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Trade Openness: An African Perspective

Examining the determinants of trade openness and bilateral trade flows for the African countries

Being a thesis submitted for the degree of Doctor of Philosophy in Economics

By

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DEDICATION

To

Faraja, Brighton, Awstine and Giovanni

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ABSTRACT

This research entails an empirical examination of the determinants of trade openness in Africa and the determinants of bilateral trade flows between Africa and the BRIC and OECD member countries. Besides, the study examines the impacts of trade openness on the economic growth in Africa. Before all this is done, the study surveys the updated empirical data on the African economy and trade to give a state of the art on the economic development processes in the African continent. Recognising the role of international trade in the global economic growth and considering the marginalisation of Africa in the world trade, this study highlighting important factors that are relevant for policy makers in the African countries to consider in order to boost-up their trade levels. It is also an attempt to empirically examine and provide explanations on the relatively lower trade levels that these countries have been experiencing ever since their political independence.

The study has been done with panel data analysis methods in order to capture the relationships between the variables of interest over an extended time periods and disentangle the time invariant country specific effects that are very relevant particularly in examining bilateral trade flows. Econometric estimations of the coefficients for the regressors were made through the application of either random effects or fixed effects models, a selection of which is based on Hausman test. Where necessary the study has made use of instrumental variable estimation techniques like the 2SLS, Hausman Taylor and System GMM.

Among others, this research contributes to the existing literature by examining the importance of private sector and the role of the ever- increasing mobile phone subscriptions in the African countries, in enhancing intra African bilateral trade flows. The facilitation of the private sector through provision of credits can enhance intra and inter African trade as well as boosting up the efforts to diversify African exports composition and export market destinations.

CHAPTER ONE

INTRODUCTION

1.1 Research background and objectives

International trade has received much attention in the literature because of the role it plays on the global economy. It is among the fastest growing economic activities in the world, it has a great impact on the majority of countries' incomes. Globally, trade accounts for a significant share of most countries' GDP; in 2007 it accounted for 57.3 per cent of the global GDP. During the same year, the world merchandise exports were around 14 trillion dollars, while the world exports of commercial services were 3.5 trillion dollars (World Bank, 2011). Besides having economic influence, trade has global political and social influences based on the fact that lots of today's negotiations and agreements have an implicit goal of trade. The recent growing ties between China and African countries can be a typical example to this.

Development of international trade in the recent decades has been sophisticated due to the globalisation phenomenon. Technological developments witnessed in the last century since the end of WW II have led to the sophistication in the transportation system which resulted into a decline in international transportation costs. The literature provides an econometric evidence of the effect of the decline in shipping costs as well as the innovation of jet aircraft engines to the rapid growth in international trade (Estevadeordal et al., 2002). For instance, from 1950 to 2004 the average growth of the global trade was around 5.9 per cent, with a manufacturing trade growth rate of 7.2 per cent (Hummels, 2007b). The expansion of trade volumes and global integration has also been speeded up by the global value chain (globally dispersed production).The increasing global trend of FDI flows has also been an explanation to an increased international trade rates over the past century to date.

Despite these developments in the world economy resulting from the globalised production and trade, Africa's position in the world trade has for long been marginalised. For both intra and inter African bilateral trade, African economies has had a relatively lower rates compared to countries in the other regions of the world. According to the World Bank, from 1980 to 2011, Sub Sahara Africa (excluding South Africa and Nigeria), exports grew at a mean annual rate of 0.1 per cent, while imports at 2.2 per cent. The mean value for the total trade as a ratio of GDP for the whole period was 55.9 per cent and had been declining at a mean rate of 0.01 per cent annually. The volume of trade as a ratio of GDP has been declining despite the fact that Africa's GDP rate of annual growth has been 3.8 per cent on average for the whole period from 1960 to 2011 (WorldBank, 2013).

This has resulted into myriad studies that examine and analyse the reasons behind this trend. Under international trade much attention has focused on relating trade to some macro-economic variables like economic growth, total factor productivity, GDP per capita, inflation and governance to mention a few. The scope of these studies on Africa varies, some covers Africa as a continent (e.g. Asiedu, 2002; 2006; Wood and Mayer, 1998), groups of African countries (e.g. Zannou, 2010; Read and Parton, 2009) and few on individual African countries (e.g. Osakwe, 2000).

This research is examining determinants of trade openness and bilateral trade flows for the African countries. The latter is done for intra African trade and African trade with BRIC[1]and OECD[2] countries. The research also examines the relationship between trade openness and economic growth for the African countries. This study finds justification on grounds that there is very little theoretical and empirical analysis on determinants of the openness of African

[1] BRICS comprises of five emerging developing economies, Brazil, Russia, India, China and South Africa. These countries have recently initiated efforts to establish a strong financial institution of their own similar to those of Breton Wood (that is the World Bank and the International Monetary Fund).
[2] OECD is the Organization for Economic Cooperation and Development.

countries. Amongst the few published studies examining the determinants of trade openness is a paper by Guttmann and Richards (2006) who did an empirical study on trade openness in an Australian perspective; and considered the economic and geographic variables that are able to explain cross-country differences in openness. In considering the impact of openness on the size of government, Alesina and Wacziarg (1998) provide a brief empirical analysis of the determinants of openness, using a sample ending in 1989. Pritchett (1996) briefly considers openness in a wider examination of the outward orientation of countries' policies. Rogowski (1987) considers the relationship between openness and government/parliamentary structure.

This thesis also examines determinants of intra and inter-African bilateral trade flows. The inter-African trade considers the African bilateral trade flow with OECD and the emerging economies (BRIC). While for some decades now the OECD accounted for the largest share of African trade, of recent the share of non-OECD countries in Africa's trade has risen from 26.4 per cent in 2000 to 39.4 per cent in 2009. China (taken as a single country) may soon take a lead considering the rate of growth with which it trades with African countries. For instance, China's share in the Africa's trade has risen from less than 1 per cent (1980's) to 13.5 per cent (Africa's imports) and 11 per cent (Africa's exports) in 2009; besides China accounts for more than any individual European country in Africa's trade. In 2011, as Africa's largest trading partner, China's trade deals totalled $160 billion (De Grauwe et al., 2012).

Therefore the main research objectives includes; to examine the determinants of trade openness in the African countries, to examine the effect of trade openness on the economic growth of African countries, to examine the determinants of intra and inter African bilateral trade flows and, to derive policy implications from the empirical results. The study make use of panel data analysis methods in order to capture the relationships between the variables of interest over an

extended time periods and disentangle the time invariant country specific effects that are very relevant particularly in examining bilateral trade flows.

Econometric estimations of the coefficients for the regressors are made through the application of either random effects or fixed effects models, a selection of which is based on Hausman test. Where necessary the study has made use of instrumental variable estimation techniques like the 2SLS, Hausman Taylor and System GMM.

1.2 Structure of the research

The thesis starts with a review of the economy and trade in the African countries. It is a survey of empirical data on the pattern and structure of intra and inter African trade and investments. The chapter is important as it gives a picture of the diversified economic development in the region. It highlights the regional efforts towards strengthening the regional economic communities as a way to enhance intra and inter trade of the African countries.

Chapter three discuss the international trade theories so as to explain the rationale behind the global trading activities. Trade theories are discussed based on the classification adopted by various literatures. Then the chapter goes on with providing the link existing between trade theories and the gravity model, a model that is eminent in the international trade literature to explain bilateral trade flows. This was necessary because chapter four uses the trade openness equation in the specification of the model which is based on the gravity equation. Besides chapter six has made use of the gravity model in the specification of the determinants of bilateral trade flows for the African countries.

Chapter four is an empirical examination of the determinants of trade openness in the African countries. The chapter provides a replication of the study by Guttmann and Richard (2006) trade openness, an Australian perspective; however this study includes some other variables

which are in a better position especially in explaining the African perspective. Besides, the chapter models the effects of logistics performance index (LPI) on the trade openness in the African countries.

Chapter five provides an empirical examination of the effects of trade openness on the economic growth of the African countries. Besides the empirical results, the chapter offers an excellent description of the hypotheses on the direction of the causality between trade openness and economic growth. It also gives a good account on the channels through which trade openness affects the economic growth of an economy.

An empirical examination of intra and inter African bilateral trade flows is provided under chapter six. The intra African bilateral trade flow is trade among African countries where as the inter-African bilateral trade flows is between African countries and the BRIC countries and the OECD countries.

The last chapter on the study, chapter seven, offers the general conclusions and policy implications. It also includes some research limitations and suggestions for further research.

CHAPTER TWO

AFRICA ECONOMY AND TRADE

2.1 Introduction

Africa's economy and trade as depicted in the empirical literature is marginalised relative to other regions in the world. A huge continent composed of fifty four independent states, Africa has an estimated combined market size of more than 600 million people. Comparing to other developing region of the world, Africa has large number of countries per square area. It has a 40 per cent of its population living in landlocked countries, which is higher compared to east and central Asia population of 23 per cent. Economic growth in most of the African countries has been suffering from civil conflicts associated with political upheavals, weakening of the global economy, and decline in the world market commodity prices, volatile oil prices and the raising in food prices. The rising in oil prices have caused most of the persistent inflationary pressures in these economies as well as causing destructions in the purchasing power of national currencies and the economy as a whole.

