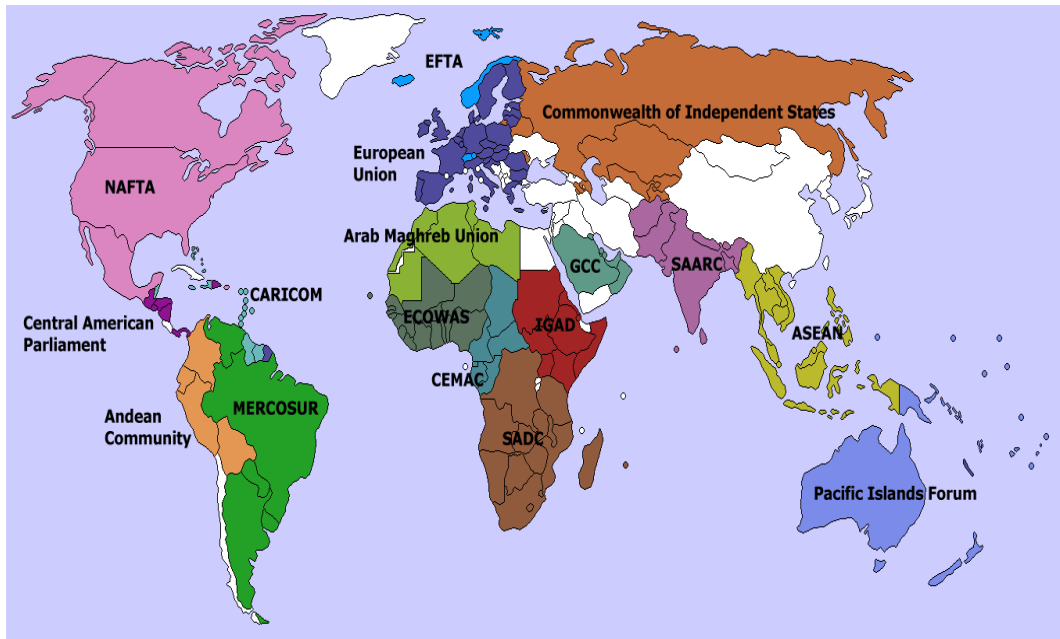
Figure 2.1: World Regional Trading Blocs. Source: *Wikimedia Commons.*

As suggested by endogenous growth theories, large countries are more likely to grow faster because growth is seen as depending on innovation which, in turn, is believed to be an activity intensive in scale effects. Countries get together to enjoy economies of scale, which would allow them to increase productivity, diversify their outputs and ultimately boost growth. According to the New Charter University Online, the merits and demerits of regional trade agreements may include the following;

2.1.1.1 Merits of regional trade agreements

Trade creation: regional agreements create opportunities for countries to trade among themselves by removing the barriers to trade and investment. Due to the removal of trade restrictions such as tariffs, cooperation results in cheaper prices of goods and services for consumers in the trade bloc countries.

Employment opportunities: economic integration can help boost job opportunities by the removing all barriers to job find. An example is the European Union's free movement of labour in the member states.

Consensus and cooperation: member nations may find it easier to agree with matters affecting them and relate well with other non-members for collective purpose. Regional understanding and similarities may also facilitate closer political cooperation and gains.

2.1.1.2 Demerits of regional trade agreement

Trade diversion: member countries may trade more with each other than with non-members. This means increased trade with less efficient producers because they can easily be located in a member country. In this sense, weaker companies can be protected inadvertently with the bloc agreement acting as trade barrier. And this may lead to new trade barriers, particularly with countries outside the trading bloc, but serving as an incentive for bloc members.

Employment shifts and reductions: countries may shift production to cheaper labour markets in member states. Similarly, job seekers may move to gain access to better jobs and wages, and this sudden shift in employment can negatively affect the least resource endowed member countries.

Loss of national sovereignty: Politically, nations may give up more of their political and economic rights more especially when it involves collective decision-making and consensus building within the bloc. This threatens member states in the determination of their own domestic economic policies.

With the continued increase in the number and size of Regional Trade Agreements(RTA) throughout the world, nearly all countries, including those in Sub-Saharan Africa (SSA) now participate in at least one bilateral and RTA (Yang & Gupta, 2005; Keane *et al*., 2010).

The idea of regional economic cooperation in Africa received considerable attention after post-independence with the optimism of sustained growth and development. The motivation of virtually every RTA has been the prospect of enhanced economic growth, through an expanded regional market which allows economies of large-scale production, fosters specialisation and attracts foreign investment (Carbaugh, 2006). This impetus for regional integration draws its rationale from the standard trade theory, which states that free trade is superior to all other trade policies (Alemayehu and Haile, 2002). The success of any integration scheme be it free trade area, customs unions, common market, economic union, is therefore to enhance competition and efficiency within the integrated geography, through increased specialisation, and generally to enhance better allocation of scarce resources into the most productive sectors of the economy.

2.2 Trade Theories for Growth and Development

The argument from classical international trade theory is that free trade is beneficial to all. Free trade among two or more countries will improve the welfare of the participating member countries. Here we review the theories associated with trade among countries.

2.2.1 Absolute and comparative advantage

The first classical trade theory is the absolute advantage proposed by Adam Smith, the Scottish Economist in his famous book *Wealth of Nations*, published in 1776. Adam Smith posits that if countries specialise in the production of goods and services according to their absolute advantage, then trade with others, they all gain in international trade. According to Reinert (2012) absolute advantage refers to the possibility that, due to differences in supply conditions, one country can produce a product at a lower price than another country. Although Smith's statement may be convincing for a country which has absolute advantage, it cannot however explain the rationale for a country which does not have absolute advantage to attend international trade. This is because in real world no country has the absolute authority to suggest for instance what others should produce and export. To deal with the shortfall of Smith's argument, the English influential economist David Ricardo, in the nineteenth century, coined the concept of comparative advantage. The principle states that ' a nation, like a person gains from trade by exporting the goods and services in which it has its greatest comparative advantage in productivity and importing those in which it has the least comparative advantage' (Lindert, 1991 cited Thai, 2006, p.7). The comparative advantage theory for gains from trade thus suggests all countries gain when each concentrates on and exports goods that they can produce at lower opportunity cost than their trading partners. That is, as noted by Krugman and Obstfeld (2000), trade between two countries can benefit both countries if each country exports the goods in which it has comparative advantage.

The Ricardian model views international trade as solely due to differences in the productivity of labour. Although empirical studies confirm Ricardian proposition that comparative advantage is based on a difference in labour productivity, the Ricardian trade model was criticised for its unrealistic underlying assumptions and its inability to neither explain the reason for the difference in labour productivity across nations nor the effect of international trade on factor earnings (Salvatore, 1998). It does not

also take into consideration economies of scale, income distribution, and intra-industry trade as well as resources endowment among nations.

2.2.2 Heckscher–Ohlin (H-O) theory of trade

The defects in the Ricardian theory therefore moved two Swedish economists, Eli Heckscher (1919) and Berlin Ohlin (1933) to explain the source of international differences in productivity -the factor that determines comparative advantage and the pattern of international trade. They extended the Ricardian trade model into what is termed the Heckscher–Ohlin (H-O) or the factor proportions model by introducing one more input, that is, capital, in addition to labour in the Ricardian model. Heckscher-Ohlin model predicts that comparative advantage arises from differences in national resource or factor endowments. The more abundant a factor is the lower is its cost, giving the country the inclination to adopt a production process that uses intensively the relatively abundant factor.

The H-O model assumes that different commodities require that factor inputs be used with varying intensities in their production, and that countries will export goods that make intensive use of those factors that are locally abundant, and import goods that make intensive use of factors that are scare locally.

The fundamental difference between the Ricardian model and that of the Heckscher-Ohlin model is that, the Ricardian theory of trade, incorporates differences in technologies between countries, and concludes that everyone benefits from trade, whereas the Heckscher-Ohlin trade model relies on the differences in factor endowments among countries as basis for trade and it concludes that there will be winners and losers from trade.

2.2.3 New trade theory

The standard trade theories have been criticised on the grounds that they explain trade to mean that countries which are less similar in factors of production tend to trade more, leaving the huge proportion of trade between countries with similar resource endowments and intra-industrial trade which characterise the exchange of goods and services among developed economies. The new trade theory however explains international trade based on the assumptions of economies of scale, imperfect competition and product differentiation, as against that of the classical theory of constant return to scale, perfect competition, and homogeneity of goods.

Under the new trade theory, each country specialises in producing a narrower range of products at larger scale with higher productivity and lower costs. Then it can increase the variety of goods available to its consumers through trade. Trade can occur even when countries do not differ in their resource and technology (see also Krugman and Obstfeld, 2005). It follows that a country may predominate in the export of goods simply because it is fortunate enough to have one or more firms among the first to produce that good; and because of economies of scale and increasing returns to specialisation, in some industries there are likely to be only a few profitable firms. Economies of scale in this sense can be defined as the reduction in average costs when there is expansion in output.

The profitability of firms in a nation's industry in global market depends on their competitiveness. Porter (1998) in his famous *The Competitive Advantage of Nations* notes that the success of a nation in global competition lies on four major attributes christened the *Diamond model*. The Diamond model narrates that a country's competiveness depends on its factor conditions; demand conditions; suppliers and related industries; and firm strategy, structure and rivalry.

The factor conditions indicates that a country's resource endowments or supply of factors of production such as human resources, physical resources, knowledge resource, location, capital resources and infrastructure play a significant role in determining its national competitive advantage. Both basic and advanced factors are the crucial determinants of the capabilities and competitiveness of a nation. The advanced factors such as skilled labour, communication facilities, technology are critical for firms' profitability. The demand conditions in home market are vital in stimulating domestic firms to embark on innovation and improve quality of products. When domestic consumers have high tastes for instance, a pressure in the market is created for firms to meet high standard of quality demanded. A nation's advantage in industry is also conditioned by the preserve of vigorous home-based suppliers of cost-effective and quality inputs or related supporting industries. Successful industrial growth in the exporting country may emerge on the quantum of the growing clusters of related industries. The will and the motivation of a nation to go global are based on the firms, management strategies and organisational structure. Porter argued that government policy and actions as well as chance events are secondary auxiliary variables in creating competitive and effective advantage of a country. Effective industrial and trade policy of an open economy would encourage

local firms to compete abroad. But more restrictive and protective policies discourage and weaken the abilities of local firms to produce and compete in international markets.

A major point raised in the new trade theory includes the impact of increasing returns to scale on the pattern as well as on the mutual benefits from international trade. Firms with first mover advantages will develop economies of scale and create barriers to entry for other firms. New trade theory suggests that governments might have a role to play in promoting new industries, supporting the growth of key industries and creating the enabling environments for them to thrive and compete in the global market. As argued by Pettinger (2013) this means that poorer, developing economies may struggle to ever develop certain industries as they lag too far behind the economies of scale enjoyed in the developed world. Sen (2010) concluded that the evolution of trade theory from old trade doctrines to the new trade theory has impacted policy at two levels. The first relates to the continuing support of the free trade doctrine to determine policy for developing areas; and the second relates to policies pursued by advanced nations, which relies considerably on the new trade theory doctrines for strategic trade. He added that the uneven power relations between the rich and poor nations of the world permits a continuation of this asymmetrical combination of policies, to which trade theory unfortunately has contributed much. The new trade theory emphasises long-run productivity effects of trade (Grossman and Helpman, 1991) and productivity spillovers can occur via importing and exporting (Velde, 2008).

2.2.4 Importance of trade to economic growth

The welfare gains from foreign trade among countries to the process of economic development in any country are enormous. Firstly, trade increases economic well-being of a country by holding resources and technology constant. This leads to consumption and production gains. The gains come about because productive resources are tailored into the country's comparative advantage industries; and because of this redistribution of resources, overall output (GDP) increases leading to the static gains from trade.

Secondly, gains from trade bring about increases in the economic well-being that accrue to a country because trade induces increases in the productivity of existing resources. This is because the economy of a country grows over time either due to

increases in its stock of productive factors or because a technological innovation helps a country's existing stock of factors to become more efficient, leading to a shift in a country's production possibility frontiers. The relationship between international or regional trade and economic growth can be seen in terms of non-restrictions of trade in both raw materials, intermediate products and capital goods, such that there would be increases in supply of these categories of goods in either of the participating countries at any point in time. In this way, trade will boost the global diffusion of all products across unlimited borders, which ensures rapid economic growth.

Also, exports ease the pressure on the balance of payments and create the much-needed employment opportunities (Jordaan and Eita, 2007). Export trade is important to meet the foreign exchange gap. International trade provides greater opportunities to earn foreign income, to shore up the country's foreign reserve and stabilise its currency depreciation and reduce the effect of economic shocks.

2.3 Regional Economic Integration in Sub-Saharan Africa (SSA)

The continent of Africa is the world's second largest and second most populated continent but abounds in rich natural resources. Comparatively, the continent has experienced continuous economic growth despite the slow pace of efforts. On average annual growth rate of real output increased from 1.8 percent in the period 1980–1989 to 2.6 percent in 1990–2000 and reached 5.3 percent in the period 2000–2010. And in the period 2008-2012 the continent grew at about 3.8 percent. The continent experienced a significant slowdown in growth due to the global financial and economic crisis of 2008/2009 (UNCTAD, 2014). The continent's slow pace of economic growth over the decades could be linked to challenges of food insecurity, high unemployment, poverty and inequality, commodity dependence, lack of economic transformation, environmental degradation, and low integration of the continent in the global economy recognised by the United Nations. The annual growth rates of Africa continent compared to other regions of the world is shown in Table 2.2.

Table 2.2: Average Growth Rates of Real Output (%)

	1970-1980	1980-1989	1990-2000	2000-2010	2008-2012
World	3.80	3.26	2.82	2.77	1.65
Developing economies	5.80	3.53	4.89	6.07	5.17
Africa	4.22	1.81	2.62	5.28	3.79
America	5.97	1.76	3.12	3.64	3.02
Asia	6.18	5.34	6.24	7.13	6.09
Eastern Asia	7.80	9.66	8.13	8.30	7.20
Oceania	2.86	3.79	2.38	2.87	3.41

Source: UNCTAD

Most of Africa's countries have low per capita income levels and small populations which result in small markets. In 2008, 12 SSA states had populations of less than 2 million while 19 had a gross domestic product (GDP) of less than US$5 billion, six of which had a GDP of less than US$1 billion. Not only are most SSA economies small and poor, but 15 are also landlocked, an important contributory factor to high trade transaction costs, and more generally to the high costs of doing business in Africa (Hartzenberg, 2011, p.3).

To overcome the aforementioned challenges, African countries have embarked on several attempts to promote regional integration, which includes intra-regional trade particularly after independence in the 1960s. In the region, measures to regional integration include the establishment of the African Union- a continental grouping of all countries; and the creation of various Regional Economic Communities (RECs), such as the Economic Community of West African States (ECOWAS) which are pursuing integration through free trade, and developing customs unions and a common market.

Regional integration schemes within the Sub-Saharan Africa level was established as a result of the small size of the typical African economy and the perceived disadvantages associated with smallness (Babatunde, 2006). The general reason for the creation of these trading groups is to increase economic growth and gain benefit of the member countries (Kotabe and Helson 2010).

The belief is that trade blocs present opportunities for promoting regional trade, boosting growth and engendering development. This conviction in the formation of regional trade blocs dates back to Viner (1950) who suggested that the effects of regional integration on trade can be either *trade creating* when trade replaces or complements domestic production, or *trade diverting* when partner country

production replaces trade from the rest of the world. Two forms of gains are associated with regional trade agreements- static and dynamic gains.

The static gains are due to better and more efficient allocation of resources which occur when the elimination of trade barriers among members of a trading bloc creates trade by shifting production from high- to low-cost producers within the bloc (UNCTAD, 2013). While regional trade agreements can affect growth through dynamic output and productivity effects such as through competition and scale (Velde, 2008). It is advanced that exposing firms to enhanced competition, trade openness can force firms to lower costs, facilitating improvements in productivity and efficiency. According to the Department of Business Innovation & Skills (2011), by lowering the returns to producing in the import competing sector and increasing returns to exporting, trade openness facilitates a reallocation of resources from lower to higher productivity firms and sectors, leading to faster economic growth.

Economic literature suggests that trade, especially intra-regional trade, plays a vital role in promoting economic growth and development. This is on account of the fact that aside from fostering large-scale capital investments and enhancing economic efficiency, intra-regional trade provides a useful platform for improving competitiveness of national enterprises before exposing them to the rigors of global competition (Ekra, 2010) . Against this backdrop, the last three to four decades the world witnessed a significant growth in the formation of regional and sub-regional economic groupings for the principal objective of promoting trade at the regional and sub-regional levels. In this regards, as at the end of 2008, intra-regional trade as a percentage of total trade stood at: 70% in the European Union; 32% in North America; 47% in developing Asia; 27% in within Latin America; and 10% in Africa (Ibid).

2.3.1 Economic Community of West African States (ECOWAS)

The Economic Community of West African States (ECOWAS) is a regional economic integration scheme in West Africa sub-region established with fifteen

member countries [2] in May, 1975 with the goal to attain sustainable economic development and self-reliance through:

- elimination of custom duties and other charges of equivalent effect in respect of the exportation and importation of goods between member states;
- abolition of quantitative and administrative restrictions on trade among the member states;
- establishment of a common customs tariff and a common commercial policy towards third countries;
- abolition (as between the member states) of the obstacles inhibiting free movement of persons, goods, services and capital.

From those preceding objectives, the Community adopted the classical model of regional economic integration, which is envisaging the creation of an economic bloc through a gradual process of tariff elimination leading to the establishment of a free trade area, a customs union and a common market just like the EU. In effect, the Community can be described as being modelled on the EU experience, which envisages common market through common economic policies.

The crave for regional trade bloc in the middle of the 1970s was to overcome the constraints of smallness of the economies of the member states in the sub-region, which impedes members' ability to efficiently industrialise as well as remove problems of rigid border checkpoints which did not allow free flow of goods and services, coupled with serious difficulties in penetrating the global markets. Figure 2.2 is the map of ECOWAS on the continent of Africa.

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[2] Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

Figure 2.2: Showing ECOWAS Members in Africa (Deep Green Colour). Source: www.worldbank.org

In the Community, Nigeria (oil-rich nation) is the largest economy composing of about 63% of gross domestic product and with population of about 180 million by 2013. This is followed by Ghana and Côte d'Ivoire. Ghana's GDP composition amounts to 12% with about 25 million populations. Côte d'Ivoire's share of GDP is about 6% with population of 23 million. The remaining members have GDP less than 6% and their population below 20 million. The following Figure 2.3 reports the GDP composition of members of ECOWAS by the year 2013.
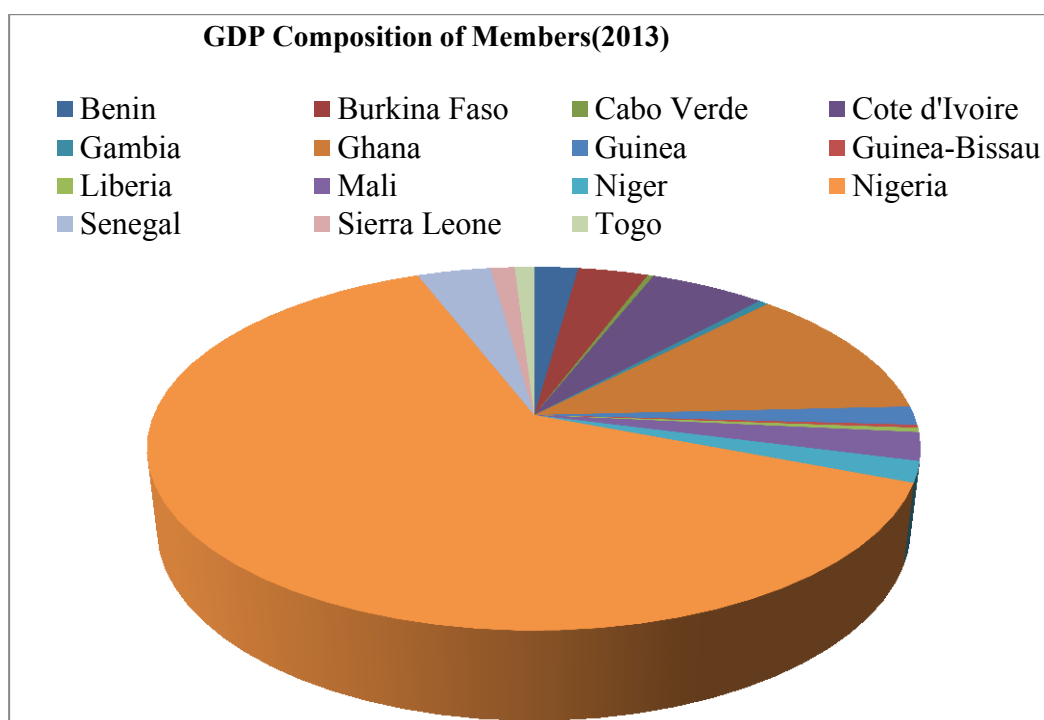
Figure 2.3: GDP Composition of Members of ECOWAS in 2013.

In the ECOWAS sub-region, trade liberalisation in particular is geared towards economic integration. The basic objective of such integration scheme is to significantly increase trade within the integrated area and as well as expand the overall trade. Ogunkola (1998) mentioned that external and internal motivation has been the major factor in the evolution and development of regional bodies in developing countries, especially bodies that are devoted to regional integration. At least in the Community, there has been an enforcement of some sub-regional integration efforts through free international trade, common external tariff wall, consolidation or freezing of customs duties, non-tariff barriers to intra-trade and gradual phasing out of duties on industrial products from community projects over a period of 6-10 years at 10- 16.6% annual rates of reduction depending on the classification of member states based on the level of development, location and importance of custom revenue (Reuben et al, 2013). The ECOWAS are involved in trading with countries within and outside the region. The Figure 2.4 demonstrates intra-trade activity of the Community between 1999 and 2009.
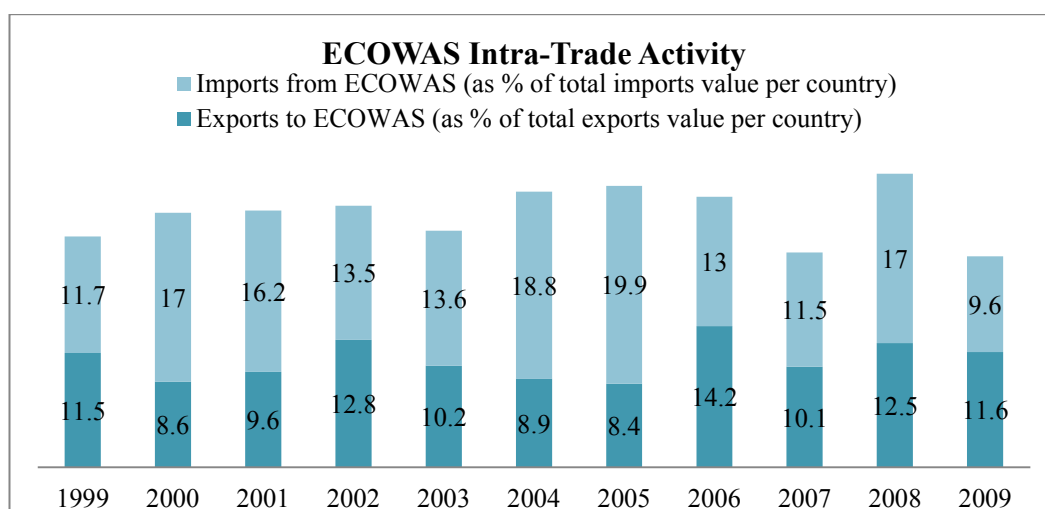
Figure 2.4: Intra-trade Activities in ECOWAS. Source: Author, constructed with data from http://ecowas.opendataforafrica.org/

Intra-ECOWAS trade as percent of total export and import values from 1999-2009, is represented in Figure 2.4. ECOWAS's intra-trade, accounts for an average of 10.76 percent of the total exports and 14.71 percent of the value of total imports from 1999 to 2009, an indication of higher intra-import trading activity among member states. Also, in 2010, Economic Community of West African States (ECOWAS) adopted its 'West African Common Industrial Policy'. One of its core objectives is to increase the share of intra-regional trade from around 12% of total trade to 40% by 2030, with a vision to 'maintain a solid industrial structure, which is globally competitive, environment-friendly and capable of significantly improving the living standards of the people by 2030' (ECOWAS, 2010, p.4). The specific objectives include among others;

- Development of the Private Sector through support measures aimed at boosting competitiveness;

- Development of industrial productive capacities through increased endogenous processing of local raw materials to create more wealth and value added in value chains;

- Development of infrastructure and support services such as infrastructure to evaluate quality and compliance, information services on technologies, trade, investment, export promotion, customs, energy, industrial areas, etc.

- Enhancement of cooperation between the Private sectors of Member States through exchange of experiences in the area of product quality, economic information and standardisation, etc.;

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- Development of regional industrial integration in the areas of intra-regional and global trade, due to its importance for economic and social development;
- Promotion of endogenous and direct foreign investments;

In the collaborated study of the OECD, UNDP and AfDB on regional economic outlook, West Africa remains the fastest growing region on the continent of Africa. The region's macroeconomic prospects are strong. After some decline in the year 2013, growth is projected to accelerate to above 7% in 2014 and 2015 as compared to 4.8% and 5.7% in 2014 and 2015 respectively for the entire continent of African (AfDB *et al*, 2014). This underscores again West Africa's resilience to global and regional headwinds. Figure 2.5 shows the real gross domestic product and projections of the Community.
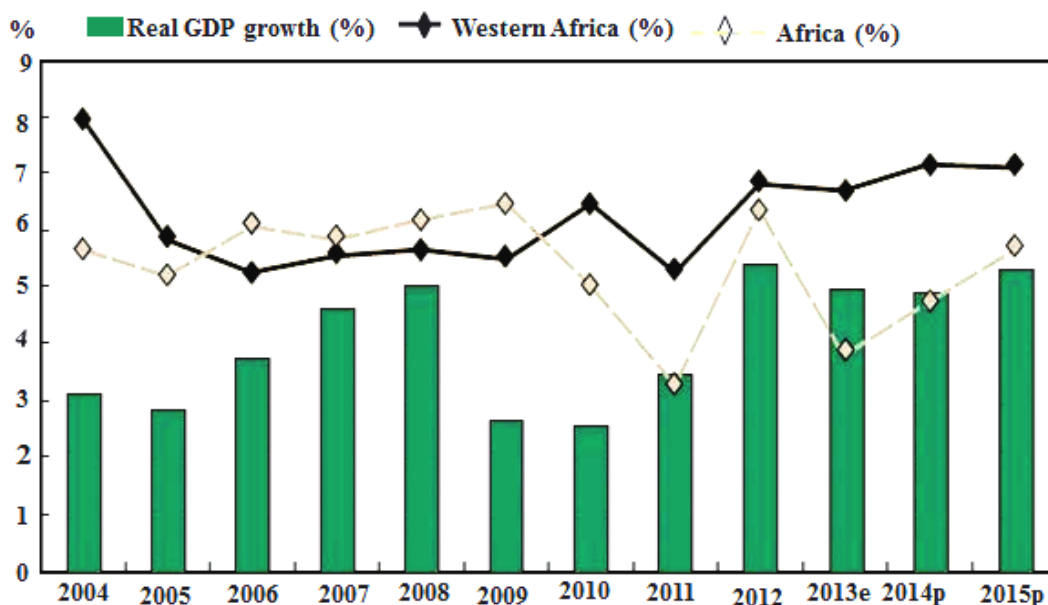
Figure 2.5: Real GDP Growth of ECOWAS, in AfDB *et al,* 2014.

The above real GDP growth rates of the region demonstrates that, all things being equal, the future prospects of the region is high, and countries that are strategically positioned with sound trade and industrial policies could reap benefits from trade in the community. It is worth mentioning however that these projections are going to be affected heavily with the current Ebola disease and insecurity in the sub-region. These expectations are likely to be negatively impacted in countries such as Sierra Leone, Guinea and Liberia where the Ebola disease is endemic. And general trading in the region is likely to slow down.

The ultimate growing interest in regional integration in the ECOWAS sub-region is however to derive its full benefits of allowing goods and services to be exported

(imported) among members as well as to the rest of the world, which offers access to large variety to consumption. Each member country thus has a wide range of market to sell its goods apart from trading within its borders. Again, sub-regional cooperation affords members the opportunities to be able to better negotiate against rich powerful economies and promote increased collaborations among member states to reduce the negative effects associated with globalisation and unfair trade.

ECOWAS's exports are mostly comprised of a limited range of agricultural commodities. The reliance on these primary commodities such as oil and gold in international market leaves ECOWAS countries vulnerable to the external shocks of global market price fluctuations. Since all countries but Nigeria are net oil importers, fluctuations in oil prices on the import side are often combined with commodity price shocks on the export side. Manufactured exports are negligible. Intra-regional trade as a share of total trade remains marginal, at some 10 percent reflecting the lack of complementarities of the economies.

2.4 Profile of Ghana

The Republic of Ghana is a unitary state and growing democracy in sub-Saharan Africa after gaining independence from Britain in March, 1957. The population is about 25 million and land mark of 238 000 square kilometres. Ghana has ten (10) administrative regions and capitals with Accra being the national capital. It is a lower middle income country since 2010, and it shares boundaries with Burkina Faso to the north, Togo to the east, Côte d'Ivoire to the west and the Gulf of Guinea to the south. The map of Ghana is shown in Figure 2.6 below.

Figure 2.6: Ghana in Africa and Administrative Regions (http://www.wpmap.org/)

Ghana's long term development goal is to achieve a per capita income of at least US$3,000 by 2020. It is however estimated that by 2013 Ghana's GDP (at purchasing power parity) stood at US$90.41 billion with per capita at US$3,500 according to the Central Intelligent Agency World Factbook country profile. In the ECOWAS sub-region Ghana was the second largest economy after Nigeria, with estimated GDP of US$478.5 in 2013 and followed by Cote d'Ivoire, with estimated GDP of US$43.67 billion in 2013.

Ghana embarked on several programmes aimed at economic growth and development over the last decades. Notable among these economic programmes included the Import Substitution Industrialisation (ISI) strategy in the 1960s with the purpose of producing goods that were previously imported from the developed economies locally and also serving as a means of attaining rapid economic growth while diversifying productive structures. The performance of this strategy was however not encouraging just as in other sub-Saharan economies. In 1963 for instance the economy grew by 4.4%, but recorded a negative growth of -4.3% by 1966 (World Bank's World Development Indicators [WDI], 2014). In light of the failure of ISI strategy prompted the Bretton Woods institutions (i.e. the International Monetary Fund and the World Bank) to propose outward-oriented development strategies as part of structural adjustment and reform programmes in the 1980s. The structural adjustment programmes (SAP) focused on shifting away from ISI strategies, and redirect growth towards the external market. This was aimed at

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achieving higher economic growth pivoted on a dynamic and more vibrant external sector. The objectives for the external sector were to restore incentives for the production of exports and increase the overall availability of foreign exchange, and to improve the foreign exchange allocation and channel it into selected high priority areas. Trade policy under the Programme included tariff reductions, removal of quantitative restrictions on imports, liberalisation of foreign exchange, deregulation of domestic market prices and controls and institutional reforms that particularly affected revenue-generating bodies like Customs, Excise and Preventive Service (CEPS). The performance improved and both exports and imports saw some growth since the 1980s. For example exports of goods and services (as percentage of GDP) grew from 11% in 1985 to 49% by the year 2000 (World Development Indicator Database).

Ghana's sectorial structure is pivoted on three-sector economy, comprising agriculture, industry and service. The economy has maintained commendable growth trajectory with an average growth of about 6.0% over the past six years. In 2013 however growth declined to 4.4%, considerably lower than the growth of 15% recorded in 2011 and 7.9% achieved in 2012. Figure 2.7 shows the real GDP growth rate and projections of Ghana in Africa.
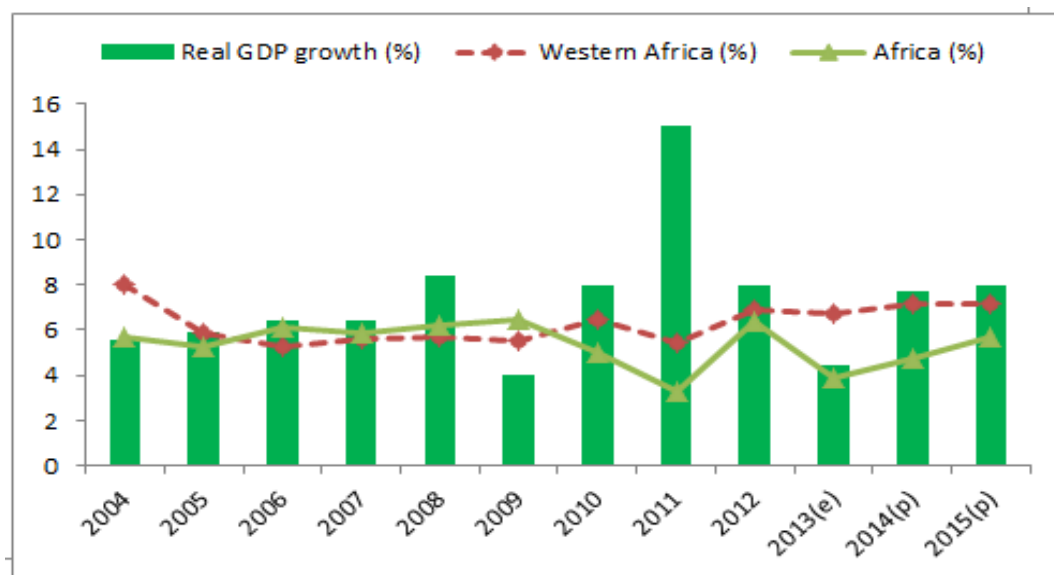
Figure 2.7: Real GDP Growth and Projection of Ghana's economy (Note e=estimation, p= projection in AfDB *et al*, 2014).