However, since mid-1990s the economic growth in Africa begun to increase steadily. This was stimulated by the improved political, microeconomic stability as well as the microeconomic reform efforts that were undertaken by various African economies during that decade. Despite this growth, to many of these countries this was the recovery from the devastating civil wars and long periods of economic decline since the oil crisis in the early1970's. To countries like Botswana and Morocco, these economic growth were the result of significant investments in the 1970s and 1980s. Besides, the rising of demand for commodities have been driving investors around the world to go for Africa's natural resources and to forge new types of partnerships with African economies. With this, Africa has been gaining greater access to international capital. However, weak institutions for conflict management and ethnic divisions

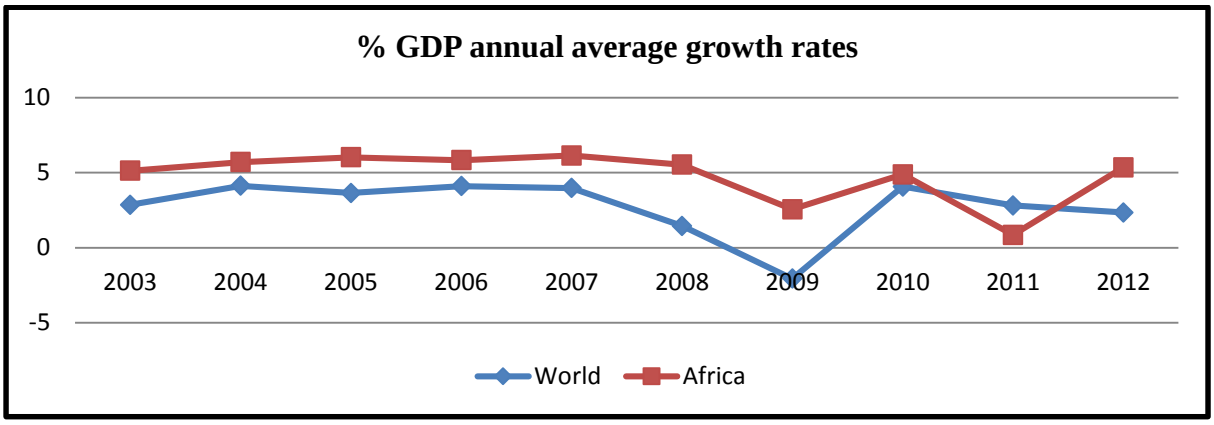
still result into persistent problems in Africa. These conditions have acted and continue to act as a threat to continual economic growth as it poses excessive risky environment for both existing and prospective investors.

In the 2000's the continent's economic growth even doubled that of 1980s and 1990s, this has been attributed to the increase in demand for primary commodities by the emerging economies particularly China (Seguino and Were, 2014). Africa's growth acceleration was widespread, many of its economies witnessed their economic growth growing at annual rate of above 5 per cent. For instance, according to World Bank (2013) from 2002 to 2011, the average growth of African economy in terms of GDP was around 8 per cent. During this period, the highest growth rates were seen in Equatorial Guinea (13 percent), and Angola (11 per cent). Five African countries (Chad, Sierra Leone, Ethiopia, Uganda and Rwanda) growth rates clustered around 8 to 10 per cent; while Mozambique, Tanzania, Liberia, Ghana and Nigeria experienced a growth rate of 7 per cent. Zambia, Malawi, Democratic Republic of Congo, Burkina Faso, Cape Verde and Guinea grew at a rate of 6 per cent.

Due to the African ties to the global economy, the recent financial crisis (2007–2012) did not leave African economy safe. Just like some other parts of the world, the continents' economy was also affected by rising in oil and food prices, among others. However according to World investment report by UNCTAD (2014), in the recent three years, as the global economy has shown some signs of strengthening, together with easing political and social tensions as well as stopping rising of oil prices and food prices, African countries has seen their economies growing as well. The continent's average economic growth (in terms of GDP) has been performing well compared to the world growth as a whole. For instance in 2013, Africa had an average GDP growth rate of 4 per cent while the global economic growth in the same year was 3 per cent (figure 1). This has been a consistent trend since the 2010 global recession.

However, growth performance in Africa is characterised with country and regional differences. This reflects the existing differences in the continent in terms of stages of development, natural resources availability, weather conditions and political and social stability. The reported regional economic growth in 2013 shows that east and west Africa had the fastest growth rates of 6.2 per cent and 6.7 per cent respectively(AFDB, 2013).

Figure 1: Africa's annual GDP growth compared to the world rates (2003-2012)



Source: Researcher's manipulation of the World Bank data, 2014

In West Africa, Nigeria which is currently the strongest economy in Africa in terms of economic growth, the non-oil sectors are the main economic growth drivers. These are sectors such as agriculture, trade and ICT; while the oil sector is said to be dragging the economy down due to theft, weak investment and pipeline vandalism (AFDB et al, 2013). Other countries in the region include Ghana, Mali, Sierra Leone and Cote d'Ivoire, economic sectors being oil and gas production and increased private and public investments, agriculture, iron and ore exports, manufacturing, services and construction. In east Africa, Tanzania, Rwanda, Ethiopia, and Uganda are the economies that records higher economic growth in the recent years. The economic growth has been between 6.5 to 7.5 per cent in 2013, dominant economic sectors for these countries include agriculture, mining, industry, and service. The increasing African ties with the global economy create a good avenue for the future consistent higher economic growth

rates for African economies. As the emerging BRIC economies increases their links with African economies, the flow of green investment is increasing in Africa in search for natural resources like gas and oil.

The chapter revisits African economy and trade trend and pattern. The rest of the chapter proceed as follows; following will be the analysis of Africa's position in the world economy. Part three presents a review of the trade policy reforms in African economies in the 1970s to 1990s. Part four reviews the African regional differences, a review is based on their differentiated economic development and trade. Part five concentrates on foreign direct investment trend in Africa. And finally the review of regional economic communities.

2.2 Africa in the global economy

The fact that Africa's place in the world economy is marginalised is explained by its historical past, the fact that the continent has been characterised by lack of capacity and will to influence the global market; that Africa has been a source of raw materials to the industrial developments in the today's developed countries. In 1963 one Ugandan scholar Machyo Chango noted that, as long as the continent continues to be a producer of raw materials and semi processed goods, the prevailing unfavourable balance of payments facing African economies can never end (Machyo, 1963). Table 1 shows that, compared to South and Eastern Asian countries, Africa have had higher trend of unfavourable balance of payments though relatively lower to South American countries (see also figure 2).

The underperformance of Africa can be traceable even back during the mercantile period, which disoriented the continent's production and trading patterns to becoming the producer of primary products and the transfer of huge economic surpluses away from the continent to the so called "the centre"(Ajulu, 2001). The unequal exchange established during this period came to be strengthened during the period of colonialism, where colonisers were mainly producing

primary products instead of initiating production of manufacturing goods which would mean industrialisation for Africa.

Table 1: Africa, South America and southern East Asia: annual balance of payments (US$ in millions) for 2003 to 2012.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Africa	11,635	23,362	60,644	76,880	59,003	54,069	- 32,812	3,275	- 12,801	- 17,302
South America	9,173	21,143	34,972	48,054	14,941	- 28,805	- 24,919	- 57,060	- 69,370	- 95,013
Southern-Eatern Asia	48,561	41,910	44,856	87,029	111,980	71,461	105,955	116,881	118,978	71,834

Source: UNCTADstat, 2014

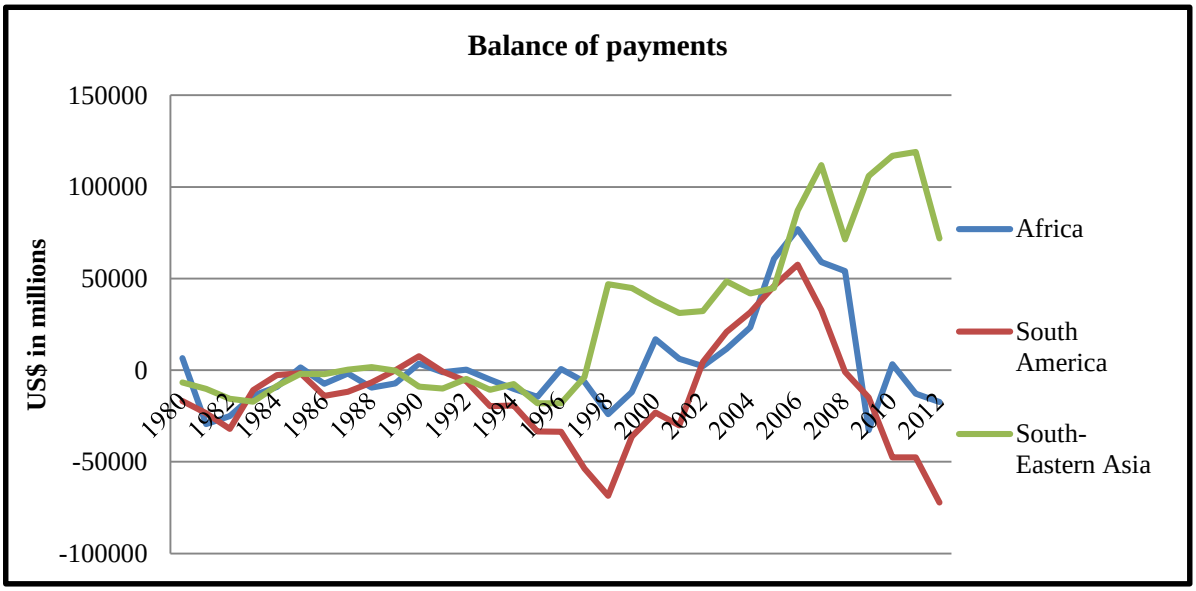
Africa remained at the margins of the global economy since this time and to most countries even after the independence period, because these economies were deliberately not designed to take part in the global market on a competitive basis. In the 1960s Chango noted that;

> *"…in addition to interest paid on loans raised from outside and fabulous profits made by foreign investors and remitted abroad, is the problem of expatriation of capital. ...African economy is largely in the hands of foreign capitalists. Today, all these are busy remitting to overseas banks every bit of their surplus capital. Many financial institutions in Europe and America are full of money expatriated from Africa for 'safe keeping'. This callous drain on our capital has been very much reflected in the countries of East Africa. From this it cannot, therefore be disputed that in 'aiding' Africa the developed countries are just doing good for themselves. For example according to the US publication 'Newsweek' the Paris officials also know that much of aid-spending as with all donor nations, goes directly to individual Frenchmen and indirectly back to France. We can now see why although Africa is potentially one of the richest continents in the world, its people are paradoxically among the poorest due to colonial and neo colonial plunder and ruthless inhuman exploitation. This exploitation does grossly affect our productive capacity" (Machyo, 1963, pg.6).*

The 1960s were the period for independence for many African countries, however this was not meant for economic independence as, despite the initiatives, it was not coupled with sustained economic development. A brief sustained economic growth is recorded to take place for a period less than ten years (from 1965 to early 1973), where Sub Saharan Africa (SSA) experienced an average economic growth of 5 per cent with its industrial production raising by

about 10 per cent (Tarp, 1993; Ajulu, 2001). With the collapse of real commodity prices and the oil crisis in mid-1970s, African countries saw their economic progress prospects falling and to most of them since then they have never recovered. In the early 1980s, African economies experienced even a worse economic situation characterised with low export base dominated with one or two agricultural commodities, worse terms of trade and a reduced access in the international finance. This was finalised by the debt crisis in the 1982 initiated by the cessation of Mexico to pay its international debts (Rodrik, 1999, 1998).