Growth of the economy is however largely driven by service-oriented sectors and partly industry, which on average have been growing at a rate of 9.0% over five

years to 2013. Over the medium term projections, by the year 2015 the economy is expected to register robust growth of around 8% , all things being equal, propelled by improved oil and gas production; increased private sector investment with the launched of the public-private partnership initiative; public infrastructure such as sustainable power supply; and sustained political environment. The Figure 2.8 highlights sector contribution to output between 2010 and 2012.
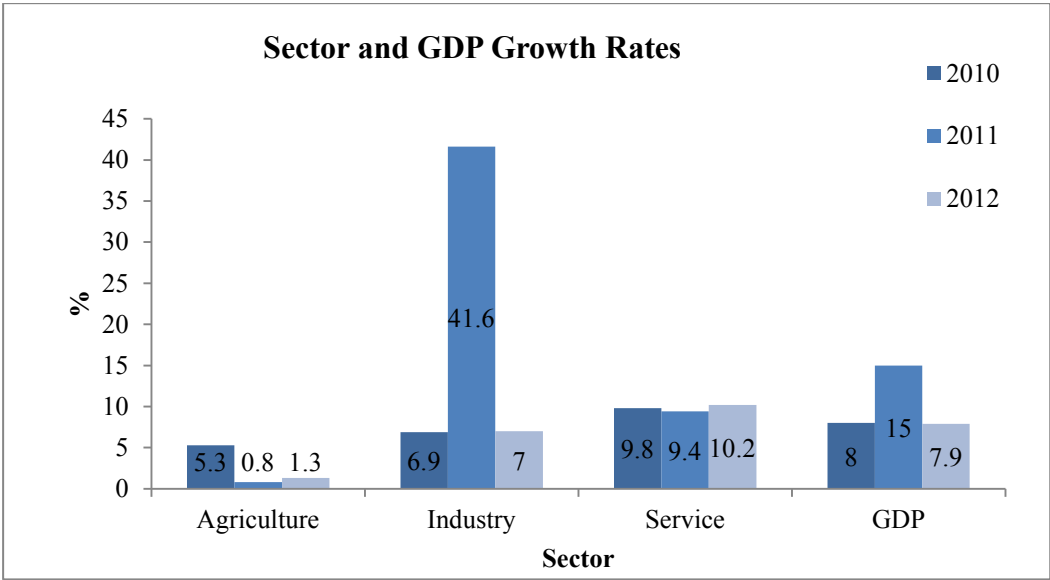
Figure 2.8: Ghana's Sectors and GDP Growth Rates (in %) 2010-2012.

Ghana's trade activity in the global market is crucial to its economy growth, particularly in this age of modernisation where there is dramatic shift from traditional sector economy characterised by agriculture to modern sector led economy. A modern sector of an economy is dominated by intensive industrialisation and service sector growth. Rodrik (2013) put forward that accumulation, innovation, and productivity growth occur in modern sector, while the traditional sector remains technological backward and stagnant. Figure 2.8 above is the attestation of this observation. The agricultural sector's contribution to GDP has been on the decline (from 5.3% in 2010 to 1.3% in 2013). The economy is still largely an agrarian and exports depend heavily on primary products. Ghana exports mainly commodities such as cocoa, gold, tuna, timber, bauxite, diamond, aluminium, manganese ore, horticulture and more recently crude oil. Its imports commodities are mainly capital equipment, refined petroleum, and foodstuffs such as rice and wheat flour. The growth in industry in 2011 was as a result of the commencement of the country's crude oil exploration in the previous year. The slowdown in the sector in the

following years was attributable to decline in the growth rate of crude oil production, coupled with slow growth in manufacturing production and the challenges of utilities such as electricity and water distribution according to the Bank of Ghana (BoG) annual report. The contribution of manufacturing activity, a component of industry sector, to output has seen a decline over the years. It contributed about 7.9% to gross domestic product in 2008. This has since been on the decrease, contributing about 6.9% to output by 2012 (Ghana Statistical Service [GSS], 2014). The implication is the Ghana is not doing enough in manufacturing, which has effects on trade activity. One key consequency is imports-dependence rather than promoting export.

The current development policy framework is the *Ghana Shared Growth and Development Agenda (GSGDA 2010-2013)*. Within the framework, trade features prominently, and emphasises improving export competitiveness, diversifying and increasing exports and markets. Table 2.3 below is the five major world exports and imports partners and their shares of trade with Ghana in 2012.

Table 2.3: Five Major Exports and Imports Partners of Ghana (2012).

World Exports Partners	%	World Imports Partners	%
France	13.6	China	25.6
Italy	12.4	Nigeria(ECOWAS member	11
Netherlans	8.9	USA	7
China	7.4	Netherlands	6.2
Germany	4.3	Singapore	4.5

Source: Author's compilation with data from CIA World Factbook.

2.4.1 Analysis of Ghana's Trade in ECOWAS

Ghana's trade in ECOWAS has been dependent on the trade liberalisation policy of government. In the trade policy launched in 2005, it maintains that the integration of the Economic Community of West African States (ECOWAS) into a full customs union will provide access to a larger market, thereby promoting investment and industrialisation. This will also enable Ghanaian products to compete freely in the regional market and promote exports. Ghana's sub-regional activities thus aimed to reduce barriers to intra-ECOWAS trade, and promote a customs union that will support Ghana's agriculture, industry and services development strategies. It envisaged that increased regional competition will bring lower prices and a greater range of both imports and local products to the benefit of consumers and producers (MOTI, 2005).

Policy objectives;

- *To facilitate trade between Ghana and other ECOWAS countries*

- *To enable Ghanaian products to compete in the regional market freely and thus promote exports.*

- *To promote industrialisation and investment.*

Figure 2.9 reports Ghana's export and import activities with ECOWAS for the period 1999 to 2009.
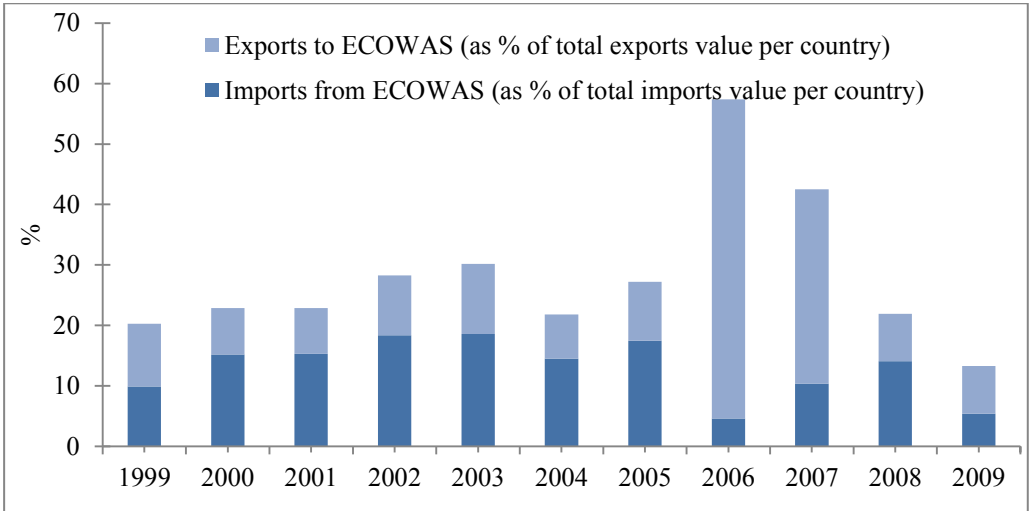
Figure 2.9: Ghana's Trade in ECOWAS from 1999 to 2009, Author's with data from http://ecowas.opendataforafrica.org/.

From Figure 2.9, it can be inferred that only in the years 2006 and 2007 that intra-ECOWAS trade constituted greater part of Ghana's total exports value. Largely Ghana's intra- regional trade has contributed less to total country exports. In the years 2006 and 2007, the share of intra- regional trade to total volume of trade of Ghana amounted to 52.8% and 32.1% of total exports value respectively. That of imports as a percentage of total country imports value in 2006 and 2007 stood at 4.6% and 10.7% respectively. Indicating that in these years, Ghana's imports largely came from outside the trade bloc. The 52.8% of total country exports in the year 2006 accounted for 16.5% of Ghana's trade activity in the ECOWAS representing the second highest trade performer in the bloc after Togo with 17.8%, and this is presented in figure 2.10 in the following page.

In the year 2009 however, Ghana's ECOWAS trade as a percentage of country total trade volume amounted to only 5.4% in exports and 7.9% in imports. From figure 2.9 above, is inferred that Ghana imported more from other member countries than

exported between 1999 and 2009. Ghana's export trade performance as compared to other members in the trade bloc in the year 2006 is highlighted in figure 2.10.
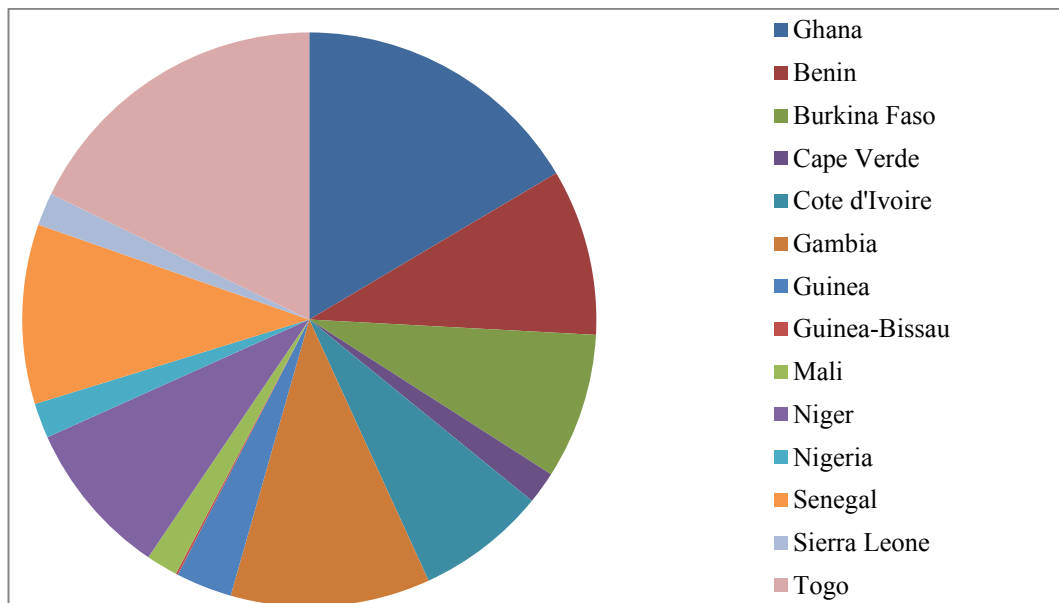
Figure 2.10: Exports to ECOWAS (as % of Total Exports Value per Country).

2.4.2 Ghana's ECOWAS Trade and Contribution to Output.

The purpose of trade is to add to output growth. An increased trade volume implies higher contribution to economic growth through the earning of foreign exchange, which has trickle-down effects in the general economy. Moreover, there is positive correlation between intense exports and gross domestic product. A country that maintains surplus current account balance has the potential desire to ensure output growth. Current account balance is the differences between country's exports of goods and services, and imports of goods and services. Jobaer et al (2013) for example in analysing the effects of export and import on GDP of Bangladesh posited that export has a highly positive impact and import has negative impact on output growth. The intra-regional trade ratio to GDP of Ghana shows unsatisfactory results of the period under study despite the trade policy launched in 2005 with the focus to promote maximum trade and regional integration. The Table 2.4 gives the analyses of the contribution of ECOWAS trade (as ratio) to the gross domestic product of Ghana in the last five years.

Table 2.4: Ratio of Export and Import of Trade to GDP in Years (2009-2013).

Year	Export/GDP	Import/GDP	Trade/GDP
2009	0.023	0.013	0.035
2010	0.015	0.006	0.021
2011	0.160	0.008	0.169
2012	0.043	0.015	0.058
2013	0.018	0.009	0.028

Source: Own computation with data from *Comtrade*

It is evidenced from Table 2.4 that Ghana's intra-trade with members of the Community has insignificant effects on output as its exports share of GDP are very marginal. The same argument can be advanced for total bilateral trade-measured as the sum of export and import on total output. Thus, Ghana's intra-trade with other members has very little effect on its ouput over the last five years.

The export and import shares of individual ECOWAS partners are also evidential. Ghana's intra-trade participation in the bloc over the last decade has been shown to be inconsistent. Out of the fourteen states, it is confirmed that only four remain a major importers of Ghanaian goods. Countries like Nigeria, Côte d'Ivoire, Togo and Benin constitute Ghana's major importers. Of the total exports to the bloc's market, Ghana's exports to Nigeria for example amounted to only 32.7% in 2008 and 13.9% in 2012, but for the same period, it imported about 73.18% and 45.82% from Nigeria. Ghana's exports to Côte d'Ivoire declined from 11.3% in 2011 to just 4.6% in 2012. Imports on the other hand amounted to 15.2% in 2012 as against 20.9% in 2011. Ghana's export trade with Togo also showed some variances. In the year 2011, exports value was 72.5%, but declined to 49.0% by 2012. In terms of imports from Togo, there was also a decline from 43.2% in 2011 to 22.9% in the year 2012. Tables 2.5 and 2.6 present the exports and imports shares of Ghana's trading partners between 2003 and 2012.

Table 2.5: Export Share (%) of Ghana's Partners between 2003 and 2012.

Partner	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benin	31.3	32.4	0.72	0.52	1.29	2.04	21.2	7.86	1.38	4.76
Burkina Faso	1.80	0.82	0.18	81.8	46.4	31.1	35.0	15.2	7.90	20.6
Cape Verde	0.42	***	***	***	0.21	0.62	0.28	0.19	0.12	0.01
Cote d'Ivoire	14.0	5.57	3.28	1.79	7.40	10.9	10.5	5.55	11.32	4.56
Gambia	0.64	5.64	0.23	0.15	0.44	0.57	0.38	1.29	0.09	0.18
Guinea	0.27	1.59	0.20	0.17	0.91	1.52	0.87	0.96	0.28	0.53
Guinea Bissau	0.03	0.02	0.02	0.02	0.01	3.13	0.13	0.20	***	0.02
Liberia	0.39	4.40	0.54	0.25	0.40	0.56	3.87	0.56	2.22	0.67
Mali	0.05	0.96	0.01	0.22	0.73	2.13	1.67	26.5	0.34	3.25
Niger	0.05	1.39	0.02	0.08	0.51	2.12	0.39	3.08	0.27	0.92
Nigeria	18.0	15.1	88.1	12.5	22.9	32.7	13.9	21.1	3.12	13.9
Senegal	8.87	18.0	3.04	1.88	5.75	6.79	2.23	1.96	0.26	0.77
Sierra Leone	1.92	3.42	3.63	0.25	11.1	0.87	1.56	1.01	0.35	0.80
Togo	22.2	***	0.02	0.31	1.95	4.80	8.47	14.7	72.5	49.0
*** means value is insignificant or equal to zero										

Source: Own computation with data from *Comtrade*

Table 2.6: Import Share (in %) of Ghana's Partners between 2003 and 2012.

Partner	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benin	0.09	2.04	0.07	0.11	0.13	0.02	0.27	0.53	1.00	0.47
Burkina Faso	0.39	0.48	***	0.76	0.75	0.42	1.45	3.28	4.54	2.67
Cape Verde	***	***	***	***	***	0.15	***	0.02	0.23	0.36
Cote d'Ivoire	2.13	40.3	1.65	2.70	15.9	14.9	16.8	24.1	20.9	15.2
Gambia	0.10	0.71	0.08	0.05	0.48	0.01	0.01	0.02	0.02	0.02
Guinea	0.66	0.67	0.03	3.68	0.14	0.34	1.71	3.08	0.62	0.70
Guinea Bissau	0.03	5.08	0.26	0.13	0.18	***	1.22	0.32	***	0.03
Liberia	0.27	0.14	0.03	0.03	0.07	0.14	5.48	0.25	0.25	1.49
Mali	0.07	0.08	0.01	0.01	0.01	0.02	0.50	0.29	0.96	0.41
Niger	0.06	0.27	0.02	0.04	0.02	0.20	2.36	5.17	3.93	1.31
Nigeria	95.7	45.3	86.1	81.2	66.9	73.2	41.5	16.7	16.3	45.8
Senegal	1.23	4.40	0.26	0.21	2.69	0.29	0.90	4.16	8.78	6.86
Sierra Leone	0.05	0.94	0.01	0.05	0.04	0.01	0.38	0.64	.062	1.69
Togo	0.06	***	11.5	11.0	13.2	0.01	28.5	41.5	43.2	22.9
*** denotes value is insignificant or equal to zero										

Source: Own computation with data from *Comtrade*

Aside the economic giants (Nigeria and Cote d'Ivoire) of the bloc Ghana's trade with neighbouring countries (those it shares borders with) appears much stronger than the larger bloc. Ghana's export trading activity in the bloc is therefore unsatisfactory and does not maximise economies of scale which does not support the theoretical justification of economic integration which states that participating countries in an economic bloc are able to improve their competitiveness.