Figure 2: Africa, South America and South- eastern Asia: Balance of payments, Current account net, annual from 1980 to 2012



Source: UNCTADstat, 2014

The only resort for these economies by then was to go for institutional funding offered by Breton Wood institutions (the IMF and World Bank) and some individual developed donor countries. These funding was embedded with conditions such as cutting down government support to social services (which was very crucial for nurturing Africa's growing economies), currency devaluations, evicting subsidies from important sectors of the economy (e.g. health and education) and the retrenchment of the state/public sector (Ajulu, 2001). For these countries to receive any economic assistance, complying to the conditions embedded with it

was not questionable, and most of these conditions were meant to destroy the dominant state-led developmental paradigm that were initiated by many of these countries immediately after their independence (i.e. import substitution). It was also a way of promoting open and free competitive market economy where the state has less to do in the economic activities of the country. However these interventions have had disastrous repercussions on the African economies. To most of the countries they led to economic stagnation, ubiquitous poverty, and these countries have ever since remained small, fragile with extreme heavy and growing debt burden (Adekanye, 1995; Mkandawire, 2005; Ajulu, 2001).

During this time African countries had also to reform their trade policies. Thus the development of Africa's trade policy towards liberalization started since mid-1980. A process which was implemented in platforms; the first was through the structural adjustment programs (SAP) as a package in the WB/ IMF assistance. Countries were required to resort to unilateral trade liberalization as a way to macroeconomic stabilization. The second was by countries joining the regional integrations like COMESA[3], ECOWAS[4], EAC[5] and SADC[6], where they were compelled to implement certain trade reforms to fit into the group. The third was becoming member country to the World Trade Organization(WTO); African countries had to take part in the multilateral trade reforms (Dupasquier and Osakwe, 2006; Kirkpatrick and Weiss, 1995). Therefore the period between 1980s and 1990s saw a series of economic reforms for many of the African economies.

Despite this marginalisation of the continent in the world trade, taken as a whole, the participation of Africa in the world trade is in accordance to what can be expected according to the international benchmarks that relates trade volumes to income levels, country size and

[3] COMESA is the Common Markets for Eastern and Southern Africa.
[4] ECOWAS is the Economic Community of West African states.
[5] EAC is the East African Community.
[6] SADC is the Southern African Development Community.

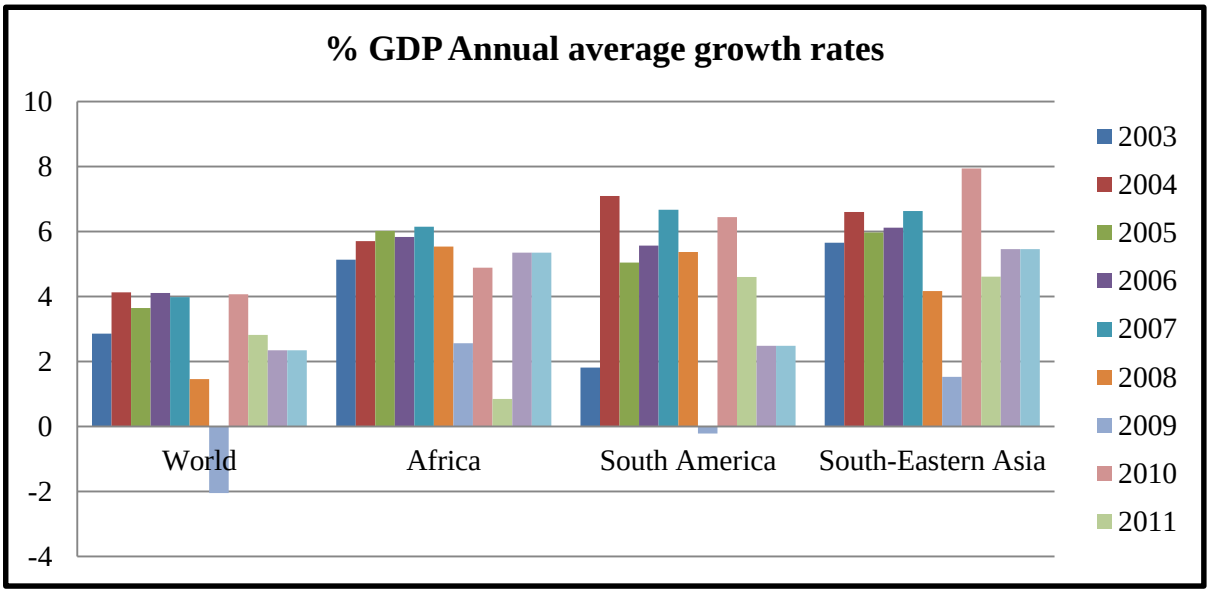
geographical factors (Rodrik, 1998). However some studies note that the reason for the continent to have such a small role in the world trade and investment (global economy for that matter) is its segmented nature, that is, the continent has an extremely inconvenient and costly transportation infrastructure (Broadman, 2007; Naudé, 2009). Thus, the high internal transports costs coupled with underdeveloped institutions, weak governance, and constraints on business competitions results into international trade and investment in Africa being too costly (Broadman, 2007).

In their study, Wood and Mayer (2001) compare African trade structure to the rest of the world, they reveal that Africa is characterised with lower share of manufactured goods and processed products in its primary exports and that this is due to its low level of skills per worker and high level of land per worker. However most of the countries in the continent have full potential of developing in the manufacturing sector so as to improve their economic growth. There are efforts by some countries in the region (like South Africa, Nigeria, Mauritius, Morocco and Kenya) on diversifying their exports, they export some few technology based products. Some other efforts are such as moving from relying solely on exporting raw materials to exporting light manufactured goods, processed foods, horticulture, and services such as tourism (Broadman et al, 2007).

There is currently a good indication of Africa's trade growth which is enhanced by the fast growing linkage to Asia. Africa's imports especially manufactured goods, intermediate goods for African manufacturers and machineries as well as consumer's non-durables are from Asia. Africa's exports to Asia have grown by 20 per cent during the period between 2000 to 2005 accounting 27 per cent of all the continent's exports approaching the EU share (32 per cent) and USA (29 per cent) (Broadman et al, 2007). The leading export commodities, especially to

China and India, are petroleum, ores and metals. Others include timber, cotton and food products.

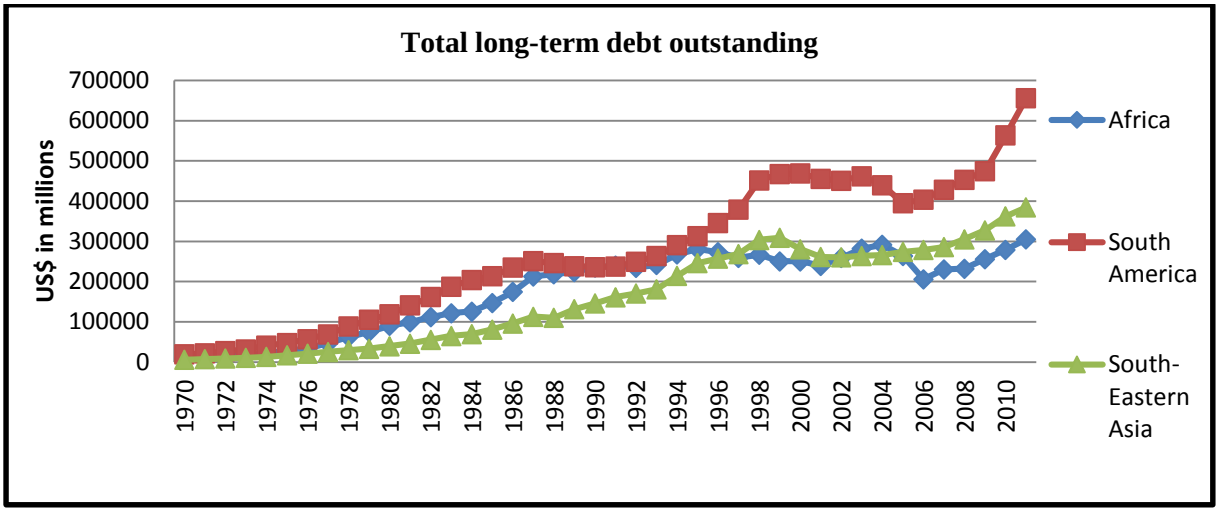
Figure 3: Africa GDP growth compared to the world rates and other developing regions (2003-2012)



Source: Researcher's manipulation of the World Bank data, 2014

In the last two decade Africa has experienced a persistent economic growth and an increased participation in the global economy, though still relatively small. Figure 3 above shows the annual GDP growth rates in Africa were consistently higher than any other region, until before the global financial and economic crisis. For the period from 1996 to 2010 the continents annual GDP growth averaged to 5 per cent, with GDP per capita increasing annually at a rate of 2.5 per cent (World Bank, 2012). Despite these growth rates, compared to Asian developing countries and Latin American developing countries, Africa is less indebted region as can be seen in figure 4, probably because it is the region that receives higher ODA than other developing regions as can be seen in figure 5.