2.4.3 Challenges of Ghana's Regional Trade

Despite the advancement in regional integration processes in the region, barriers to intra-regional trade remain largely a challenge for the economies in West Africa. Barriers to intra-regional trade in Sub-Saharan Africa in general are still persistent. Principal among these barriers are poor transportation network; cumbersome import and export procedures and border-crossing impediments; limited use of information and communication technology (ICT); ineffective involvement of the private sector in the design of program aimed to raise intra-regional trade; and poor trade

settlement systems (Anyanwu, 2014). The United Nations Economic Commission for Africa (ECA) for instance revealed that transport costs in Africa are among the highest in the globe. Particularly in landlocked African countries, transport costs average about 14% of the value of exports compared to 8.6% for all developing countries. The causes of such high transport costs are attributable to the inadequate road and rail infrastructure, limited direct sea links and inefficient commercial transport operating systems, time of delays and bribing activities at the checkpoints. The number of controls, amount of bribes shippers of goods pay and time of delays at border points are alarming (IRTG, 2011). Average number of controls per 100 kilometres is around 2. The average of brides per 100 kilometres vary between $2.18 in Ghana and $3.96 in Côte d'Ivoire ; and the time of delays per 100 kilometres vary between 14 minutes in Togo and Ghana; and up to 28 minutes in Senegal. The Table 2.7 shown on the following page gives the overview of number of controls, bribes and delays on six corridors of the ECOWAS region.

We can infer from Table 2.7 that, on average, a total of 23.3 control checkpoints exist on the trade route between Tema (Ghana) and Ouagadougou (Burkina Faso), a distance of only 1,057 kilometres and paying about $39.1 in bribe; 18.77 checkpoints between Lome (Togo) and Ouagadougou (Burkina Faso), a distance of 1,020 kilometres trade route and paying total of $40.45 in bribe; and 25 checkpoints between Abidjan (Côte d'Ivoire) and Ouagadougou (Burkina Faso) and paying a total $98.36 in bribe, among others.

Table 2.7: Border Controls, Bribes and Delays on Trade Routes.

IRTG Results between 1st October and 31st December 2010: Controls, Bribes, Delays induced per trip							
Corridor	Distance on each corridor in km	Average number of controls per trip		Average bribes in USD per trip		Delays (in minute)	
		Total	Ratio for 100 km	Total	Ratio for 100 km	Total	Ratio for 100 Km
Tema-Ouagadougou	1,057	23.31	2.20	39.1	3.70	245	23
Ouagadougou-Bamako	920	28.23	3.07	110.5	12.01	234	25
Lome - Ouagadougou	1,020	18.77	1.84	40.45	3.97	181	18
Bamako - Dakar	1,476	28.15	1.91	97.96	6.64	441	30
Abidjan-Ouagadougou	1,263	25,55	2.02	98.36	7.79	296	23
Abidjan-Bamako	1,174	24.61	2.10	157.25	13.39	181	15

Source: IRTG, 2011.

Figure 2.11 indicates checkpoints on the selected regional corridors of the ECOWAS sub-region in the last quarter of 2010. These checkpoints between the various commercial cities of the member states are an indication of delay at points of entry, which negatively impact smooth transaction and trading. The presence of these impediments on trade routes can lead to trade diversion among members away from Ghana, and the resultant effect would be low trade flows for economic growth.
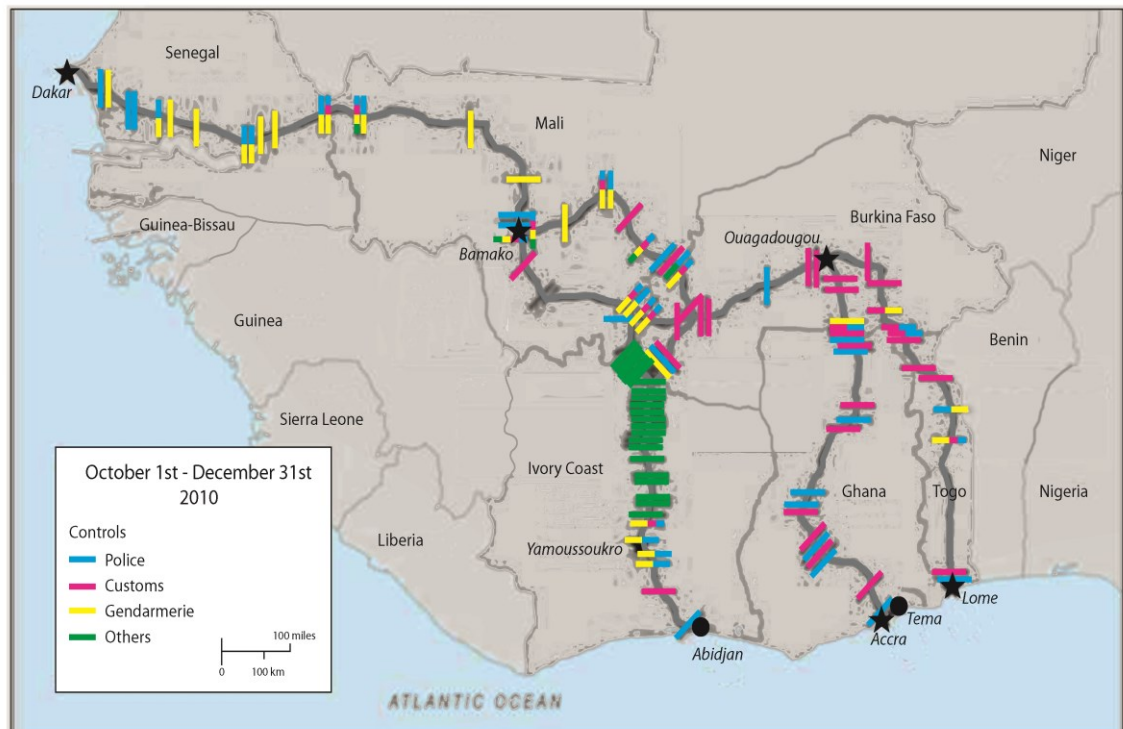
Figure 2.11: Checkpoints on Trade Routes in ECOWAS, adapted from IRTG, 2010.

In conclusion, the theory of regional economic integration can be reviewed from trade perspective. Countries that integrate geographically stand the chance to benefit from trade. Regional economic integration is aimed at the removal of trade barriers, to allow the free flow of factors of production as well as goods and services across borders. Regional integration efforts in ECOWAS seeks to liberalise trade between member countries so as to increase bilateral trade flows, diversify exports by overcoming the limits of small markets, and deepening specialisation through economies of scale. The purpose of bilateral trade is to improve the welfare of the participating members through the earning of foreign income, diversification of production, investment and increase in output growth. Obtaining the maximum benefit from trade also depends on the comparative advantage and factor endowments of individual countries. There is comparative advantage in trade when each member in the regional bloc concentrates on and exports goods that they can produce at lower opportunity cost than their trading partners. Harnessing regional integration more effectively, for both goods and services, would help all countries lower their cost base thereby enhancing global competitiveness (Gillson, 2010).

3. GRAVITY MODEL FRAMEWORK

Regional trade involves the exchange of raw materials, manufactured goods and services across regional borders. Undoubtedly, a country trading with its regional neighbours is an important part of a country's overall trade expansion policy process. In general decreasing trade barriers increases the trade volume between countries in an economic bloc. The classical and new trade theories significantly explain the reasons countries and economies participate in international or regional trade. However is there indeed something inherently different to intra-regional trade compared to trade with the rest of the world for a country like Ghana in its development process? And what is the magnitude and direction of trade between Ghana and other member states? The gravity model provides the means to measure the magnitude of intra-trade of Ghana and its ECOWAS partners. The choice of gravity methodology is based on its extensive application in bilateral trade analysis and its goodness of fit. Moreover, comparatively few studies used the gravity model to explore empirically the determinants of intra-regional trade among countries in SSA, on one hand, and between the countries of regional groupings on the other hand (Reuben *et al*, 2013).

Gravity model, as a component of trade theory, has been substentially applied to analyse the pattern and performances of world trade; and is used to quantify the trade flow of a country. The gravity equation model has been a long-time toolkit in international trade analysis since the seminal work of Jan Tinbergen (1962). The application of gravity model in empirical trade analysis also deals with the analogy of how the size of an economy and distance impact on its trade flow and potential. The theory behind gravity model approach and its usage in international trade demonstrates its potential contribution to empirical studies. In this section the theoretical background and the application of the gravity model are reviewed.

3.1 Theoretical Background of Gravity Model

The gravity model is based on Newton's universal law of gravitation in physics, which later inspired other researchers for the use of it in empirical analysis of spatial flows. Bergstrand (1985) noted that, tourism, commodity shipping, immigration and commuting constitute typical examples of those spatial flows. The gravity equation has been a useful work-horse for explaining these kinds of flows in a consistent way. The model states that the gravitational attraction between two objects is proportional to their masses and inversely related to the square of their distance. The analogy is that the bigger and closer the objects are to each other, the stronger the attraction. This is expressed as follows;

$$A_{ij} = G \frac{M_i M_j}{D_{ij}^2} \qquad (3.1)$$

Where

A_{ij} is the gravitational attraction between object i and j;

M_i and M_j are the masses of two objects;

D_{ij} is the distance between i and j; and

G is the gravitational constant

For the explanation of bilateral trade flows, the gravity model has been empirically used to investigate the relationship between the volume and direction of international trade and the formation of regional trade blocs where members are in different stages of economic development. Tinbergen (1962), Poyhonen (1963) and Linneman (1966) were the pioneers who analysed spatial interactions with gravity model in the social sciences.

Since then, the gravity methodology has become a popular instrument in empirical foreign trade analysis. According to Krugman *et al* (2012), the gravity model works because large economies tend to spend large amounts on imports because they have large incomes.

In its most basic form, the gravity model as applied to bilateral trade, follows the analogy that the trade volume (T*ij*) between country *i* and country *j* is proportional to the product of their economic size (often proxy by GDP*i* and GDP*j*) and inversely related to the distance between the two countries (D*ij*). Bilateral trade is explained in terms of the GDPs of the two participating countries, and distance between them, (often measured as the distance between, either their respective capital cities, or their

commercial centres). The rationale for the explanatory variables emanates from the following:

(i) the amounts of exports a country is able to supply depends on its economic size (i.e. its GDP or GNP);

(ii) the amount that can be sold to a particular country will depend on the size of that country's market (i.e. GDP or GNP and/or population of the importer country);

(iii) volume of trade will depend on transportation costs often measured by the geographical distance between the two countries or their capital cities.

Initially gravity model was presented in a simple form consisting of the two variables mentioned above. Metulini (2013) categorised them as the *push* and the *pull* factors. The push factors represented by the economic size, is proxied by the gross domestic products of the origin as well as the destination country. This factor is an incentive to trade flow because it is a positive contributor to trade. The pull factors are proxied by the transport costs of traded goods, and measured by the geographical distance between the two participating countries. The pull factor is disincentive to flow of trade, since it is negative contributor to regional trade.

Tinbergen (1962) concluded that national income was the most effective factor for trade volume. Over time others scholars have enriched the gravity models with more variables in order to give a more analytical and accurate quotation of the factors which either affect trade activities positively or negatively. Other variables inserted in the gravity model specification to capture the push and the pull effects include, among other things, prices, exchanges rates, population, contiguity, common language, common currency and a qualitative variable for expressing a preferential trade agreement. Rose (2000) is credited with the introduction of common border, same official language and same currency to the gravity model. For instance common currency she noted decreases the transaction cost between countries which enhances trade flows. Besides the aforementioned variables, several qualitative variables have been used (e.g. subsidies, tariffs), which are normally expressed as dummy variables (Yeboah *et al.*, 2007).

Although the use of gravity models in international trade analysis was as early as in the 1960s by economists like in Tinbergen (1962), these models lacked a rigorous theoretical background. It was Anderson (1979) who developed further the theoretical framework for using gravity equations in trade analysis by using the properties of constant elasticity of substitution (CES) functions (see Bergeijk and

Brakman, 2010). By using the properties of an expenditure system, Anderson made two basic assumptions:

(i)   preferences among consumers from different regions are identical;

(ii) differentiation of goods by place of origin. Moreover, through the use of CES system Anderson (1979) extended properly the Cobb–Douglas system by including non–unity income elasticity in an unrestricted gravity equation and separated goods into traded and non–traded.

Up to 1980's most of the spatial trade research focused on spatial equilibrium models by using a mathematical algorithm. Anderson's work was extended by Bergstrand (1985) by defining the basic assumptions for a general equilibrium framework.

Among the most highlighted assumptions is the substitutability of goods across countries, the adoption of zero tariffs, zero transportation costs and the importance of price variables. He acknowledged those basic assumptions and despite the lack of theoretical background, Bergstrand named this equation as generalised gravity equation, similar to the basic gravity model, usually formed in analysing international trade. According to Bergstrand (1985), the generalised gravity equation performs in a similar way to a basic gravity model. More specifically, for importers' income, adjacency and preferential trade agreements he found positive effects, whereas for distance a negative one.

Furthermore, Bergstrand (1989) expanded the microeconomic theoretical foundations of his work in 1985 by adding factor endowment and taste variables. Moreover he took into consideration supply and demand functions. Income for consumers plays a significant role according to his research, combined with a number of constraints. He substituted national income with GDP, an example which was followed later in other studies. Bergstrand (1989) also categorised goods into luxurious and necessary goods. He claimed that luxurious (in consumption) goods are capital intensive (in production), so their elasticity of substitution exceeds unity and the coefficients of income and income per capita are positive for exporters and importers.

McCallum (1995) studying the regional trade patterns between Canada and USA found that border has a decisive effect on continental trade pattern, suggesting the importance of national borders or contiguity. Exploring further the border effects of the McCallum study, Anderson and van Wincoop (2003) also observed the U.S-Canadian border effect on bilateral trade. They however noted that McCallum's

study lacked a theoretical foundation in the gravity equation. They explored the potential impediments which were considered as the main trade barriers. These are: (i) bilateral trade barriers, (ii) exporters resistance to trade with all regions, and (iii) importers resistance to trade with all regions. They modified the constant elasticity of substitution (CES) expenditure function as in Anderson (1979) in order to obtain a simpler version of the gravity model. A crucial difference between their analysis and McCallum's (1995) analysis was that they found a substantial reduction (about 44 percent) of trade among United States of America and Canada because of the border effects between the two countries, instead of the 19 percent change of the McCallum's findings. They therefore concluded that, trade barriers established on the borders seemed to diminish the trade flow between United States and Canada.

Based on a constant elasticity of substitution (CES) system, Anderson and van Wincoop (2003) used a Non-linear Least Squares (NLS) model considering the endogeneity of trade costs to refine the theoretical foundations of the gravity model and provided evidence of border effects on trade. They indicated that the costs of bilateral trade between two countries are affected not only by bilateral trade costs such as distance, being landlocked, a common border and language; but also by the relative weight of these trade costs in comparison to trading partners in the rest of the world. What they termed as the '*multilateral resistance*'. Anderson and van Wincoop (2003) pointed out that multilateral resistance factors should be taken into account in empirical research in order to avoid a biased estimation of the model parameters. In the same vein, Matyas (1997) proposed that bilateral trade flows should be estimated as a three-way specification including time effects and exporter and importer fixed effects in order to avoid inconsistent modelling results caused by unobserved variation.

Martinez-Zarzoso and Nowak–Lehmann (2003) used the gravity model to explore the determinants of the trade flows among Mercosur and European Union countries. Their aim was to evaluate the role of the regional trade agreements which were established between the two regional trade blocs. They found that variables such as infrastructure and income differences played a significant role on international trade flows.

Despite the fact that initially gravity equations seemed to be a useful tool for empirical international trade analysis, it was criticised on the grounds of weak theoretical basis. The gravity model framework is largely dependent on econometrics

procedure. Within the last two decades, economists began using panel data methodology to estimate gravity models, unlike previous years where cross-sectional data was commonly used. The reason behind this choice is mainly the gradual increase in data availability and the improvement of econometric techniques. However, three studies that deal with time-series econometrics discussed the additional problem of non-stationarity of variables (Coccari, 1978; Dale and Bailey, 1982; Shapiro, 1999). In the case of non-stationarity of data the assumptions of the Ordinary Least Squares Estimator (OLS) can be violated, as it will result in biased results. Another possible bias is the phenomenon of heteroskedasticity or significant correlation in the residuals (Zwinkels and Beugelsdijk, 2010).

However the great advantage of the gravity model is that it allows incorporating the effects of other relevant variables deemed as facilitating or impeding trade flows in the estimation. According to Deardorff (1984), the empirical success of the gravity equation is due to the fact that it can explain some real phenomenon which the conventional factor endowment theory of international trade cannot: the trade between industrialised countries, the intra-industry trade and the lack of dramatic reallocations of resources when trade liberalisation processes have taken place.

The three main components of the gravity equation are the economic coefficients, which affect the traded volume in exporting countries, importing ones and other determinants, either quantitative or qualitative (Koo and Karemera, 1991). For example Koo and Karemera (1991) revised the conventional gravity model and applied it to wheat markets to determine the factors which affect the trade flows of wheat. The main variables included in their work, concerning multilateral wheat trade flows, were national income, prices, inflation rates, exchange rates and transportation costs.

Kepaptsoglou *et al* (2010) in their study to assess the extensiveness of the use of gravity models in specification and modelling international trade flows and free trade agreement effect, established that gravity model has been found as a major instrument for analysing trade flows and explaining effects of related trade agreements. Covering a ten (10) year reviews of empirical studies from 1999-2009, with 55 papers published over the last decade, indicated that panel data sets are preferred in recent gravity model studies with only few cross-sectional models.

3.2 Empirical Studies of Trade with Gravity Modelling

The literature shows that there are several studies that have utilised the gravity equation approach in the analysis of bilateral trade. The summary of different empirical studies can be found in Table A.1 in the appendices. Here we present some selected empirical studies and their conclusions.

Bergstrand (1985) applied an augmented version of the gravity equation to analyse the determinants of bilateral exports among 15 OECD countries in 1976. In addition to the conventional gravity variables, Bergstrand inserted exchange rate, price indices for exports and imports, GDP deflators in both countries, and dummies for adjacency, European Economic Community (EEC) and European Free Trade Area (EFTA) memberships, among the explanatory variables. Bergstrand found that the economic sizes of participating countries, import price index, adjacency and EFTA membership had significantly positive effects on exports between two trading countries, whilst the geographic distance between them was found to reduce the volume of exports of these countries. The other variables were found to be statistically insignificant.

Gani (2008) also investigated the factors influencing trade between Fiji and its Asian partners, used a panel data for the period 1985 to 2002 over a cross-section of seven Asian countries (i.e. China, Hong Kong, India, Indonesia, Japan, Singapore and Thailand) for the import model and five (i.e. China, Hong Kong, Japan, Singapore and Malaysia) for the export model. Gani (2008), employing the gravity model, asserted that Fiji's imports from and exports to its Asian partners at time t are determined by their GDPs, the geographic distance between Fiji and the major port of entry of an Asian country, and other possible influences such as the exchange rate and infrastructure. The results obtained from the panel data estimation techniques indicate that imports by Fiji from Asia are significantly influenced by the population and the infrastructure of the Asian countries and the distance between Fiji and the exporting country.

Rahman (2009) similarly applied generalised gravity models to explore Australia's global trade potential with its 57 trading partners for the period of 1972-2006. In his study, the standard gravity model was augmented by including GDP per capita of Australia and its partners, the per capita GDP differential between Australia and its partners, openness of its partners and dummies for common language and RTA

membership. Employing panel data estimation procedure to estimate the specified model, the estimated coefficients were then used to predict Australia's trade potential. The results obtained revealed that Australia's bilateral trade is affected positively by income, openness of trading partners, common language and free trade agreement, and negatively by the per capita income differential and distance between Australia and trading partners. The results indicated that Australia has notable trade potential with trading partners such as Mexico, Argentina, Uruguay, Austria, Peru, India, the Philippines, Brazil, Chile, the USA, New Zealand, Greece, Japan, Turkey, Nepal, Kenya, Spain, Hungary, Brunei, Hong Kong, South Africa, Pakistan and Canada.

Tumurbaatar and Oh (2011) studied the international trade patterns of Mongolia. They stated that the log-linear structure of regression equation based on the gravity model produces not only a comparison of traded goods and trading partners but also the determinants of trade. This analysis also examines the influence of Mongolia's geographical location on the country's trading patterns. The results show that Mongolia's exports are distorted by its geographical location. However, its imports and overall trading patterns have not been distorted.

Roy and Rayhan (2011) analysed the determinants of trade flows in Bangladesh through gravity model panel data approach. This study covered a total of 14 countries including Bangladesh and other 13 countries that have bilateral trade agreement with Bangladesh, namely South Asian Association for Regional Co-operation (SAARC). The data collected for the study spanned from the period of 1991 to 2007 (17 years). From the results of this study, both basic and extended gravity models were established, which showed that Bangladesh's trade flows are significantly determined by the size of Bangladesh's economy and that of its partners, openness of the partner's economy and exchange rate.

In the sub-Saharan Africa, the use of gravity model approach in trade analysis can be found in such studies as Eita (2008), Taye (2009) and Zannou (2010).

Eita (2008) modelled Namibia exports as a function of its GDP and per capita GDP and those of its major importers, the distance between them and exchange rate. Dummy variables were also incorporated in the Namibia's export model to capture the effects of sharing a common border with Namibia, and belonging to the Southern African Development Community (SADC) and EU. The results showed that an increase in importer's GDP and Namibian GDP is associated with an increase in

Namibian exports. Importer's GDP per capita was found to have a negative impact on export, while real exchange rate and Namibia's GDP per capita do not have significant impact on exports. As per the theoretical expectations, distance was found to be associated with a decrease in exports. Membership of SADC, EU and sharing a border with Namibia were found to positively and significantly promote Namibia's exports. The study showed that Namibia has unexploited export potential with, Australia, Belgium, Kenya, Mauritius, Netherlands, Portugal, South Africa, Switzerland and the United Kingdom, among others.

Taye (2009) conducted similar study in Ethiopia. The study examined the determinants of Ethiopia's export performance by first decomposing the growth in Ethiopia exports into the contribution from internal supply-side conditions (i.e. domestic transport infrastructure, macroeconomic environment, real exchange rate, foreign direct investment and institutional quality) and external market access conditions (i.e. tariff and non-tariff barriers, transportation costs, and geographical location). Within gravity model framework, Ethiopia's export was observed to depend on its GDP, importer's GDP, foreign direct investment, internal transport infrastructure, real exchange rate, foreign trade policy index, institutional quality index and the weighted distance between Ethiopia and its trading partners.

Zannou (2010) used the gravity model to investigate the determinants of intra-ECOWAS trade flows with data spanning 1980 to 2000. He found out that remoteness and enclosures reduce the volume of intra-community trade, while proximity (measured by geography, linguistic or monetary) increases trade. Furthermore, economic, demographic as well as exchange rate stability and openness of national economies are sources of more increased trade within ECOWAS.

The literature on gravity model in the case of Ghana is limited, notwithstanding the growing interest of researchers and policymakers in the subject and the vast number of empirical applications in trade literature (Bonuedi, 2013). The application of the gravity model framework in trade analysis between Ghana and ECOWAS countries is hard to find in the literature despite Ghana's influence in the ECOWAS sub-region. The majority of empirical studies on Ghana's external trade place much emphasis on the effects of exchange rate on the nation's trade balance (Bhattarai & Armah, 2005); the impact of devaluation on Ghana's trade balance (Agbola, 2004); the impact and development of North and South on Ghana's bilateral trade (Adam and Tweneboah (2008); trade balance and policy efficiency (Amoah & Loloh, 2009);

and the determinants of Ghana's trade flows (Bonuedi, 2013) in a worldwide context. Studies focusing on the ECOWAS sub-region will be vital because of the growing market potentials of countries like Nigeria and Cote d'Ivoire, offering more opportunity for proper regional economic integration.

In conclusion, the gravity model framework has been used extensively in studying trade between countries and it fits well in the analysis. Using the gravity model to estimate trade flow between Ghana and its ECOWAS trading partners thus follows the existing literature. In the study of Benedictis and Taglioni (2011) of the role of the gravity model in international trade concluded that there is an observed causality relationship between income and distance to trade. Ghana as a member of regional bloc with increasing income and strategic geographical location is expected to be trade attractive in the sub-region.

4. GRAVITY MODEL SPECIFICATION AND JUSTIFICATION

Following the literature, this study applies a gravity equation with panel data ranging between 1999 and 2013, based on data availability, to estimate the trade flows between Ghana and other ECOWAS partners. The dependent variable used is Ghana's bilateral trade (measured by the sum of both exports and imports) and the explanatory variables are economic, demographic, geographic and cultural links of the trading partners. Table C.1 gives the description of the variables and their sources. The countries included in the estimation are Ghana, Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, The Gambia, and Togo. The choice of panel data methodology over others such as the cross-section data analysis is based on two main advantages. First, the use of panel data makes it feasible to capture the relevant relationships among variables over time. Second, panel data has the potential to observe the possible unobserved trading-partner pairs of individual effects (i.e. the effects of each trade partner on others).

In basic gravity model, trade between country *i* and country *j* is positively related to the size of their economies and negatively related to the distance, a proxy for transportation costs, between them. A basic gravity model of bilateral trade can be mathematically expressed in the following form;

$$T_{ij} = A\left(\frac{GDP_i{}^{\beta_1} \cdot GDP_j{}^{\beta_2}}{D_{ij}}\right)\mu_{ij} \tag{4.2}$$

Where

T_{ij} is volume of trade;

GDP_{ij} is the gross domestic products of countries *i* and *j*;

A is a constant, β is the parameter to be estimated; and μ represents an error term. For econometric analysis, the classical gravity model in equation (4.2) can be converted into a natural log linear form as;

$$\ln T_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln D_{ij} + \mu_{ij} \tag{4.3}$$

In addition, a number of bilateral factors that facilitate or hinder trade are usually included as explanatory variables. This thesis follows the generalised gravity equation specification by Martinez-Zarzoso and Nowak-Lehmann (2003) to investigate the bilateral trade flows between Ghana and its trading ECOWAS countries. It follows that:

$$X_{ij} = \beta_0 \cdot Y_i^{\beta 1} \cdot Y_j^{\beta 2} \cdot N_i^{\beta 3} \cdot N_j^{\beta 4} \cdot D_{ij}^{\beta 5} \cdot A_{ij}^{\beta 6} \cdot \mu_{ij} \qquad (4.4)$$

Where Y_i and Y_j indicate Gross Domestic Products (GDPs) of the exporter and importer,

N_i and N_j are the populations of the exporting and importing countries, D_{ij} measures the distance between the two countries' capitals or economic centres.

A_{ij} represents any other factors facilitating or impeding trade between pairs of countries, and μ_{ij} is the error term. The use of this specification is due to easy access to data for the variables.

Equation three (4.4) can be transformed to its standard form by taking the natural logarithms of both sides to obtain the log-linear form of the model as represented below;

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln N_i + \beta_4 \ln N_j + \beta_5 \ln D_{ij} + \beta_6 \ln A_{ij} + \mu_{ij} \qquad (4.5)$$

Using the log-linear form allows the interpretation of the coefficients as elasticities of trade flow with respect to the explanatory variables.

The gravity equation employed in this study is augmented with per capita GDP and population density differentials and trade freedom index. Also dummy variables of common border, common language, and common coloniser are included. The gravity model for this research is estimated using the basic gravity model and two additional models: (1) the measure of the effects of economic and market size; and distance on total trade flows (2) the extended gravity model, which estimates the impacts of of other variables, including dummies on total trade flows.

Model one (1) follows the form:

$$\ln TT_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} +$$
$$\beta_5 \ln Dist_{ij} \qquad (4.6)$$

Model two (2) follows as:

$$\ln TT_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln Dist_{ij} +$$
$$\beta_6 \ln PCGDP_{ijt} + \beta_7 \ln Popdens_{ijt} + \beta_8 \ln Traf_{it} + \beta_9 \ln Traf_{jt} +$$
$$\beta_{10} Combor + \beta_{11} Langcom + \beta_{12} Comcol + \mu_{ijt} \qquad \textbf{(4.7)}$$

Where

ln = the natural logarithm,

i=1(Ghana)

j=1, 2, …, 14(Ghana's trading partners)

t =1999, 2000,…, 2013.

TT_{ijt}: Ghana's total trade with country j in year t.

GDP_{it}: GDP of Ghana in year t.

GDP_{jt}: Country j GDP in year t.

POP_{it}: Population of Ghana in year t.

POP_{jt}: Population of country j in year t.

$Dist_{ij}$: Distance between Ghana and country j.

$PCGDP_{ijt}$: Per capita GDP differentials between Ghana and country j in year t.

$Popdens_{ijt}$: the absolute difference of population density between i and j in year t.

Traf: Trade Freedom Index of Ghana and country j in year t.

β_s: the coefficients to be estimated;

μ_{ijt}: the error term representing the myriad other variables that have influences on bilateral trade, assumed to be equal to zero.

4.1 Rationale and Description of Explanatory Variables

It is crucial when choosing variables or indicators for economic specification. The criteria should be identified for selecting the appropriate indicators, particularly when there is wide range of variables to be included. Langenhove and Lombaerde (2005) offered the criteria[3] to identify and select indicators. Following this, these variables are defined and included in the gravity model estimation.

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[3] See appendices for the criteria for choosing variables

4.1.1 Dependent Variable

- **Total trade value (TT):** Anderson (2010) noted that the dependent variables most often used in gravity models are exports, imports, and total trade. Total trade value is the sum of bilateral exports and imports between country *i* and country *j* at time *t* in current U.S dollars. Exports of a country refer to the amount of goods and services sold to the rest of the world (ROW); and its imports refer to the amount of goods and services bought from the rest of the world. Data on bilateral exports and imports were obtained from UNCTAD, *Comtrade* Database online and corroborated by the World Integrated Trade Solution (WIT) Software.

4.1.2 Independent Variables

- **Gross Domestic Products (GDP):** The GDPs of country *i* and *j* measure the economic size of the two trading countries in terms of their ability to produce and market. The theoretical rationale for the idea that bilateral trade depends on the product of GDPs comes from the works of Helpman and Krugman (1985). This is because exporting countries higher levels of GDP imply that there is more space for promoting exports based on their comparative advantage. In addition, for the importers higher income means more economic power for importing goods and services. Given that the GDP is a variable that is indicative of the size of the economy, the coefficients for GDP are therefore expected to have a positive effect in both exporting and importing countries. (i.e. $\beta_1 \geq 0$ and $\beta_2 \geq 0$ to confirm that the bigger the economy, the more significant trade it becomes).

- **Populations (POP):** The POP_i and POP_j are the size of the population of countries i and j, respectively. The impact of population on bilateral trade is not clear. Greene (2013) suggested that countries with larger populations have larger and more diversified economies (production), are more self-sufficient, and tend to trade less than countries with smaller populations. Martinez-Zarzoso and Yang (2013) added that, population would tend to negatively correlate with trade flows as larger populations imply bigger domestic markets, richer resource endowment and more diversified outputs, as well as less dependence on international specialisation. They further pointed out that, the coefficient of population can also be positive, because a larger population in an importing country enables imported goods to compete better with domestic goods and compensates exporters for the cost of sales activities abroad. This indicates economies of scale

and promotes the country to trade more with foreign partners in a wider range of goods. The impact of the size of the population on bilateral trade can thus be positive or negative depending on whether the absorption effect is bigger than the economies of scale effect, which is equally related to the population. The assumption then is that $\beta_3 \geq 0$ or <0 and $\beta_4 \geq 0$ or < 0.

- **Distance (Dist):** In the literature distance is commonly referred to as a 'friction to trade' (as hindrance to trade). As such, distance viewed from both, intuitive and econometric perspectives, has a negative impact on trade flows. The D_{ij} measures the distance between the commercial cities of country i and country j. The distance variable accounts for the *space effect* on trade flows. This is here considered as a proxy for cross-border effects including dynamic time-based factors such as delay time, and bribing payment at border checkpoints during transportation of goods, but not directly emerging from the physical distance. The greater the distance between the two countries, the more transport costs tend to rise, and consequently reducing the volume of trade; hence, it is expected that β_5 <0 or the expected sign for the distance coefficient of trade is the negative sign.

- **Per Capita GDP (PCGDP):** differential: This variable has been inserted in the model to explore whether Ghana's bilateral trade in the sub-region is predicted on the Heckscher-Ohlin hypothesis or on the Linder hypothesis. The Heckscher-Ohlin hypothesis predicts that countries with dissimilar levels of per capita income will trade more than countries with similar levels. On the contrary, the Linder hypothesis predicts that countries with similar levels of per capita income will trade more with each other, as they will have similar preferences for differentiated products. Thus the Linder hypothesis is associated with a negative effect of Per capita GDP differential between country *i* and *j* on bilateral trade. A positive effect of this variable is associated with the Heckscher-Ohlin hypothesis. Per capita GDP differential is measured as the absolute difference between the per capita GDP of Ghana and that of its trading partners. Thus, $\beta_6 >0$ or $\beta_6 <0$.

- **Population density Differentials (Popdens):** The population density is determined as total population divided by the total land area of a country. The population density differential is measured as the absolute difference of population density between country i and country j. Even though population density does not necessarily represent an indicator of economic growth of country, it does reflect directly to the factor endowment of a country. This

variable is relevant because land and human capital are factors of production. Trade in the sub-region is mostly made up of primary commodities produced from land which is labour intensive. Greene (2013) incorporated this variable to analyse export potential for U.S. technology goods to India, and propounded that larger countries with larger populations can absorb greater quantities of imports than countries with smaller populations and smaller land areas. Higher population density also measures agglomeration effects of a country. The interpretation of the estimated coefficient of this variable follows the Heckscher-Ohlin hypothesis or the Linder hypothesis as defined in Per capita GDP variable. Thus, $\beta_7 > 0$ or $\beta_7 < 0$.