Figure 4: External long-term debt of developing economies (Africa, Southern America and South-Eastern Asia), annual 1970-2011



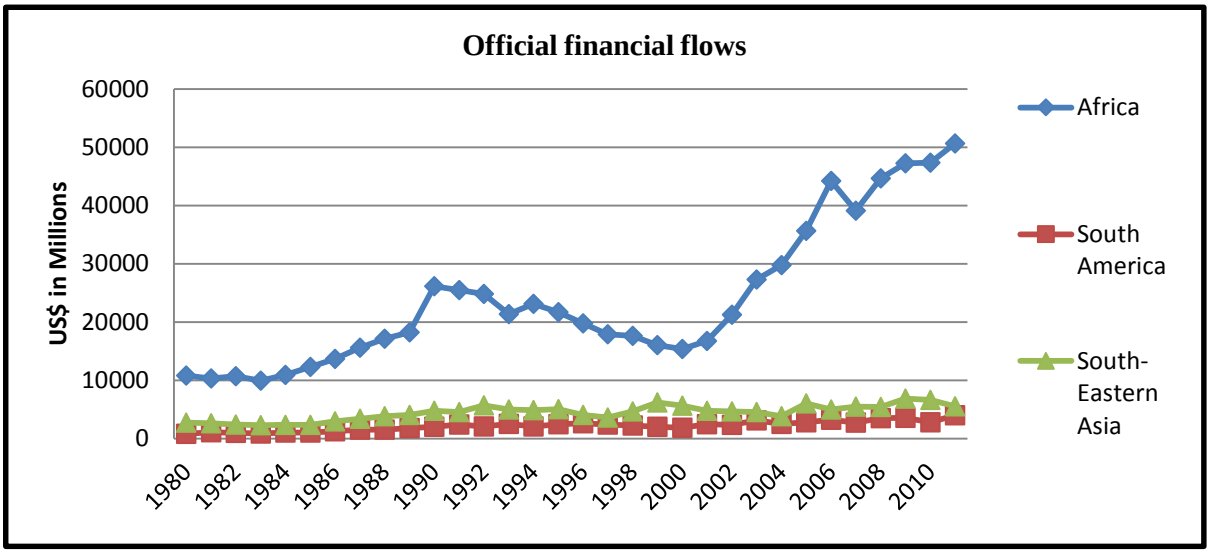
Source: UNCTADstat, 2014

For instance, according UNCTAD (2014), Africa's debt was US$279,097 million and US$305,017 million in 2010 and 2011 respectively. Latin America had higher rates of debt, US$ 563,740 in 2010 and US$ 655,744 in 2011; while southern and eastern Asia US$ 362,486million and US$384,622 in 2010 and 2011 respectively. The ODA to Africa in 2010 was US$ 47,372.3 million and US$ 50,649.8 million 2011 marking an annual increase of about 7 per cent. Comparing to the Latin America (US$ 2,806.9 million in 2010 and US$ 3,992.9 million in 2011) and for South-Eastern Asia was 6,649 million in 2010 decreasing to US$ 5,540.2 million in 2011.

The recent economic growth in the continent is attributed in oil production, mining, agriculture and services. The increase in global commodity prices in the recent decade, has really boosted the persistent growth in the region with resource rich countries benefiting more than those that are less endowed in natural resources. Even the regional economic growth differences in the continent are based on the differences in natural resources endowment and in political and social stability. Moreover, examining the export prices relative to import prices (terms of trade)

which shows the purchasing power of an economy, many economies in the continent saw their terms of trade changing in the 2000s due to the rise in commodity prices (AFDB, 2013).

Figure 5: Africa, South America and Southern East Asia: Total official development assistance net from 1980 to 2011



Source: UNCTADstat, 2014

Service sector which has been so weak in African trade structure has currently been picking up and it is becoming more diversified, from the traditional transport, trade, public administration and real estate, to include information and telecommunication, financial services, insurance services and tourism. Additionally, manufacturing sector is also growing at promising pace, most important is that it takes a large share of the intra-African trade though relatively still of small scale contributing about 10 per cent of the Africa's GDP.

Global economic and regional environment improvements, relatively high commodity prices, easing infrastructural constraints, and increasing trade and investment ties with emerging economies, especially China are among other factors that account for the recent economic growths in the continent. Besides Africa's increasing domestic demand particularly from a growing class of new consumers associated with urbanization and rising incomes also give rise to the robust growths in Africa. Moreover, the continent experiences improvements in

economic governance and management which should also translate into sustained growth. A moderate growth recovery in 2014 in emerging and developing countries, led by China, and projected improvement in major developed economies should also stimulate growth in Africa, through increased trade, investment and capital flows (UNCTAD, 2014).

2.3 Trade policy reform in Africa

As pointed out earlier, from mid 1990s Africa has seen a substantial progress towards its participation in the world trade; partly this was due to its reduction in trade tariff, non-tariff measures and other trade barriers towards international trade. By lowering its barriers, Africa has seen a remarkable change in its trade patterns away from dependence on commodity exports to much greater reliance on manufactures and services (Martin, 2003). The use of tariff in African countries has their trace back to the period before independence whereas tariffs as an instrument of trade policy were the major device for generating revenue for colonial governments. For some other countries this strategy continued to be used even after attaining their political independence, whereas it has been serving as a way for balance of payments adjustments.

During the period before independence, many African countries' trade policies were formulated in line with their respective colonials trade policies, mainly aimed at promoting and regulating trade to serve the interests of a metropolitan country. The prime emphasis was to forge and strengthen trade ties with the metropolitan countries; hence anything to do with foreign trade was monopolized by the colonial masters (Lyakurwa, 1991). Any importation from a country other than the metropolitan country required a specific license followed with tariffs. For many of these countries this practice became relaxed only after their political independence, whereas countries sought to loosen their trade ties with the metropolitan countries.

In the 1950s to 1960s many of the developing countries including African countries resorted to import substitutions policy as a gate way for industrialization process. The policy was meant to protect their infant industries while stimulating their newly growing economies. Even during this period, and for the successful adoption of import substitution policy, tariff policies played a pivotal role in many of the African countries. The primary goal of import substitution was to encourage the relatively simple step of assembling foreign parts hoping that with time more of these parts and intermediate products would be produced domestically (i.e. backward linkage). During this period, high priority was to purchase machinery and construction of new factories which meant excessive capital intensity with relatively little labor absorption (Salvatore, 1992; Lyakurwa, 1991). However the policy sustained for a very short time because due to the resultant extremely high rates of effective protection, domestic industries became ineffective as foreign currency value of inputs became greater than foreign currency value of output. Domestic industries could therefore not survive as consumers faced higher price rates.

However, the literature (Nash, 1993a) as well as the data (WorldBank, 2013)reveals that the economic performance of African economies in the 1960s and early 1970s was better than for the period after the mid-1970s world market turbulence. Nearly two third of the countries had higher per capita income than they did in 1980s and early 1990s. During these approximately two decades countries faced countless pressure from donor institutions and countries to adopt free market economy which, as mentioned earlier, went in together with deregulation, retrenchments, free trade and privatization of state owned institutions. This was the package designed for the reformation of countries in developing countries, to which Latin American countries fully adopted. Many of the African economies were reluctant to adopt these orthodox recipes and especially that of reducing the role of the state in the economic activities of these young economies, as a result the trade reforms in Africa proceeded gradually.

For many African countries, the progress in trade reforms has been more impressive in the 1990s than in 1970s and 1980s, nevertheless there were some variations from one country to another. Mauritius, Uganda and Ghana have been noted to be the leading aggressive reformers amongst African countries who have implemented most of the elements in the reform package. Lack of commitment in adopting adjustment programs especially trade policy for African governments, resulted into poor response to adjustments of the tradable good sector. Nonetheless the reluctance for adoption could be explained by the inappropriateness of the trade reforms to the African context in sense of poor design, sequencing of the reforms and inconsistency between the trade policy with other policies in these economies (Lyakurwa, 1991; Oyejide, 1998; Nash, 1993b).

2.3.1 Major components in the trade policy reforms

The trade policy reform processes in the African countries may be considered to have included three main components; policy reforms with respect of imports, exports and consequently how to deal with exchange rate issues to facilitate imports and exports. Countries faced different experiences during the designing and implementation of the trade policy reforms in the 1980s and 1990s. Below is an account of some salient features of export and import policies with some examples from African countries.

Exports policy: Since pre-colonial period exports represented an important sector in the economy, a sector that attract foreign currencies to finance imports. Before the structural adjustment programs in 1980's and 1990's, to many African countries, this sector was characterized by government control in all major commodity exports channels and there were export bans and licensing with implicit and explicit taxes on exports. For private exporters, the export procedures were very bureaucratic which were designed purposely to ensure export proceeds are repatriated. Any discussion of exports calls for a distinction of traditional and

non-traditional export commodities (Nash, 1993a; Katz, 1992; Barham et al., 1992). The traditional exports were mostly agricultural produce and minerals; these were directly controlled by state owned institutions such as marketing boards. These institutions were responsible for administering any direct or indirect taxes that was associated with exports. Reform efforts went together with making sure that these economies disentangle themselves from relying on traditional exports only, hence diversifying their exports to include the non-traditionally exports in the exports structure.

Countries like Nigeria had marketing boards for export products like cotton, cocoa, groundnuts, rubber, palm kernels, skins and wood. During the reforms, these marketing boards were abolished, besides export ban was imposed on the exports of skins, wood and palm kernels so as to encourage domestic processing. In 1987, Madagascar privatized the internal and external marketing of export crops as well as abolishing taxes on some export products remaining with cloves, vanilla and coffee (Nash, 1993b). For countries that relied on one or two export crops, reforms like abolishing the marketing boards was very slow. This was because by doing so it would mean a significant loss in the government revenue. So for countries such as Ghana which relied on cocoa, Uganda on coffee, Tanzania on coffee and sisal, and Cote d'Ivoire on coffee and cocoa; there were no efforts to privatize marketing boards for these crops. However, eventually reforms progressed gradually as for instance in 1990 Tanzania non-traditional exporters were allowed to retain 50 per cent of their foreign earning; while in 1992 Uganda allowed private exporters to compete with the state owned marketing boards.

From 1970s and 1980s as a way of accelerating the reforms, Africa countries which had for decades relied on traditional exports; had to do more in promoting non-traditional export crops. Countries like Ghana, Mauritius and Nigeria offered tax holiday, income tax refunds, depreciation allowances and special subsidies to private exporters. Kenya, Senegal, Tanzania

and Cote d'Ivoire also provided direct export subsidies based on the export value. These efforts were accompanied by a reduction in the bureaucratic system (lengthy delays) for private exporters such as shortening the export licensing or certification processing (Lyakurwa, 1991; Nash, 1993). A good example is Tanzania, where this delay took up to 6 months before the license was issued, with the Trade facilitation reforms in 1990s, the average waiting time for export license was now within one week.

Private exporters were facing another problem related to the foreign exchange system, whereas they had no direct access to foreign exchange. There were some restrictions on foreign exchange retention by private exporters, however with the reforms this changed gradually. Until 1992 in Uganda and Zambia exporters were allowed to retain and sell all their earnings, in Ghana depending on the export crop, they were allowed to retain 5 – 35 per cent of the earnings, 35 percent in Tanzania and 50 percent in Kenya. To encourage more exports and foreign direct investment (FDI) inflows many African countries liberalized their investment codes in the 1990s (Nash, 1993).

Import policy: Imports is another category that can explain the trade policy and the reforms in Africa for that matter. Imports were characterized by very high tariff rates as well as non-tariff measures like, import bans and restrictive import licensing system. In countries like Nigeria, Ghana and Tanzania the licensing system operated in conjunction with the exchange controls so that any steps taken to regulate imports licensing would involve regulating exchange allocation system. Tariffs were of very higher rates as for many of the African countries relied on revenue from these tariffs. Thus in times of balance of payment crises, exchange controls and non-tariff import controls were used as replacements. In 1980, Kenya removed the import bans and the *'non-objection certificates'* which required an importer to obtain a permission of competing domestic producers as a condition of getting import license.

Quantitative restrictions were evicted in 1986 to 1989 in Senegal and Cote d'Ivoire. These restrictions were used for products that were thought to be luxuries and those that could compete with domestic producers.

Reduction of tariffs was at the center of all trade policy reforms; however the implementation varied greatly for the African countries. According to Ancharaz (2003), for many countries in Africa therefore, these reforms have taken place in phases, and there are three notable phases; phase one was concerned with the rationalization of tariffs structure (for example the reduction of the spread between tariff rates on final goods and inputs from 40 per cent in 1985 to 25 percent in 1988 by Senegal, in Ghana and Nigeria the tariff structure was rationalized to 10, 20 and 30 per cent in early 1980s). The second involved the reduction of tariff dispersion (which entailed the reduction of high tariffs and increasing the lowest tariffs). The final phase is that of reducing the average tariffs.

Until the mid-2000s, most of the countries phase one and two were complete and phase three is still going on (Ancharaz, 2003; Dupasquier and Osakwe, 2006). Several factors determined the happening of these reforms, as well as the intensity of trade liberalization processes in general. The study by Ancharaz (2003) analyses these factors including a strong current account position; higher levels of urbanization (because urban people have a lobbying power and it is a political base for most of African countries); a relatively large manufacturing sector; larger aid flows in which package comes with the requirement for SAP, and economic crises. On the other hand factors such as heavy dependence on trade taxes as a source of government revenue, greater import competition, and a large government size reduced the probability of trade reform being adopted.

Table 2: Tariff rate, applied, simple mean for all products (%)

Region	1996 - 2009
SSA	15.1
World	8.8

Source: Author's computation of data from World Development Indicators, 2011

As depicted in table 2 above, despite the efforts initiated in 1980's, until 2009 most African countries, especially Sub Sahara African countries had an average tariff rates (15.1%) which are higher if compared to the world average rate (8.8%). This indicates there has been no substantial progress towards trade reforms and this confirms the claim of most analysts on trade policy in Africa that it is still protectionist relatively to the world and its trading partners and competitors(Sharer, 1999a; Osakwe, 2006).

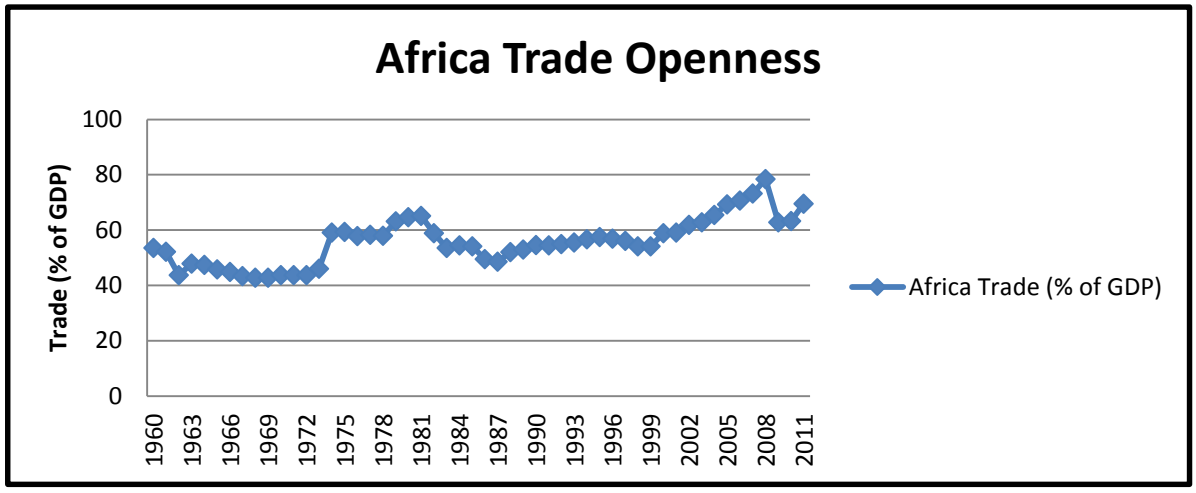
Nevertheless, it should be noted that tariff changes should be taken with caution as a country could achieve tariff reduction through making a tradeoff between using tariff barriers and non-tariff barriers, when the latter is opted, a country could be regarded as having a reduced tariff rate when it is actually not the case. Having this in mind one note that, despite the high tariff rates in African countries, core non-tariff barriers are relatively lower than other developing countries. Martin (2003) offers evidence about this fact by giving the non-tariff rates between 1995 and 1998, SSA (10.4%); East Asia and the Pacific (16.4%) and South Asia (58.3%). Even the most developed countries, the first world countries so to say, imposes some trade restrictions particularly on non-trading block members. The restrictions ranges from the importation of high-tech industries like aircraft industry, computer and data processing industry to the importation of automobiles, steel, textiles, agricultural products and consumer electronic products . These restrictions are imposed because these countries think that they need to protect employment and promoting growth in their respective countries. Efforts to limit these behavior

by the Uruguay round (1986-1991) which was preceded by Tokyo round (1974 – 1977) could not fully succeed (Salvatore, 1992).

From this account of African trade reform therefore, it can be deduced that the process has not been as smooth as it could be expected. Nash (1993) accounts for some reasons as to why the reforms were not easily adopted in these countries including the fact that they lacked ownership feeling by the African policy makers, a factor which is crucial for any successfully adjustment program. Besides, the unpreparedness of the African economies could also explain this fact. This is in terms of lack of proper institutional set up for the then economies, which led to weak organization of the proper personnel to enter into the broadly based policy dialogue and to implement whatever proposed measures. Moreover, the fact that by that time many of the African economies were under a quite different trade regimes characterized by tight foreign exchange controls, large overvaluation and heavy direct taxation on exportation sector (Nash, 1993b) could not guarantee a smooth and quick implementation of the trade reform.

However, despite the slow reforms in trade policy, it has been evidenced that African slow long term growth performance has been contributed much more by factors other than trade policy. Trade policy has played a very little role (probably on excessive taxations on exports only) in the retardation of Africa's growth performance, instead weakness on factors such as investment in human resources, fiscal policy, demography has been said to be fundamental in this (Rodrick, 1997). This is true because even for the leading reformers in Africa, Mauritius, Uganda, Ghana, Mali and Gambia, whose massive trade reforms boosted their trade volumes, yet they have neither reached their income per capita they had in the early 1970s nor have they recovered from long term of economic decline.

Figure 6: Trade openness trend in Africa 1960 to 2011



Source: ESDS database based on author manipulation, 2013

However, generally as can be seen in figure 6, Africa has seen a substantial progress towards its participation in the world trade; partly this was due to its liberalization in trade policy reforms. The level of trade has a stable increasing trend especially from the early 1990's, though slightly slow.

2.3.2 Current status of trade policies in the African countries

The current tariff rates for many of the African countries have been reduced significantly as compared to the period during and before 1990s. According to the World Bank data (see table 3 for the year 2009 and 2012) the country with lower rates of tariff is Mauritius with rates below 4 per cent and most of them are around 0.3 to 3.1 per cent. Some other countries with tariff rates lower than 10 per cent include South Africa, Botswana, Namibia, Mozambique and Morocco. This is a good indication of the change in the economic growth for Africa as with reduced barriers to trade, Africa can experience stable and sustained growth rates. Moreover for the majority of the countries tariff rates are around 10 to 13 per cent. Most of these recent

reduction in tariff rates is said to be multilateral in character as unilateral liberalization was normally reluctantly adopted (Brander and Spencer, 1992).

Table 3: Tariff rates by product for the African Countries for 2009 and 2012

Country	year	1	2	3	4	5	6	Country	year	1	2	3	4	5	6
Algeria	2009	14.2	14.5	14.2	8.6	7.8	8.9	*Mali*	2009	12.8	12.8	12.8	8.4	7.9	8.7
									2012	12.7	12.8	12.7	8.4	7.9	8.8
Angola	2009	7.4	11.6	6.8	7.4	13.9	5.9	*Mauritius*	2009	2.9	1.2	3.1	1.3	0.4	2.0
									2012	1.7	1.2	1.7	0.8	0.3	1.3
Botswana	2010	8.8	6.1	9.0	5.2	0.5	6.6	*Morocco*	2009	9.1	18.0	8.2	7.1	8.9	5.8
	2012	7.6	3.6	7.9	6.4	1.8	6.5		2012	4.6	13.2	3.7	3.4	5.2	2.2
Burkina Faso	2010	12.4	11.4	12.5	8.8	8.1	9.2	*Mozambique*	2009	7.7	8.2	7.6	4.5	4.4	4.5
	2012	12.3	11.3	12.4	8.4	7.5	9.0		2010	7.7	8.7	7.5	4.8	4.7	4.7
Cameroon	2009	18.4	20.5	18.1	15.0	12.9	15.9	*Namibia*	2009	6.5	5.7	6.7	1.8	2.1	1.7
	2012	18.9	21.6	18.5	12.7	9.4	14.2		2012	7.8	7.0	7.9	6.9	2.5	8.6
Chad	2009	17.6	22.5	16.8	14.7	17.2	13.8	*Nigeria*	2009	11.2	14.8	10.8	10.0	10.1	10.0
	2011	17.5	21.7	17.0	14.9	17.7	14.4		2010	10.9	11.8	10.7	10.6	9.1	10.8
Côte d'Ivoire	2009	13.2	15.3	12.9	6.4	4.1	9.8	*Senegal*	2009	13.4	14.1	13.3	8.4	7.0	10.4
	2012	12.9	15.1	12.5	6.8	5.0	9.2		2012	13.1	14.2	12.9	8.0	6.9	9.6
Dem. Rep. Congo	2009	12.9	14.2	12.6	11.0	10.8	11.1	*South Africa*	2009	7.5	5.1	7.8	3.9	1.6	5.3
									2012	7.1	4.3	7.5	4.2	0.9	5.8
Egypt	2009	12.6	37.6	9.4	8.1	6.4	9.5	*Sudan*	2009	13.4	15.9	13.1	7.9	7.7	7.9
									2011	13.3	16.6	12.9	14.7	10.8	15.8
Ethiopia	2009	18.1	19.2	18.0	9.7	5.6	12.8	*Tanzania*	2009	11.7	16.4	11.2	10.8	14.9	10.0
	2012	18.1	19.6	17.9	10.3	5.8	12.9		2012	12.3	16.8	11.9	11.5	12.8	11.4
Ghana	2009	13.0	16.6	12.5	8.6	8.9	8.4	*Uganda*	2009	12.3	15.6	11.8	8.4	8.5	8.4
	2012								2012	12.0	15.6	11.5	6.7	6.2	6.9
Kenya	2009	12.1	16.2	11.6	7.5	8.4	6.7	*Zambia*	2009	10.8	9.2	11.0	3.8	3.1	4.2
	2012	12.0	16.2	11.5	10.5	11.9	10.3		2012	9.8	7.1	10.1	4.1	2.7	4.3