- **Trade Freedom Index (Traf):** Miller and Riley (2012) noted that there is a strong correlation between trade freedom and a variety of positive indicators, such as economic prosperity and low poverty rates. The classical objective of economic integration is to eliminate barriers such as tariffs to trade. This means openness to the movement of goods and services across geographical border with ease. The trade freedom is proxied by trade freedom index which is a composite measure of the absence of tariff and non-tariff barriers that affect imports and exports of goods and services. It is measured as the weighted average of tariff on goods; and non- trade barriers imposed by a country. The index ranges from 0 to 100. A trade freedom score closer to 100 indicates that the country imposes zero tariffs and non-tariff barriers and thus signifies an environment that is most appropriate for trade activities (see *The Heritage Foundation*). It is included to capture the degree of openness of trade partners to the flow of goods and services from around the world (including Ghana) and the ability of people to interact freely as buyers or sellers in the global marketplace. The insertion of the variable follows the study of Bonuedi (2013). The coefficients of trade freedom indices of country i and j are expected to be positive. i.e. $\beta_{8.9} > 0$.

4.1.2.1 Dummy variables

There are several time invariant dummy variables to include in gravity modelling of trade. For the purpose of this study, the following time invariant dummy variables were included based on the features of the region understudy.

- **Common border (Combor):** Anderson and van Wincoop (2003) noted that the primary concern of policy makers and macroeconomic analysts is the impact of

borders on international trade. To control for contiguity, we have included the border dummy variable. The inclusion of this variable in the specification emanates from the argument about transaction costs. Countries with common borders are likely to have more trade than countries without common borders (Karemera, *et al.* 1999). Crossing a border involves not only fees but also other transaction costs, implying that countries that do not have a common border may incur higher cost of trading with each other as they have to ship goods through third countries or ports. Cumbersome border-crossing procedures and delays add to the overall costs of intra-trade. The transaction costs between countries sharing common border(s) turns to be smaller as compared to those without a common border. If both trading countries in a group have geographical contiguity, the dummy variable is equal to one (1) and zero (0) otherwise. This variable should have positive effect on trade. That is $\beta_{10} > 0$.

- **Common Language (Langcom):** If trading partners share a common official language, transaction costs of trading is expected to be reduced, because speaking the same language helps facilitate and expedite trade negotiations. Barriers to communication are therefore eliminated and trading parties can effectively relate to each other in the transaction process. This implies that trade is expected to increase between the participating trading partners. If both trading countries in a group have common official language, the dummy variable is equal to one and zero otherwise. Although the Community is made up of multiple official languages such as English, French and Portuguese, it is expected that the estimated coefficient will be positive. i.e. $\beta_{11} > 0$.

- **Common coloniser (Comcol):** This variable measures the historical link in terms of colonisation between country i and country j. Countries with common coloniser may turn to relate more in terms of regional trade than with different coloniser. Since the bloc is composed of several colonies with variant colonisers, the coefficient of the variable is expected to be negative. That is $\beta_{12} < 0$.

According to Adam and Tweneboah (2008), omitting one or more variables related to exporters, importers and time-variant effects will result in regression bias on other elected variables; and to overcome this biasness in the estimation, the error term μ_{ij} has been included to capture possible effects of the myriad unobserved variables.

To ensure reliability and validity of the study, all datasets used in this study were obtained from internationally acclaimed sites, including United Nations Conference

on Trade and Development, the World Bank, the Central Intelligent Agency World Fact Book among others. The summary of the description of variables and the sources of data used in the estimation are shown in *Table C.1* in the appendices.

4.2 Estimation Techniques

This study relies on econometric estimation modelling procedure. To ensure that coefficients estimated are free from bias, the specification must meet certain standards. According to the rule of thumb, the specification should be efficient and consistent. There are three techniques that can be estimated in panel data estimation. These models are pooled OLS, fixed effects and random effects.

4.2.1 Pooled Ordinary Least Squares (OLS)

The simplest, and the basic, estimator for panel data is the pooled OLS estimator, which proceeds by essentially ignoring the panel structure of the data (i.e. the space and time dimensions of the pooled data), and just estimate the usual OLS regression. It is the restrictive panel data model form. It follows that;

$$y_{it} = \alpha + \beta x_{it} + \mu_{it} \qquad (4.8)$$

4.2.2 Fixed Effects Model (FEM)

The fixed effect model (FEM) or the Least Squares with dummy variables (LSDV) represents the observed quantities in terms of explanatory variables that are treated as if the quantities were non-random. That is, in the fixed effect model (FEM) the intercept (α_i) in the regression is allowed to differ among individual units but each individual intercept (α_i) does not vary over time t. The estimation takes the form;

$$y_{it} = x_{it}\beta + \alpha_i + \mu_{it} \qquad (4.9)$$

4.2.3 Random Effects Model

Random effects model or Variance Components model treats the intercepts as random variables rather than fixed constant. The random effects model (REM) assumes that the individual (heterogeneity) effects are captured by the intercept and a random component, which is independently and identically distributed over individuals. That is, the random component is not associated with the regressors on the right hand side and part of the error term (see Maddala and Lahiri, 2009).

It follows as;

$$y_{it} = x_{it}\beta + (a_i + e_{it}) \tag{4.10}$$

Where y_{it} is the dependent variable, x_{it} the independent variable, a_i (i=1…n) the unknown intercept for each country at time t, and e_{it} is the error term.

This study adopts the pooled OLS instead of fixed or random effect to analyse the panel data since the study deals with the flows of trade between Ghana and its fourteen (14) main trading partners in different stages of economic growth in the bloc. The fixed effects model faces problems of multicollinearity of estimated variables, which does not meet the purpose of this study. This is so because fixed effect model cannot directly estimate variables that do not change over time, such as distance, common language, contiguous and colonial link, because the inherent transformation tends to wipe out such variables (Martinez-Zarzoso and Nowak-Lehman 2003). On the other hand, the random effects model is appropriate specification if only the individual observations are drawn randomly from a large population (Baltagi, 2005).

5. FINDINGS AND ANALYSIS

The goal of this study was to investigate the factors that determine Ghana's trade flows in the regional economic bloc (ECOWAS) using the gravity model framework. Panel data of the country's bilateral trade with the other fourteen member countries between 1999 and 2013 was estimated using the STATA version 13.0 software package.

Before running the regressions, observations with missing trade values were treated as zeros, following the method proposed by Helpman et al, 2008; and these missing observations were duly dropped by the help of the statistical package. The results are categorised and discussed under (a) basic gravity model, which tests the impact of gross domestic and distance on trade flows; (b) gravity equation model 1, which estimates the effects of economic and market size proxied by gross domestic products and populations of Ghana and its trade partners on total trade volume using pooled OLS estimator; (c) model 2, the extended gravity equation with the augmented and dummy variables using the pooled OLS, fixed effects (FE) and random effects (RE) estimating techniques.

First, we explored the effects of exports and imports on the gross domestic product of a country as submitted by Jobaer *et al* (2013) as Ghana's intra-regional trade contributes marginally to the country's output. Export has a highly positive impact on gross domestic, but import on the other hand has negative influence on GDP growth. The multiple regression of Ghana's intra- ECOWAS trade produces the same results where GDP is the endogenous variable; and export and import represent the exogenous variables. The estimated model is: GDP= 2.05 + 7.91*export + (-3.12)*import. The regression equation result is presented in the Table 5.1 in the following page.

Table 5.1: Regression of Ghana's ECOWAS Exports and Imports on GDP.

Independent variables	Coefficient	Standard error	t-statistics	Probability
Constant	2.05	1.04	19.63	0.000
Exports	7.91	2.98	2.66	0.009
Imports	-3.12	9.74	-0.32	0.749

5.1 Basic Gravity Model of Bilateral Trade

The hypothesis that bilateral trade is directly proportional to the economic size measured by GDPs of the trading partners and inversely related to the distance between them specified in equation (4.3) in chapter four is also presented. Equation 4.3 follows that;

$$\ln T_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln D_{ij} + \mu_{ij} \qquad (4.3)$$

Running the regression, it is established that the gross domestic products of two countries positively relates to total volume of trade; and negatively impacted by the distance between them. The result is presented in Table 5.2.

Table 5.2: Effect of Economic Size and Distance on Total Bilateral Trade.

$\ln T_{ijt}$	Coefficient	Std. Error	t-statistic	Probability
$\ln GDP_i$	0.567	0.150	3.79	0.000***
$\ln GDP_j$	0.889	0.0837	10.62	0.000***
$\ln Distance_{ij}$	-1.445	0.193	-7.51	0.000***
Constant	-6.805	3.832	-1.78	0.077
*** indicates significant at 1% level.				

The estimated coefficients of the GDPs of country i and j are positive (i.e. 0.57 percent and 0.89 percent) respectively and with distance coefficient of -1.45 percent which are statistically significant at 1%. The implication is that the bigger output growth of trading partners and the shorter the distance between them will yield significantly higher impact on bilateral trade volume. The remaining section discusses the results for equations specified for this study.

5.2 Effects of Economic and Market Size on Trade Flows - Model 1

This gravity equation model measures the effects of economic and market size on trade flows as specified below. It follows that the bilateral trade flows of Ghana with ECOWAS is dependent on the economic and market size of the trading countries and distance between them. That is:

$$\ln TT_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt}$$
$$+ \beta_5 \ln Dist_{ij} \tag{4.6}$$

Table 5.3 below gives the results of equation 4.6 using the pooled Ordinary Least Squared technique followed by the interpretations.

Table 5.3: Effects of Economic and Market Size on Trade Flows.

Explanatory variables	Coefficient	Robust Std. error	t- statistic	p>|t|
lnGDP$_i$	0.56	0.66	0.85	0.398
lnGDP$_j$	0.12	0.20	0.61	0.546
lnPOP$_i$	2.22	4.81	0.46	0.645
lnPOP$_j$	0.95	0.25	3.79	0.000***
lnDist$_{ij}$	-1.18	0.19	-6.28	0.000***
Constant	-44.2	66.4	-0.66	0.507
Observations	207			
R Squared	0.61			
All non-dummy variables are in logs, and *** indicates significant at 1% significance level.				

With the pooled OLS technique, the coefficients of all the variables produced the expected signs, which is, positive correlation coefficients of the explanatory variables and distance variable showing negative. However for the test of statistical significance, only population of the trading partners and distance variables are highly significant. Country i (Ghana) own gross domestic product is also statistically insignificant. The insignificant measure is as a result of multicollinearity among the variables such as between country Ghana's GDP and own population. Multicollinearity refers to correlation among the independent variables, that is, same variables measuring the same thing. The positive coefficient of these variables however indicates that Ghana's trade in the bloc depends on its market size as well as that of the partners. From the estimated results, holding all other things constant, it is evident that a 1 percent increase in the economic and market sizes, measured by

GDPs and populations of Ghana and that of the other fourteen trading countries, leads to an increase of about 0.56 percent, 0.12 percent, 2.22 percent and 0.95 percent respectively bilateral trade flows. Distance however serves as an impediment to bilateral trade; reducing trade volume by about 1.18 percent which also confirms the economic theory of trade.

5.3 Extended Gravity Model- Model 2

The extended gravity equation model estimates all the explanatory variables with the dummies.

$$\ln TT_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln Dist_{ij} +$$
$$\beta_6 \ln PCGDP_{ijt} + \beta_7 \ln Popdens_{ijt} + \beta_8 \ln Traf_{it} + \beta_9 \ln Traf_{jt} +$$
$$\beta_{10} Combor + \beta_{11} Langcom + \beta_{12} Comcol + \mu_{ijt} \qquad \textbf{(4.7)}$$

The extended gravity was estimated using the pooled ordinary square, fixed effects and random effects techniques. The fixed effects model technique was not used in the analysis of the results due to the obvious collinearity of variables like the distance and the dummies predicted by Martinez-Zarzoso and Nowak-Lehman (2003). This makes it problematic for conducting Hausman Test to determine which estimator is more appropriate. The estimated parameters using the random effects estimator technique produced similar results, just like the pooled ordinary square. Therefore the analysis adopted the pooled OLS method.

Using the pooled OLS model, the traditional gravity model variables proxied GDP_i, GDP_j, POP_i and POP_j, correlate positively with total trade value; with POP_j producing highly statistical significant. Thus a 1 percent change in these three variables will yield respectively, a 0.45 percent, 0.25 percent and 0.77 percent change in total trade value. The positive coefficients of the population variable of the other countries also illustrate the potential for the demand of Ghana's exports in the bloc as large population number is a determinant of quantity demanded of goods.

The results also suggest that Ghana's trade with ECOWAS follows the Heckscher-Ohlin hypothesis, which predicts that countries with dissimilar levels of per capita income will trade more than countries with similar levels of per capita income. According to Hassan *et al* (2010) positive income per capita coefficients support the idea that higher income per capita results in more trade. The coefficient of the per capita gross domestic product differential is positive, but insignificant. The estimated

coefficient value is 0.071, which means that bilateral trade increases as the difference between the per capita GDP of Ghana and its trading partners in the regional bloc increases.

The relationship between trade value and the variable population density differentials is negative, confirming the Linder hypothesis. Coughlin (2010) observed that countries with larger population densities or smaller geographical areas tend to have lower trade costs because of the distribution network and internal transport costs.

The trade freedom index of Ghana is however negatively correlated with total trade flows, but insignificant implying that 1 percent improvement in trade policy will decline bilateral trade by 1.18 percent. On the other hand, index of trade freedom of Ghana's trading partners correlates positively with total bilateral trade of Ghana and highly significant. This implies that a 1 percent improvement in free trade policies of partner countries for instance leads to 2.14 percent of Ghana's total trade value. The fixed effect variables of sharing geographical borders and common official language also contribute positively to bilateral trade flows.

Following the literature, when the model is specified in log form, the estimated coefficients for the qualitative variables or the dummies are interpreted by taking their exponentials. The dummies of sharing geographical borders and common official language also contribute positively to bilateral trade flows whiles common coloniser declines trade flows.

The coefficient value of the variable common border has a positive sign (1.11) and is statistically significant at 1 percent. The projected results [exp (1.11)-1 =2.034358] indicating that Ghana' bilateral trade with its neighbouring countries (sharing a common border) will be higher by 200 percent.

The common official language also measures statistically significant at 1 percent significant level and the coefficient value 5.55 [exp (1.88)-1 =5.55] implies that bilateral trade between Ghana and those countries with whom it shares a common language will be higher by over 500 percent.

The common coloniser variable is negative but measured statistically insignificant. It however affirmed our hypothesis that since the bloc is composed of several colonies with variant colonisers, this phenomenon negatively affects bilateral trade. The coefficient of the common coloniser dummy is -0.45[exp (-0.60)-1= -0.45] implying Ghana's trade with members with whom it does not share the same coloniser with is

45 percent lower than expected. Table 5.4 reports the results of this study, with the pooled ordinary least square technique.

Table 5.4: Extended Gravity Model Equation Estimates.

Explanatory variable	Pooled OLS	Fixed Effects (FE)	Random Effects (RE)
$\ln GDP_i$	0.45 (0.72)	0.44 (0.74)	0.45 (0.77)
$\ln GDP_j$	0.25 (1.06)	-0.55 (-0.64)	0.25 (1.28)
$\ln POP_i$	0.95 (0.21)	15.3 (2.33)	0.95 (0.22)
$\ln POP_j$	0.77*** (2.93)	-10.1 (-2.34)	0.77*** (3.57)
$\ln Dist_{ij}$	-0.99*** (-4.14)	omitted	-0.99*** (-6.38)
$\ln PCGDP_{ijt}$	0.07 (0.73)	-0.15 (1.74)	0.07 (0.84)
$\ln Popdens_{ijt}$	-0.18* (-1.77)	omitted	-0.18* (-1.68)
$\ln Traf_{it}$	-1.18 (-0.46)	-0.84 (-0.34)	-1.18 (-0.43)
$\ln Traf_{jt}$	2.14** (2.53)	1.54 (1.32)	2.14** (1.93)
Combor	1.11*** (2.93)	omitted	1.11*** (4.46)
Langcom	1.88*** (2.87)	omitted	1.88*** (11.18)
Comcol	-0.60 (-0.93)	omitted	-0.60*** (-2.67)
Constant	-23.8 (-0.39)	-84.0 (-1.25)	-23.8 (-0.40)
Observations	195	195	195
R^2	0.68	0.39	0.68

All non-dummy variables are in logs, and *** (**)* indicates significant at 1%, 5% and 10% level respectively. The values in parathesis are the t-values associated with the coefficients.

5.3 Sensitivity Analysis

To ensure robustness of results, the extended gravity model was re-run by excluding either population or GDP variable owing to the high collinearity between them. Estimating model 2 without GDP indicated that population of country Ghana and those of trade partners has a significantly positive impact on bilateral trade flows in the regional bloc. The result shows that 1 percent increase in Ghana's population will

increase trade volume by 4.5 percent. Again 1 percent growth in partners' population will yield 1 percent increase in Ghana's trade flows as a member of the regional bloc. This means that the higher the population the higher the demand Ghana's exports in the regional market. In addition, higher population may increase the need for the imported goods from partner countries as well.