Source: World Development Indicators, 2014

Where; 1 = Tariff rate, applied, simple mean, all products (%)
2 = Tariff rate, applied, simple mean, primary products (%)
3 = Tariff rate, applied, simple mean, manufactured products (%)
4 = Tariff rate, applied, weighted mean, all products (%)
5 = Tariff rate, applied, weighted mean, primary products (%)
6 = Tariff rate, applied, weighted mean, manufactured products (%)

In spite of the fact that Africa might have succeeded to liberalize its trade policy by making sure it lowers its rates of tariffs through the regional economic groups; there are still huddles to take care of. There are cases of the non-tariff measures (NMT) in most of the countries that need to be dealt with. The Nigerian trade policy for instance, in order to protect existing domestic industries and reduce the countries perceived dependence on imports, there is a prohibition of importation of 24 groups of items. They comprise a range of food products, certain medicines, industrial products such as glass bottles and textile fabrics and consumer

products including footwear and furniture. The justification for the ban is for preventing importation of all products that can be produced within.

Another example is the case of countries in the East African community, where based on the sanitary and phytosanitary (SPS), the trade policy has a set of standards that guide the EAC diary sector. This is based on the fact that considering the technological level of the region, the consumption of raw milk could be dangerous health wise. Thus by regulating the production and transport of dairy products the region ensures itself that it can protect the population health across the region (Jensen et al., 2010). There are also measures that poses restrictions on importation of goods based on the maintaining product standards, they are however bringing nuisance to consumers because of the inadequate capacity by governments to handle the set procedures that ensures standards are met.

For example, it is a requirement that all imports and exports of food products in Tanzania must undergo mandatory testing for radiation contamination by the Tanzania Atomic Energy Commission (TAEC), while the TAEC has the capacity to test only ten to fifteen samples per day hence causing unnecessary delays hence leading to higher prices to consumers. Another example is the case of fertilisers in Zambia and Kenya. Traders in Zambia are required to submit fertiliser samples to the Bureau of Standards three months prior to shipment arrival even though quality certificates are never actually issued. In case of Kenya each shipment of imported fertiliser must carry a quality certificate from the exporting country's bureau of standards and is further subjected to pre-shipment inspection (Cadot and Gourdon, 2011).

2.4 Income and regional disparity among African economies

An account of regional differences in the African continent is inevitable to any analysis of economic development considering the heterogeneity nature of African economies. The continent is quite diverse; there are differences on natural resources endowments regional wise

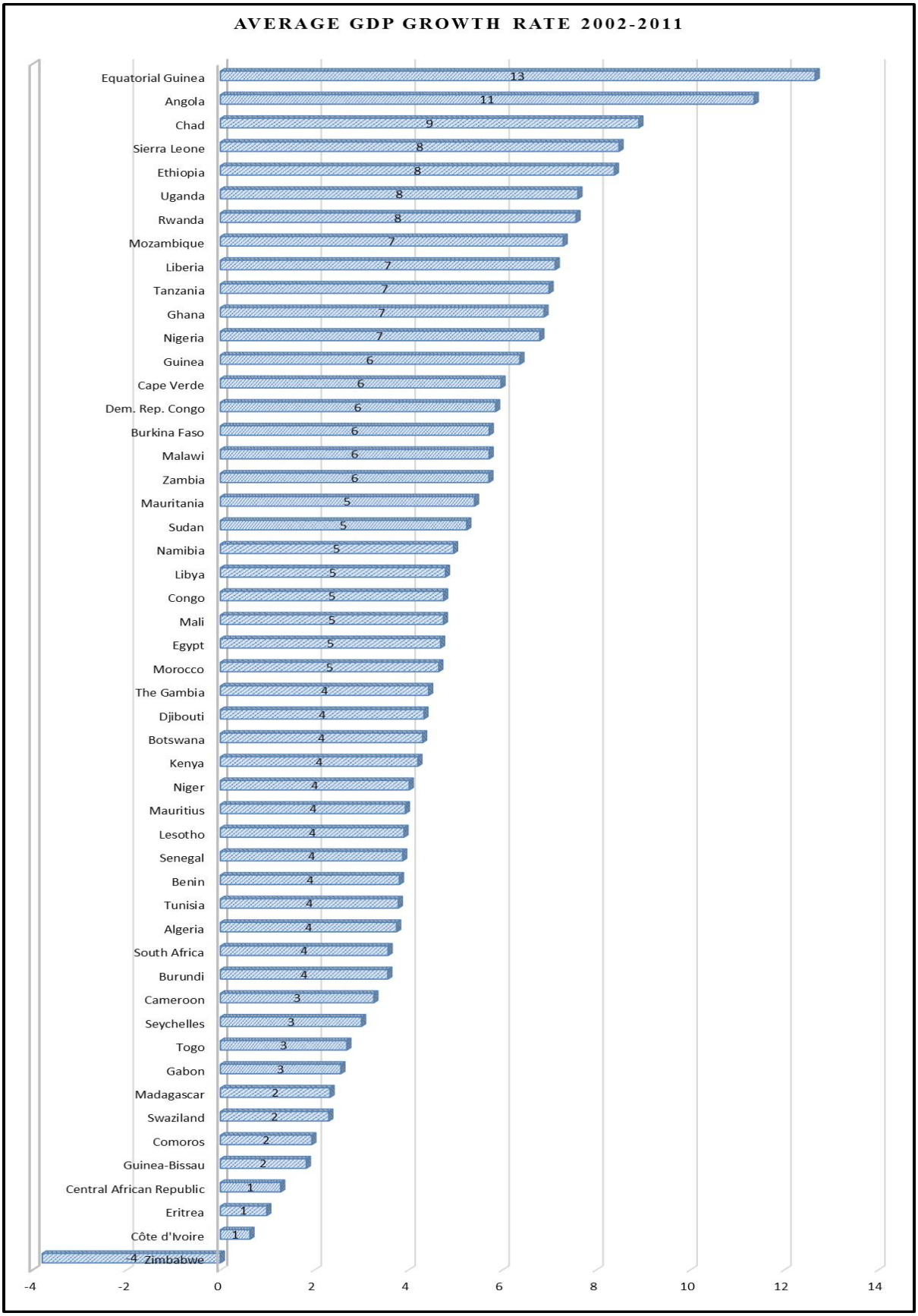
and even country wise, differences in the rates of economic growth (annual GDP growth) as can be seen in figure 7 below. There is also diversity in the GDP per capita (Constant 2000 US$) from one country to another, which ranges from less than $200 to $8800 (World Bank, 2014), the Democratic Republic of Congo being the country with lowest GDP per capita of about US$105 and Seychelles the highest GDP per capita of US$ 8,788.

Similarly, there are differences across the continent in the exposure to developments in the various regions of the world; for instance, countries in the northern part of Africa depend much on the European market hence they are more exposed to weaknesses of the European economy (e.g. crises in the euro area) than the rest of African countries. There is an even great variation within the region in terms of trade which is influenced by factors like trade policies, natural resource endowments, economic size, geography and levels of income (Rodrick, 1997).That is why it has been suggested that any discussion of African economy should take into account the differences among countries, in levels of development, economic structure, and political and social environment (Darley, 2012).

The continent has the largest number of landlocked countries than any other region in the world. This is because it has the largest number of countries per square area with each sharing borders with an average of four neighbours, ranging from 1 to 9 borders (Broadman, 2007) as it can also be seen in column 16 of table 4 below.

Economically, just two countries Nigeria and South Africa accounts for about 55 percent of the continents economic activities. Ghana, Nigeria, Mozambique and Tanzania are among 15 countries that experience a sustained economic growth in the last decade. There are 13 countries with about one-fifth of the continents population that have experienced little or negative GDP per capita growth. Table 4 gives a snapshot of this diversity considering various factors relevant for economic, social and political development.