Furthermore the estimation from the revised modelling using GDP variable shows that GDP of Ghana's trade counterparts has a significantly positive effect on trade flows, which is reflected in the basic gravity model. In terms of influence on other variables, only per capita income variable produced variation when the extended model is estimated using GDP.

Table 5.5: Sensitivity Analysis

Explanatory variables	With Population			With GDP		
	Coef.	t-value	P>|t|	Coef.	t-value	P>|t|
$\ln GDP_i$	-	-	-	0.41	1.60	0.110
$\ln GDP_j$	-	-	-	0.87	9.73	0.000***
$\ln POP_i$	4.5	2.63	0.009***	-	-	-
$\ln POP_j$	1.0	10.99	0.000***	-	-	-
$\ln Dist_{ij}$	-0.92	-4.09	0.000***	-1.30	-5.81	0.000***
$\ln PCGDP_{ijt}$	0.11	1.13	0.261	-0.01	-0.07	0.946
$\ln Popdens_{ijt}$	-0.17	-1.73	0.086	-0.22	-2.24	0.026**
$\ln Traf_{it}$	-1.28	-0.51	0.613	-1.35	-0.52	0.606
$\ln Traf_{jt}$	2.09	2.52	0.012**	2.49	2.89	0.004***
Combor	1.20	3.30	0.001***	0.83	2.19	0.030**
Langcom	1.66	2.65	0.009***	2.36	3.70	0.000***
Comcol	-0.39	-0.63	0.539	-0.91	-1.42	0.159
*** (**)* indicates significant at 1%, 5% and 10% level respectively.						

We also excluded country Nigeria from the extended model since it is the largest economy of the bloc, both by economic size and population, which could exert some influence on the parameters estimated. The results produced some level of variance but not much significance. For the standard gravity variables, country Ghana's GDP will affect trade flows by 0.52 percent but insignificant as against 0.45 percent if Nigeria is included. The effect of the other partners GDP on Ghana's trade flows also increased from 0.25 percent to 0.43 percent but statistically not significant. Coefficients of population of country i and j however reduced to 0.62 percent and 0.57 percent respectively with country j's population measuring highly significant at

five percent significance level. Table 5.6 reports the remaining estimated effects of excluding Nigeria from the analysis on total bilateral trade of Ghana.

Table 5.6: Pooled OLS Estimates Excluding Nigeria.

Explanatory variables	Coefficient	Robust Std. error	t- statistic	p>|t|
$\ln GDP_i$	0.52	0.66	0.78	0.434
$\ln GDP_j$	0.43	0.31	1.39	0.165
$\ln POP_i$	0.62	4.80	0.13	0.897
$\ln POP_j$	0.57	0.27	2.10	0.038**
$\ln Dist_{ij}$	-1.05	0.24	-4.32	0.000***
$\ln PCGDP_{ijt}$	0.04	0.11	0.39	0.701
$\ln Popdens_{ijt}$	-0.19	0.11	-1.82	0.071*
$\ln Traf_{it}$	-0.71	2.77	-0.26	0.797
$\ln Traf_{jt}$	2.62	0.89	2.95	0.004***
Combor	1.03	0.40	2.55	0.012**
Langcom	1.97	0.69	2.85	0.005***
Comcol	-0.65	0.64	-1.01	0.312
Constant	-23.9	64.9	-0.37	0.713
Observations	180			
R Squared	0.66			
*** (**)* indicates significant at 1%, 5% and 10% level respectively.				

The distance variable is also entered with the negative sign as expected at one percent significant level. The negative coefficient of distance variable indicates that the distance between Ghana and the other thirteen remaining trading partners in the economic bloc leads to a decline in Ghana's trade volume. A one percent difference in distance will reduce trade value by 1.05 percent.

The above analysis however indicates that the variables of gross domestic products of Ghana and its trading partners, as well as Ghana's population which measure the effects of economic and market size on trade volume report insignificant test which is against the economic theory.

The hypotheses formulated for this study and the regression results estimated for equation 4.7 using the pooled OLS techniques are reported in Table 5.7.

Table 5.7: Summary of Hypotheses and Regression Results of Study

Explanatory variables	Pooled OLS			
	Coefficient	t-value	Prob.	Hypotheses
$lnGDP_i$	0.45	0.72	0.471	+
$lnGDP_j$	0.25	1.06	0.291	+
$lnPOP_i$	0.95	0.21	0.834	+/-
$lnPOP_j$	0.77	2.93	0.004	+/-
$lnDist_{ij}$	-0.99	-4.14	0.000	-
$lnPCGDP_{ijt}$	0.07	0.73	0.466	+/-
$lnPopdens_{ijt}$	-0.18	-1.77	0.079	+/-
$lnTraf_{it}$**	-1.18	-0.46	0.647	+(-)
$lnTraf_{jt}$	2.14	2.53	0.012	+
Combor	1.11	2.93	0.004	+
Langcom	1.88	2.87	0.005	+
Comcol	-0.60	-0.93	s0.353	-
** denotes different expected sign produced.				

All the explanatory variables used in the augmented gravity model framework produced the expected signs except the variable, Ghana's index of trade freedom. Ghana's trade with ECOWAS is predominantly import-oriented, thus the trade freedom index which measures the openness of country i (Ghana) was expected to justify this scenario. It however indicates that the variable negatively affects trade volume but statistically insignificant. This result also follows existing literature. For example Tummurbaatar and Oh (2011) analysing the effect of trade freedom index on Mongolia's trade, established that own trade freedom negatively influences trade. The magnitude of the effects common border and common official languange on intra-trade of Ghana are huge. Sharing a common official language affects trading positively, as it expedites trade negotiations and reduces transaction costs. We hypothesised that although ECOWAS is composed of different official languages such as French and English, sharing common language postively affects Ghana's bilateral trade with trade partners. The results comfirmed our hypothesis as the the estimated value is positive and strongly significant in measure. The implication is that Ghana's trade activity with other members in the regional bloc is affected by the absence of common official language. Therefore, it is inferred said that absence of common language is a barrier to trade performance of Ghana in the region. Distance between Ghana and other member states however measured statistically significant

to negatively affect intra- trade activity, and as such the main barrier to intra-regional trade, which is in line with other proven empirical studies.

Traditional variables such as GDP, population and geographical distance are the main factors that determine the bilateral trade between Ghana and the other fourteen members of the regional economic bloc, ECOWAS. Ghana's economic, demographic, geographic features as well as those of the other members of the ECOWAS are major determinants of its bilateral trade flows. Therefore, an increase (decrease) in gross domestic products of Ghana and that of its trade partners would result in an increase (decrease) in Ghana's bilateral trade with the bloc. Moreover, free trade policy arrangements in other member countries are crucial for Ghana's trade enhancement or otherwise in the region. Positive trade measures such as trade openness, reduced tariff and non-tariff policies, would lead to improve trade flow of Ghana, particularly for exports as Ghanaian exporters will seize the opportunity to explore those markets and become regional competitive.

5.4 Limitations of Study

This study faced some challenges. The possible impact resulting from regional free trade agreements is either trade creation or trade diversion advanced by Viner (1950). However in this study, the limit of analysis is a single-country case, which is Ghana, therefore trade creation and trade diversion to individual members and non-members of the regional trade area are not investigated here. Moreover, dealing with bilateral trade flows, there is possibility of zero value trade flows which might affect the estimation of the models by underestimating them. Again there are myriad variables to include in intra- regional trade analysis. This research is limited to those considered relevant and based upon data availability. Also there are other advanced statistical methods available to estimate intra-trade flows, we settle on the pooled ordinary least squares model as a simple technique.

6. CONCLUSION AND POLICY RECOMMENDATIONS

International trade is a vital element of economic growth and development, particularly for developing countries like Ghana, in their efforts to reducing poverty and meeting the basic needs of their citizens. Trade between countries is beneficial as it helps diversify their economies and transform factors of production. From the Ricardian model of trade, trade can occur between countries if nations differ in their technological ability, convert factor endowments into goods and services. The development of regional trade leads to the establishment of various forms of bilateral and regional trade liberalisation schemes. The formation of free trade agreements contributes to larger market size and increases the competitiveness of countries' products, which ultimately enhance economic growth. Countries in shared geographical area optimise trading activities if there is a high level of cooperation. Ghana's participation in regional trade is therefore seen as an economic strategy, as regional trade areas yield dynamic or growth benefits to the country by providing domestic firms with access to a larger market, making it possible for them to capitalise on economies of scale and overcome the constraints associated with smallness and isolation often associated with sub-Saharan African economies.

This study aimed at investigating the determinants of Ghana's trade flows as a member of a regional economic bloc based on its economic, demographic and geographic characteristics and those of its trade partners in ECOWAS using the gravity model. The determinants of trade flows between Ghana and its trading partners in ECOWAS were defined as its own gross domestic product, the gross domestic products of the trade partner countries as well as their market sizes proxied by their populations in the bloc; and the geographical distance between the commercial cities of Ghana and the other fourteen members. We also augmented the model with per capita gross domestic product differential, population density differential, Ghana's own and partners' trade freedom indices and selected fixed effect dummy variables of common border, common official language and common coloniser.

The technique of coefficient estimation was the pooled ordinary least squares. The empirical results indicate that the gravity model is very successful in explaining the Ghana's bilateral trade flows with Economic Community of West Africa States using the pooled OLS technique. This is because the coefficients of the classical gravity variables were found to be robustly consistent with the predictions of the gravity model. From the estimated gravity model equation, it was observed that trade between Ghana and the other fourteen members conformed to the general trade theory which holds that economic size has positive correlation with total volume of trade, and inversely related to the distant between a country and its trading partners. Specifically, Ghana's total bilateral trade flows were found to be significantly dependent on the improvements of own gross domestic product, as well as partners' incomes and populations. Again it is evident that improvement in open trade policies of trade partners would significantly increase Ghana's trade volumes in the regional bloc.

Increase in the population of trading partners was found to have highly significant effects on Ghana's bilateral trade. This measures the demand for Ghana's exports in the economic bloc. Ghana's intra-trade activity in the bloc also is prdicted to follow the H-O hypothesis which suggests that countries export goods that utilise their factor endowments in most intense way as per capita gross domestic product was found to be positive but statistically not significant.

As advanced by the gravity model of trade, geography matters. Distance has an economically and statistically large effect on trade flows. Challenges of cross-border transportation in the sub-region are really impacting on trade flows. It is strongly confirmed that distance between the commercial cities of Ghana and the other fourteen ECOWAS members is a major impediment affecting bilateral trade flows.

Other factors such as common border and common official language have significant influence on Ghana's trade volume with members of the Community.

We therefore recommend that government should endeavour to explore the advantages of belonging to the trade bloc by critically addressing issues of infrastructure to broaden the market base of the country. Infrastructure such as port facilities, road and rail networks are critical to export-oriented strategy of a growing economy. Again, there is the need for more collaboration on artificial borders to minimise the hassle of border crossing to facilitate easy movement of goods and services in the sub-region. There is a necessasity for political will among member

states to resolve the challenges of borders. Thus the recent proposal to introduce common control points on the borders of bloc members will help to eliminate time wasted and bribe offered in the course of transporting goods within the region.

Since the regional market is made up homogeneous commodities-mostly primary products- government should design and adopt simple but efficient technologies that add value to these primary commodities before exporting them onto the regional market. To ensure rapid economic growth in general, there is the need for structural transformation where there is a shift from the current natural resource sector dependence to value addition. Therefore government should undertake pragmatic industrialisation strategy which drives manufacturing of goods. Such strategy will create backward and forward linkages in the economy. Systemic transformation would engineer new economic activities, which create the needed jobs for the teeming youth of the country and ensuring social security. This is because manufacturing economic strategy is labour-intensive in the country due to the lack of advanced technology, so it can absorb substential amount of job seekers of the economy.

Achieving structural transformation also requires strong and quality institutions as well as efficient human resource capital base. Government should build strong institutions that fight corruption and attract investment to the country. Moreover there is the need to connect education to industry through meticulous research and development efforts. As put forward by the new trade theory, governnment has an important role to play in promoting new industries, by supporting the growth of key industries and creating the enabling environments which ensure their global market competitivenes.

Government should also set its priorities right concerning regional trade. It should determine whether to be export-oriented or import-oriented with partner members and negotiate a stronger regional cooperation for the advancement of trade. Ghana's trade activity in the bloc is currently imported- oriented, and not utilising its comparative as well as competitive advantage. We therefore proposed export-led strategy since exports has positive impacts on real output growth of a country. Moreover, the region is the fastest growing in Africa with economic and population growth projected to reach appreciable levels in the near future, holding other factors constant. This implies a continuous potential market area, which government should pay considerable attention.

Lastly, this study can be extended to include some other variables based on other assumptions such as the impact of the proposed common currency area on Ghana's trade flows in the regional bloc.

Therefore the call by civil society groups like the Economic Justice Network of Ghana for member states to promote deeper regional economic integration which enhances intra- regional trade in this era of the Economic Partnership Agreements negotiations is appropriate since it would make them more competitive and more attractive to better deals in the global economy. With deeper regional economic integration of the sub-region, Ghana stands to benefit greatly in terms of trade if proper measures are instituted, which facilitate the process of trading activities in the country as well as in the sub-region.

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APPENDICES

Appendix A

Table A.1: Further Explanations on Empirical Studies Using Gravity Models.

Author(s)	Purpose of Study	Purpose of Study	Variables inserted to extend the basic gravity model	Estimation Techniques	Conclusions (Expected sign)
Ekanayake et al (2010)	To analyse trade creation and trade diversion effects of regional trade agreements in Asia and their effects on intra-regional trade flows	Annual data for 19 Asian countries for the period 1980-2009	Relative Factor Endowment (RFE), similarity index, dummies for border, language, colony and RTAs	OLS	RFE (+) Similarity index (+) Common border (+) Language (+) Colony (+) RTAs (+)
Tummurbaatar &Oh (2011)	To analyse Mongolia's International trade as a landlocked country	Bilateral trade data covering 59 trade countries from 1995-2008	Per capita GDP, Real exchange rates, openness ratio, Trade freedom index, dummies for adjacency, WTO membership	OLS	Per capita GDP (+) Real exchange rates (-) Openness ratio i and j(+) Trade freedom index i (-) Trade freedom index j(+) Adjacency (+) WTO (+)

Table A.1 (Continued): Further Explanations on Empirical Studies Using Gravity Models.

Author(s)	Purpose of Study	Data Type and Time period	Variables inserted to extend the basic gravity model	Estimation Techniques	Conclusions (Expected sign)
Gul & Yasin (2011)	To estimate Pakistan's trade potential	Panel data across 42 countries for the period 1981-2005	Per capita GDP differential, common border, common language, Trade openness(i), trade openness partner, real exchange rates	REM	Per capita GDP (+) Trade openness of i (+) Trade openness partners (+) Common border (+) Common language (+) Real exchange rates (+)
Dilanchiev (2012)	To analyse trade pattern of Georgia	Panel data covering a cross-section of 35 countries for the period 2000-2011	GDP per capita, Foreign Direct Investment (FDI), common history and EU membership	OLS	GDP per capita (+) FDI (+) Common history (+) EU Membership (+)
Bonuedi (2013)	To analyse the determinants of Ghana's Trade with selected major trade partners across the globe.	Panel dataset with 25 major trade partners covering 1995-2011	Per capita GDP differential, internal infrastructure (INF), trade policy index (FTPI), FDI, institutional quality(IQ), real exchange rate (RBER), common language Ecowas	OLS, FEM & REM	GDP per capita (+) for all models INF (+) for all model FTPI (+) for all FDI(+) for all IQ (+) for all models RBER (+) Language (+) Ecowas (-) for all models

Table A.1 (Continued): Further Explanations on Empirical Studies Using Gravity Models.

Author(s)	Purpose of Study	Data Type and Time period	Variables inserted to extend the basic gravity model	Estimation Techniques	Conclusions (Expected sign)
Greene (2013)	To estimate the impact of India's market access policies on U.S. export of advanced technology goods	Panel data of U.S. 5 product sectors to India covering 1990-2011	Per capita GDP, stage of economic development, population density, physical land area, exchange rate, openness to import, Common language, index of trade freedom etc.	FEM& REM	Per capita GDP (+) for all models stage of economic progress (-) for all model Population density(-) for FEM; (+) for REM Physical land area (omitted for FEM); but (+) for REM Exchange rate (+) for all Openness to import (-) for all Index of trade freedom (+) for all model Common language omitted for FEM, but (+) for REM
Tripathi & Leitao (2013)	To examine India's trade flows	Panel data with 20 trade partners for the period 1998-12	Common border, cultural proximity, political globalisation	REM & Tobit model	Common border (+) for both techniques Cultural proximity (-) for REM, but (+) for tobit model Political globalisation (+) for REM, but (-) for tobit model

Table A.1 (Continued): Further Explanations on Empirical Studies Using Gravity Models.