Figure 7: Diversity in Africa's development pattern (GDP growth rates from 2002to 2011)



Source: World Bank Development indicators, 2014

Table 4: A snapshot of the heterogeneity of the African continent as at 2010

	Av. GDP growth 2002-'10	GDP per capita, (constant 2000$)	Agriculture (% of GDP)	Industry (% of GDP) [7]	Manufacturing (% of GDP)	Merchandise trade (% of GDP)	Services (% of GDP)	Conflict affected	Population density (people/ sq. km)	Surface area '000 (sq. km)	Population, million	Export product diversification index[8]	Oil producers	Landlocked	No.of borders
Algeria	3.8	2232	6.9	62.1	..	52.3	31.0	√	14.9	2382	35.5	0.8			6
Angola	11.4	1369	9.8	59.9	6.1	105.3	30.2		15.3	1247	19.1	0.8	√		3
Benin	3.8	377	..	..	..	42.3	..		80.0	113	8.8	0.8			4
Botswana	4.3	4190	2.5	45.0	4.0	73.0	52.5		3.5	582	2.0	0.9		√	2
Burkina Faso	5.7	283	..	..	..	..	..		60.2	274	16.5	0.8		√	6
Burundi	3.6	138	35.2	18.3	10.5	42.7	46.6		326.4	28	8.4	0.8		√	3
Cameroon	3.3	714	..	..	..	61.0	..		41.5	475	19.6	0.7			6
Cape Verde	6.0	1959	9.9	18.0	..	105.7	72.1		123.1	4	0.5	0.7			0
Cent. A.R.	1.3	240	..	..	..	..	..	√	7.1	623	4.4	0.4		√	5
Chad	8.9	300	..	..	..	100.0	..		8.9	1284	11.2	0.8	√	√	5
Comoros	1.9	336	..	..	..	..	..		394.8	2	0.7	0.8			0
Congo	4.8	1253	3.8	75.4	3.8	139.8	20.8		11.8	342	4.0	0.8	√		4
Côte d'Ivoire	0.6	588	22.8	27.2	19.1	76.7	50.0		62.1	322	19.7	0.7			5
D.R.C	5.9	106	..	..	..	64.9	..	√	29.1	2345	66.0	0.8		√	9
Djibouti	4.3	..	..	..	..	..	..		38.3	23	0.9	0.6			3
Egypt	4.7	1976	14.0	37.5	15.8	47.5	48.5	√	81.5	1001	81.1	0.6			2
Eq. Guinea	12.7	8537	..	..	..	..	..		25.0	28	0.7	0.7	√		2
Eritrea	1.0	147	..	..	..	..	..		52.0	118	5.3	0.7			3
Ethiopia	8.4	221	47.7	14.3	5.3	44.0	38.0		83.0	1104	82.9	0.8		√	5
Gabon	2.6	4214	4.1	59.4	3.5	97.3	36.5		5.8	268	1.5	0.8	√		3
Ghana	6.9	360	29.9	18.6	6.8	70.6	51.4		107.2	239	24.4	0.8			3
Guinea	6.4	550	13.0	47.2	4.7	74.1	39.4		40.6	246	10.0	0.8			6
Guinea-Bissau	1.8	161	..	..	..	..	..		53.9	36	1.5	0.8			2
Kenya	4.2	469	25.2	19.8	11.4	65.4	55.0		71.2	580	40.5	0.6			5
Lesotho	3.9	496	8.6	31.9	12.8	157.7	59.5		71.5	30	2.2	0.9		√	1
Liberia	7.1	261	..	..	..	134.5	..	√	41.5	111	4.0	0.7			3
Libya	4.8	..	..	..	..	..	..		3.6	1760	6.4	0.8			6
Madagascar	2.3	243	..	..	..	..	..		35.6	587	20.7	0.7			0
Malawi	5.7	185	..	..	..	77.8	..		158.4	118	14.9	0.8		√	3
Mali	4.7	273	..	..	..	..	..	√	12.6	1240	15.4	0.9		√	7
Mauritania	5.4	609	17.2	43.9	3.7	135.6	38.9	√	3.4	1031	3.5	0.8			4
Mauritius	3.9	5181	3.7	27.0	18.0	116.3	69.4		631.0	2	1.3	0.7			0
Morocco	4.6	1875	15.4	29.7	15.3	75.9	55.0		71.6	447	32.0	0.7			2
Mozambique	7.3	384	31.9	23.4	13.1	71.3	44.8		29.7	799	23.4	0.8			5
Namibia	5.0	2696	7.5	19.6	7.7	83.9	72.9		2.8	824	2.3	0.8			5
Niger	4.0	179	..	..	..	..	..	√	12.3	1267	15.5	0.8		√	8
Nigeria	6.8	540	..	..	..	69.1	..	√	173.9	924	158	0.8	√		3
Rwanda	7.6	337	32.2	15.0	6.6	41.5	52.8	√	430.6	26	10.6	0.8		√	4
Senegal	3.9	562	17.4	22.4	13.3	67.8	60.3		64.6	197	12.4	0.8			5
Seychelles	3.0	8788	..	..	..	..	..		188.1	0	0.1	0.8			0
Sierra Leone	8.5	268	49.0	20.7	..	46.6	30.4		81.9	72	5.9	0.7			2
South Africa	3.6	3753	2.5	30.8	14.7	54.9	66.7		41.2	1219	50.0	0.6			6
Sudan	5.2	679	23.6	33.0	5.6	38.7	43.3	√	14.1	2506	33.6	0.8	√		7
Swaziland	2.3	1811	8.0	46.5	41.7	123.0	45.5	√	61.4	17	1.1	0.7		√	1
Tanzania	7.0	445	28.1	25.5	9.6	63.8	46.5		50.6	947	44.8	0.8			8
The Gambia	4.4	704	28.5	12.3	4.7	60.8	59.3		172.8	11	1.7	0.7			1
Togo	2.7	265	42.8	15.7	7.9	91.1	41.5		110.8	57	6.0	0.7			3
Tunisia	3.8	3144	8.0	32.3	18.0	102.8	59.7	√	67.9	164	10.5	0.5			2
Uganda	7.6	380	24.3	25.5	8.3	57.7	50.3	√	169.6	241	33.4	0.7		√	5
Zambia	5.7	432	9.2	37.2	9.2	79.1	53.6		17.4	753	12.9	0.9		√	8
Zimbabwe	-3.8	321	16.0	26.8	13.7	126.3	57.2		32.5	391	12.6	0.8		√	5

Sources: World Bank Development Indicators, 2013, and world conflict map
Note: *D.R.C.* represents Democratic Republic of Congo, and *Cent. A. R.* represents Central African Republic

Globally, Africa has a relatively large number of economies that depend on natural resources; it is argued that one third of the world's resource dependent economies belong to Africa. Rent

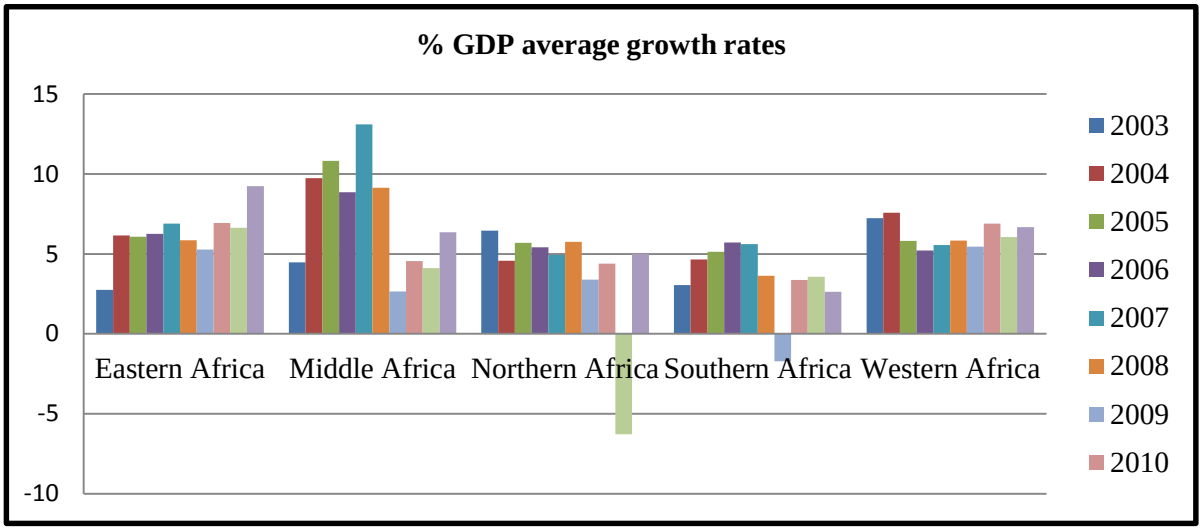
[7] Industry excluding manufacturing (e.g. construction)
[8]The diversification index measures the extent to which country's exports are diversified. It ranges from 0 to 10, the higher the index indicates that exports are more diversified.

seeking behavior is therefore persistent in these economies which fuels corruption practices, this is based on the hypothesis that a resource boom in an economy strengthens rent seeking and civil conflict (Van der Ploeg, 2011; Sala-i-Martin and Subramanian, 2003; Frankel, 2010). This is true for African economies as most of them are characterized by weak institutions which induce corruption. As a result of this, despite the fact that they are resource rich economies they fail to successfully translate their depleting exhaustible resources into other productive assets for their respective economic growth. Consequently, countries are highly endowed in natural resources like the Democratic Republic of Congo have been experiencing civil wars for decades now, as a result have experienced little or negative GDP per capita growth for the last two decades.

The differences in natural resource endowments among African countries translate into economic growth gaps among these countries, this is because even the drivers of economic development like investment and trade follows the same lines of existing disparity. Hence the foreign direct investments flowing in Africa goes to those countries which are rich in natural resources (De Grauwe et al., 2012). This contributes to higher volumes of exports for these economies compared to those with poor natural resources or weather conditions or even those with unstable political conditions.

Figure 8 depicts the five regions in the continent and their annual GDP growth for the last decade. Higher GDP growth rates for the last three years (2010 to 2012) can be observed in North Africa, Eastern African and West African countries. Moreover, generally these two regions show persistent higher growth rates for the whole decade than any other region in the continent. These rates are expected to increase with the new discoveries of natural resources in the east African countries, particularly Uganda (oil), Mozambique (gas), Kenya (oil) and Tanzania (gas).

Figure 8: African GDP growth rates by regions from 2003 to 2010



Source: UNCTADstat, 2014

The other three regions shows effects of the recent global economic crisis as there are large declines on the GDP growth from 2009 in middle Africa and Southern Africa (especially South Africa) due to strong linkage to the global markets. Northern African countries which are mostly oil rich countries, also shows same declines from 2009, but more so and even negative rates in 2010 due to Libya's stoppage in oil production which reduced the oil exports in the region. Besides, northern African countries are predominantly oil producers, hence were affected with financial crisis which resulted into decreased demand in the world market and low prices.