Author(s)	Purpose of Study	Data Type and Time period	Variables inserted to extend the basic gravity model	Estimation Techniques	Conclusions (Expected sign)
Postenyi (n.d.)	To investigate the determinants of Hungary's foreign trade	Panel data covering 79 countries for the period 1993-2011	Relative factor endowment(RFE), per capita GDP, population density, land area per worker differential, physical capital per worker, remoteness	OLS & GLS	RFE (+) for OLS; (-) GLS model Per capita GDP(-) for OLS; (+) GLS Population density (-) for OLS; (+) for GLS Land area per worker (-) OLS; (+) for GLS Physical capital (+) for OLS; (-) for GLS model Remoteness (+) for both
Prasai (2014)	To examine the overall trade pattern and flows of trade of Nepal	Panel data with 94 trade partners covering 1981-2009	Per capita GDP, dummies for landlocked, free trade agreements(FTAs), WTO membership	OLS	Per capita GDP (+) Landlocked (-) FTAs (+) WTO membership(-)

Note: + means variables correlate positively with dependent variable
      - means variables correlate negatively with dependent variable
OLS= Pooled Ordinary Least Squares
FEM= Fixed Effects Model
REM= Random Effects Model
GLS= Generalised Least Squares

Appendix B

Table B.1: Criteria for Choosing "Good" Economic Indicators.

	Criteria that SHOULD NOT be used		Criteria that SHOULD be used
1	An indicator should have to carry with it an automatic evaluation.	1	An indicator, or the information it is calculated from, should be already available, or else able to be made available easily and cheaply.
2	An indicator should have a policy instrument which corresponds to it.	2	An indicator should be relatively easy to understand
3	An indicator has to be new.	3	An indicator, to work at all, must be about something measurable
4	Proposals for sets of indicators should be based on particular theories of economic, social, and human development	4	An indicator should measure something believed to be important or significant in its own right, or should reflect or represent something important beyond what the indicator is itself a measurement of (for example, life expectancy figures might be used to indicate the general state of health of the population). This is really what makes something an indicator, rather than just a statistic.
		5	There should preferably only be a short time-lag between the state of affairs referred to and the indicator becoming available
		6	An indicator should be based on information which can be used to compare different geographical areas, social groups, etc., so that a picture of distribution –and not just totals and averages- can be built up.
		7	International comparability is desirable.

Source: Lombaerde and Langenhove, 2005

Appendix C

Table C.1: Description of Variables and Data Sources.

Variable	Description	Proxy	Expected sign	Data Source
TT_{ijt}	Total Trade between i and j at year t	Sum of Exports and Imports		UN Comtrade & World Integrated Trade Solution http://comtrade.un.org/data/ & http://wits.worldbank.org
GDP_{it}	Gross Domestic Product of Ghana(i) in year t	Economic size as measure of supply capacity of Ghana	+	The World Bank (World Development Indicators) http://databanksearch.worldbank.org
GDP_{jt}	Gross Domestic Product of trading partners(j) in year t	The economic size of importers as measure of potential demand for commodities	+	The World Bank (World Development Indicators) http://databanksearch.worldbank.org
$PCGDP_{ijt}$	GDP per capita of countries i and j at year t	Measure of purchasing power capacity of the trading countries	+/-	Author's Computation based on The World Bank (World Development Indicators) Database
POP_{ijt}	Total population of countries i and j at year t	Total market size as potential source of demand of goods and services	+/-	The World Bank (World Development Indicators) http://databanksearch.worldbank.org
$Dist_{ij}$	Distance (in km) between commercial cities of i and j	Measure of transportation cost, shipping and transaction costs	-	International Trade Data http://www.macalester.edu/research/economics/ PAGE/HAVEMAN/Trade.Resources/Data/Gravity/dist.txt

Table C.1 (Continued): Description of Variables and Data Sources.

Variable	Description	Proxy	Expected sign	Data Source
Popdens$_{ijt}$	Population density difference between i and j	Proxy for factor endowment	+/-	Author's own calculation based on data from World Development Indicators Database
Traf	The level of Trade freedom of country i and country j in year *t*	Measure of the absence of tariff and non-tariff barriers to export and import of goods and services, a measure of openness	+	The Heritage Foundation http://www.heritage.org/index/trade-freedom
Combor	Dummy variable for common border between *i* and *j* (value of 1 for share border line and 0 otherwise)	Natural link between trading partners	+	From CEPII http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp
Langcom	Dummy variable for official language spoken between *i* and *j* (1=English; 0=otherwise)	Cultural differences and costs to trade	+	From CEPII http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp
Comcol	Dummy variable for common coloniser 1 if partners have same coloniser; zero if not	Historical link of colonisation	-	From CEPII http://www.cepii.fr/cepii/en/bdd_modele/bdd.asp
Note: All continuous variables are transformed to their natural logarithm in order to make the model linear.				

Appendix D

Table D.1: Descriptive Statistics Analysis

. summarize

Variable	Obs	Mean	Std. Dev.	Min	Max
Ttijt	210	9.47e+07	3.59e+08	0	4.73e+09
Gdpi	210	2.08e+10	1.43e+10	4.98e+09	4.79e+10
gdpj	210	1.83e+10	6.51e+10	2.24e+08	5.22e+11
popi	210	2.20e+07	2372304	1.84e+07	2.59e+07
popj	210	1.79e+07	3.59e+07	434168	1.74e+08
distij	210	1286.669	712.992	189.9789	2748.258
pcgdpijt	210	537.5919	514.6914	1.353754	2457.565
popdens	210	296969.9	333499.4	7324	1028467
trafit	210	62.78667	4.144105	55.4	67.8
trafjt	198	59.64343	10.44852	19	76.2
combor	210	.2142857	.4113064	0	1
langcom	210	.2857143	.4528334	0	1
comcol	210	.2142857	.4113064	0	1

Table D.2: Pooled OLS Estimation for Basic Gravity Model

. reg lnttijt lngdpi lngdpj lndistij, robust

Linear regression

Number of obs = 207
F(3, 203) = 74.44
Prob > F = 0.0000
R-squared = 0.5675
Root MSE = 1.7604

lnttijt	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngdpi	.5668318	.1497128	3.79	0.000	.2716403	.8620233
lngdpj	.8885156	.0836776	10.62	0.000	.7235269	1.053504
lndistij	-1.44515	.1925231	-7.51	0.000	-1.824752	-1.065549
cons	-6.804566	3.831627	-1.78	0.077	-14.35946	.750325

Table D.3: Pooled OLS Estimation for the Gravity Equation Model 1

. reg lnttijt lngdpi lngdpj lnpopi lnpopj lndistij, robust

Linear regression

Number of obs= 207
F(5, 201)= 60.59
Prob > F=0.0000
R-squared=0.6055
Root MSE=1.6895

lnttijt	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
lngdpi	.5591289	.6602005	0.85	0.398	-.7426785	1.860936
lngdpj	.1240528	.2049133	0.61	0.546	-.2800027	.5281083
lnpopi	2.222006	4.808729	0.46	0.645	-7.260021	11.70403
lnpopj	.9484058	.2501781	3.79	0.000	.4550955	1.441716
lndistij	-1.177016	.1874346	-6.28	0.000	-1.546606	-.8074255
_cons	-44.15475	66.41196	-0.66	0.507	-175.1083	86.79877

Table D.4: Pooled OLS Estimation for the Gravity Equation Model 2

. reg lnttijt lngdpi lngdpj lnpopi lnpopj lndistij lnpcgdpijt lnpopdens lntrafit lntrafjt combor langcom comcol, robust

Linear regression

Number of obs = 195
F(12, 182) =30.28
Prob > F = 0.0000
R-squared =0.6818
Root MSE=1.5794

lnttijt	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
lngdpi	.4488489	.6209994	0.72	0.471	-.776435	1.674133
lngdpj	.2463346	.2324127	1.06	0.291	-.2122353	.7049045
lnpopi	.9474806	4.511699	0.21	0.834	-7.954481	9.849442
lnpopj	.7655226	.261316	2.93	0.004	.2499242	1.281121
lndistij	-.9896189	.239032	-4.14	0.000	-1.461249	-.5179886
lnpcgdpijt	.0705761	.0967115	0.73	0.466	-.1202437	.261396
lnpopdens	-.1772158	.1002837	-1.77	0.079	-.375084	.0206524
lntrafit	-1.184949	2.580479	-0.46	0.647	-6.276451	3.906553
lntrafjt	2.14427	.8473041	2.53	0.012	.4724676	3.816072
combor	1.111364	.3792286	2.93	0.004	.3631137	1.859614
langcom	1.88037	.6544711	2.87	0.005	.5890437	3.171697
comcol	-.5960402	.6404698	-0.93	0.353	-1.859741	.6676605
_cons	-23.83607	61.27216	-0.39	0.698	-144.7312	97.0590

Table D.5: Fixed Effects Model Estimation for the Gravity Equation Model 2

. xtreg lnttijt lngdpi lngdpj lnpopi lnpopj lndistij lnpcgdpijt lnpopdens lntrafit lntrafjt combor langcom comcol, fe robust

Fixed-effects (within) regression				Number of obs = 195		
Group variable: pairid				umber of groups = 14		
R-sq: within = 0.3066				Obs per group: min = 5		
between = 0.6763				avg = 13.9		
overall = 0.3908				max =15		
				F(7,13) = 14.81		
corr(u_i, Xb) = -0.9955				Prob > F = 0.0000		

lnttijt	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
lngdpi	.4446321	.6023177	0.74	0.474	-.8565961	1.74586
lngdpj	-.548846	. 8613991	-0.64	0.535	-2.409786	1.312094
lnpopi	15.253	6.556671	2.33	0.037	1.088169	29.41782
lnpopj	-10.10194	4.315812	-2.34	0.036	-19.42569	-.7781945
lndistij	0	(omitted)				
lnpcgdpijt	.1571216	.0902999	1.74	0.105	-.0379594	.3522026
lnpopdens	0	(omitted)				
lntrafit	-.8352038	2.436006	-0.34	0.737	-6.097874	4.427467
lntrafjt	1.540415	1.17134	1.32	0.211	-.990111	4.070941
combor	0	(omitted)				
langcom	0	(omitted)				
comcol	0	(omitted)				
_cons	-84.01942	67.13018	-1.25	0.233	-229.0453	61.0065
sigma_u	16.403619					
sigma_e	1.5269694					
rho	.99140919	(fraction of variance due to u_i)				

Table D.6: Random Effects Model Estimation for the Gravity Equation Model 2

. xtreg lnttijt lngdpi lngdpj lnpopi lnpopj lndistij lnpcgdpijt lnpopdens lntrafit lntrafjt combor langcom comcol, re robust

Random-effects GLS regression   Number of obs = 195
Group variable: pairid   Number of groups = 14
R-sq: within = 0.2588   Obs per group: min = 5
       between = 0.9769   avg = 13.9
         overall = 0.6818   max = 15
                                    ald chi2 (12) = 3.74e+06
corr(u_i, X) = 0 (assumed)   Prob > chi2 = 0.0000

| lnttijt	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf. Interval]	
lngdpi	.4488489	.5855414	0.77	0.443	-.6987912	1.596489
lngdpj	.2463346	.1930137	1.28	0.202	-.1319654	.6246345
lnpopi	.9474806	4.212482	0.22	0.822	-7.308832	9.203793
lnpopj	.7655226	.2146278	3.57	0.000	.3448599	1.186185
lndistij	-.9896189	.1550164	-6.38	0.000	-1.293445	-.6857924
lnpcgdpijt	.0705761	.0841224	0.84	0.401	-.0943007	.235453
lnpopdens	-.1772158	.1057449	-1.68	0.094	-.384472	.0300404
lntrafit	-1.184949	2.771458	-0.43	0.669	-6.616907	4.247008
lntrafjt	2.14427	1.11233	1.93	0.054	-.0358569	4.324397
combor	1.111364	.2493761	4.46	0.000	.6225955	1.600132
langcom	1.88037	.1681317	11.18	0.000	1.550838	2.209902
comcol	-.5960402	.2234435	-2.67	0.008	-1.033981	-.1580991
_cons	-23.83607	58.88295	-0.40	0.686	-139.2445	91.57239
sigma_u	0					
sigma_e	1.5269694					
rho	0	(fraction of variance due to u_i)				

Table D.7: Correlation Matrix of Coefficients of Regression Model

. vce, corr

e(V)	lngdpi	lngdpj	lnpopi	lnpopj	lndistij	lnpcgd~t	lnpopd~s
lngdpi	1.0000						
lngdpj	-0.0997	1.0000					
lnpopi	-0.9193	-0.0125	1.0000				
lnpopj	0.0187	-0.9346	0.0565	1.0000			
lndistij	0.0215	-0.3273	-0.0146	0.3919	1.0000		
lnpcgdpijt	-0.1231	0.0379	-0.0444	0.0639	-0.1226	1.0000	
lnpopdens	0.0153	-0.3243	0.0679	0.3180	0.4447	-0.1133	1.0000
lntrafit	0.0563	-0.1536	-0.2446	0.1214	0.0862	-0.0893	0.0631
lntrafjt	-0.2023	0.2041	0.0523	-0.1757	-0.0345	-0.0004	-0.3031
combor	-0.0324	-0.2937	0.0451	0.2888	0.6180	-0.0775	0.3149
langcom	-0.0224	0.2822	-0.0657	-0.2250	-0.0285	-0.0247	-0.1774
Comcol	0.0322	-0.1436	0.0245	0.0940	-0.1302	0.0727	-0.0635
_cons	0.9150	0.0483	-0.9893	-0.0923	-0.0339	0.0894	-0.1061
e(V)	lntrafit	lntrafjt	combor	langcom	comcol	_cons	
lntrafit	1.0000						
lntrafjt	-0.0665	1.0000					
combor	0.2702	-0.2256	1.0000				
langcom	-0.0513	0.2765	-0.0208	1.0000			
comcol	0.0341	-0.1336	-0.0073	-0.8998	1.0000		
_cons	0.1224	-0.0606	-0.1009	0.0757	-0.0267	1.0000	

Table D.8: Multicollinearity Analysis

Variable	VIF	1/VIF
lnpopi	15.53	0.064396
lngdpi	15.26	0.065532
langcom	8.46	0.118193
comcol	8.41	0.118837
lnpopj	7.71	0.129699
lngdpj	7.12	0.140437
lndistij	2.46	0.407194
combor	2.14	0.467438
lnpcgdpijt	1.99	0.502554
lntrafit	1.69	0.592019
lnpopdens	1.35	0.741524
lntrafjt	1.33	0.753759
Mean VIF	6.12	
Multicollinearity exists between the highlighted variables. Meaning that there is a linear combination measuring the same thing. The rule of thumb is that, the Variance Inflation Factor (VIF) values should not be greater than 10.		

Appendix E
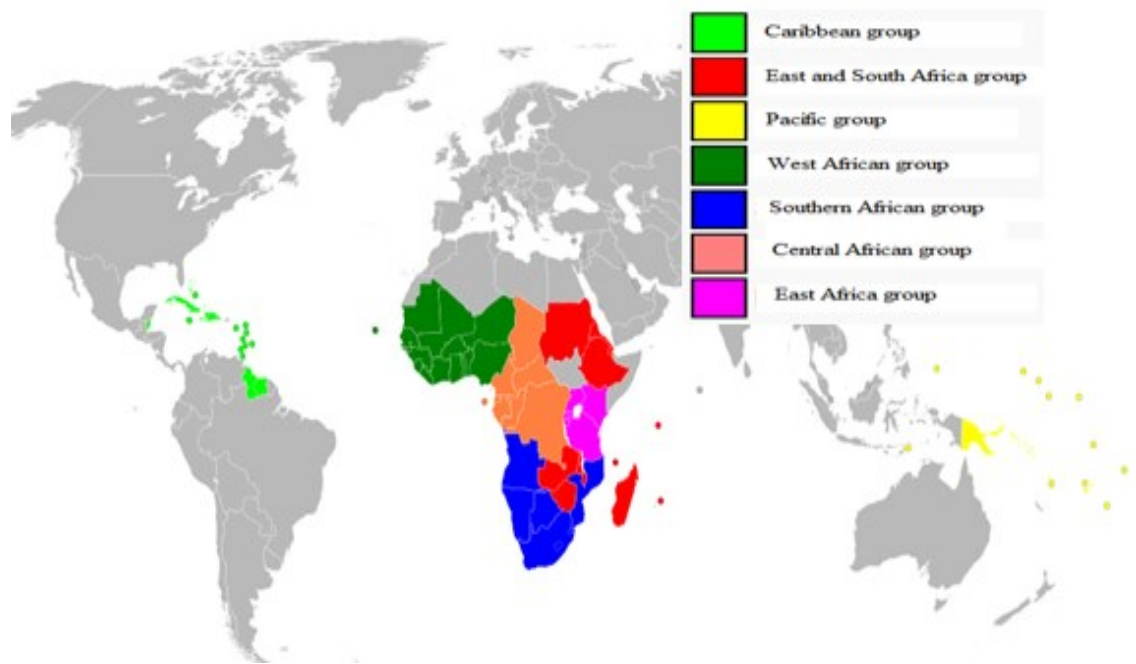
Figure E.1: Map of the African, Caribbean and Pacific Regions.

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