2.4.1 Trade volumes in the African regions

Africa's trade structure particularly in terms of exports heavily depends on primary products, especially oil, agricultural produce and minerals. This is explained in the literature with its inadequate human capital (due to low education level) and abundant natural resources(Wood and Mayer, 2001). Compared to some other regions like Asia which are becoming more manufacturing oriented, Africa can be said to follow the Heckscher-Ohlin trade theory; it produces and exports those products with which it has a relatively large supply of their

resources. According to H-O theory, however, other factors that can explain this kind of trade pattern include, the country's particular technical advantage, government policies, transportation costs and varying distances among trading countries(Mayer and Wood, 1999; Wood and Mayer, 2001). These factors also do apply when considering the regional differences within African continent.

The dependence of primary commodities put Africa's trade performance vulnerable to global market prices for these commodities. Ever since 2009 the continent's primary export commodities have experienced an increase in their prices, especially petroleum products and minerals. It is argued (Broadman and Isik, 2007; AFDB, 2013) that this increase in commodity prices is attributed to the growth in demand by developing Asian countries (i.e. China and India). Nonetheless due to the disparities in natural resources explained above, this upsurge in commodity prices has benefited only those countries in Africa which are resource rich economies. Of these natural resources, oil petroleum and minerals are the leading for attracting foreign investors and so increasing the export volumes. Being vulnerable to commodity price movement in the global market therefore, from 1997 to 2003 alone commodity price increase resulted into an increase of the Gross Domestic Income of 7 percent (for Oil rich African countries), 2.3 per cent (for African metal exporters) and 2.1 per cent (for African agricultural exporters).

In 2011 Africa's global share of oil production was around 11 per cent, with major exporting countries being Nigeria (2.62 per cent), Algeria (2.52 per cent), Angola (2.31 per cent), Libya (0.85 per cent) and Egypt (0.80 per cent). During the same period, the continent's share of global natural gas production was 5.8 per cent, main exporters being Nigeria and Algeria. Africa's share in the global coal production was 3.3 per cent South Africa being the main Africa's exporter (UNCTAD, 2014).

Table 5: Top ten African export countries for 2012

Country	Total exports (US$)	% of African exports	Major export commodities
South Africa	114,440,000,000	14%	gold, diamonds, platinum, manufacturers
Nigeria	98,087,456,287	12%	petroleum and petroleum products, cocoa, rubber
Algeria	75,548,150,127	9%	capital goods, foodstuffs, consumer goods
Angola	71,871,233,332	9%	crude oil, diamonds, refined petroleum products
Libya	61,178,300,000	7%	crude oil, refined petroleum products, natural gas
Egypt	48,601,300,000	6%	crude oil and petroleum products, cotton, textiles
Morocco	32,338,634,875	4%	fish, clothing and textiles, electric components
Tunisia	22,147,758,861	3%	clothing, semi-finished goods and textiles
Ghana	16,802,810,000	2%	gold, cocoa, timber, tuna, bauxite, aluminum
Kenya	11,025,644,515	1%	tea, horticultural products, coffee

Source: World Bank Development indicators, 2014

Thus the top countries in the list of Africa's exporters (as in table 5 below) include mainly those countries with rich endowment in natural resources. In total these 10 countries accounted for 66 per cent of the total African exports in 2012. It is also worthy to note that for most of these countries, oil exports account for almost 90 per cent of each country's total exports. Exceptions are for those that oil is not the leading export commodity such as Ghana (Cocoa), Kenya (Tea), Tunisia (Clothing), Morocco (seafood) and South Africa (Gold-metal). South Africa is the major exporter of goods within the continent, predominantly manufactures which make up 86 per cent of its exports to African countries and 20 per cent of the country's total manufacturing exports. It is a country also that accounts for a high proportion of many African country exports and imports, mainly to and from the nearby landlocked countries like Malawi, Lesotho, Zimbabwe, Swaziland and Zambia (Edwards and Jenkins, 2014). Though, the involvement of China in African economy poses threat to South Africa's share in the region's market.

Africa's trade performance is however affected by the logistics quality in the region (Limao and Venables, 2001; Behar et al, 2013). Efforts are being done to improve important components of trade facilitation such as transit times, documentation, and ports and customs.

These are crucial components in the export performance as it has been argued that a one day reduction in inland travel times leads to a 9 per cent increase in exports (Freund and Rocha, 2010). Besides, large transit delays results into not meeting delivery targets hence negative impacts on economic growth. Noteworthy is that any improvement in transit times includes doing something on the institutional set up in an economy (i.e. border delays, road quality and competition and security). There are large construction projects going on in the African countries so as to improve the infrastructure sector. It is for this reason that the import components structure of many countries has a significant part of machinery and equipment and vehicles.

Studies on trade between regions of Africa indicate that the intra African trade is underperforming. Given the geographical proximity of the geographical regions in Africa, the cultural resemblance and the size of the economies, the gravity estimates shows that intra-regional trade is below the potential. The study by UNECA, AFDB and AUC (2010) reveal that the Western and Central African countries are trading only 43 per cent of what they can potentially do in the region. The study also indicates that the Eastern and Southern African countries are relatively doing better as they are trading 75 per cent of their potential trade.

Moreover, the UNCTADstat (2014) show that African exports are highly concentrated and largely depend on primary commodity exports. Therefore any diversification into new kinds of primary export products for these countries is automatically taken as a positive development for the economy. The most desirable diversification for the African countries is the diversification into manufactured goods because it is normally associated with higher and stable export earnings, job creation and development of new skills and infrastructure for the achievement of newer export goods (Osakwe, 2007).

Another worth noting fact is that the product composition of the Africa's exports is clustered geographically following the sub regions. While the eastern African countries dominate the agricultural products export, the southern African countries are mostly exporting non-oil mineral resources. The Central, Western and most of the northern African countries have high intensity of oil exports (Broadman and Isik, 2007; Drummond and Liu, 2013).

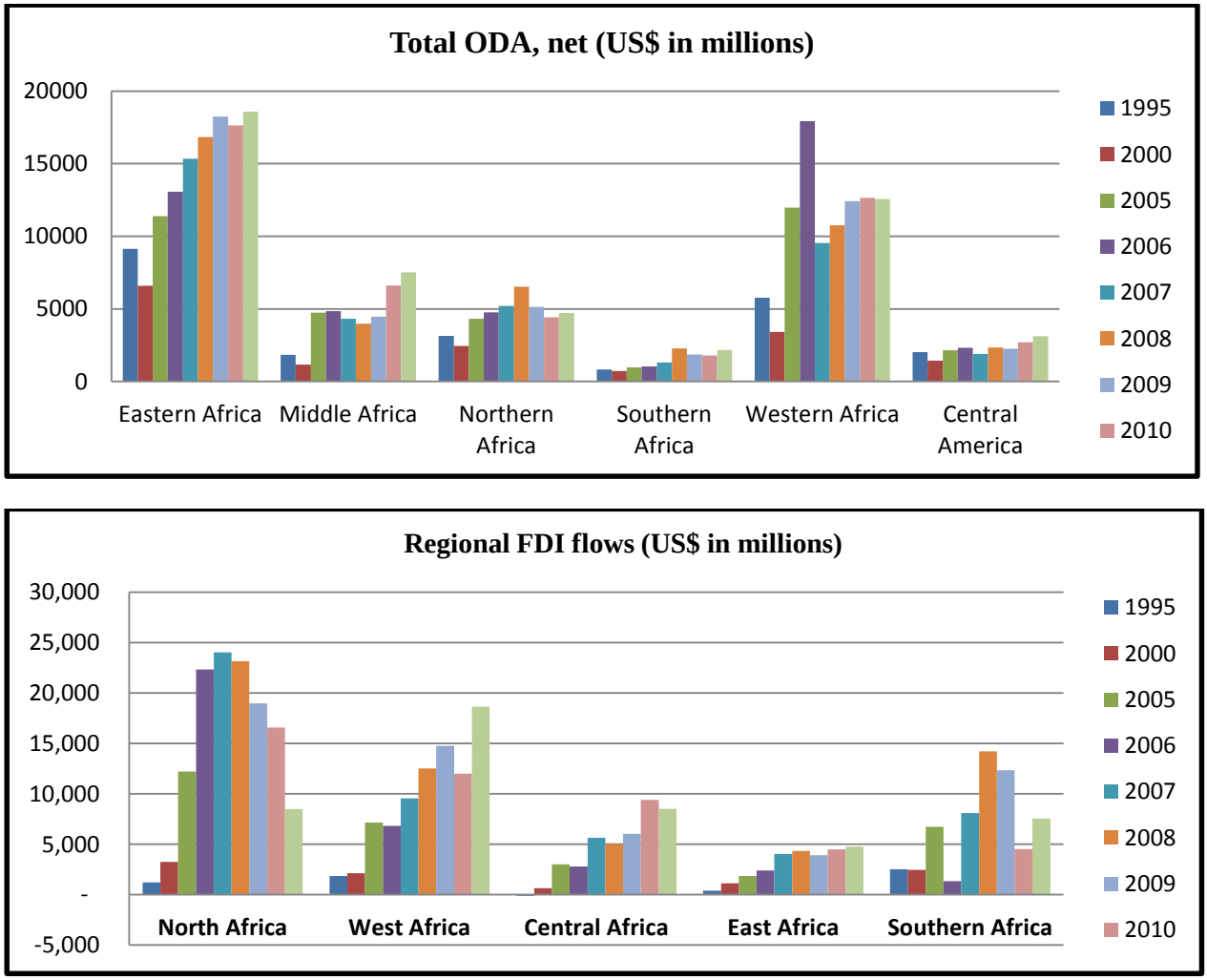
2.5 Investments: A review of FDI inflows trend in Africa

FDI has been the key element for African economic development efforts in the recent years, it is the driver for enhanced productivity and export levels, a means for acquiring new technology as well as provision of employment (Anyanwu, 2012). Where more than 50 per cent of the world FDI flows goes to North Africa and Western Europe, Africa accounts for 1.8 per cent of the world's net FDI flows. Over the last decade, the average annual growth rate of FDI flows in Africa was 17 per cent a little bit lower to that of Asia which was 20 per cent (Broadman and Isik, 2007). FDI as a percentage of GDP has been growing at a promising pace in the African countries despite the fact that just like trade, Anyanwu (2012) argues that FDI is also concentrated on natural resources (50 to 80 percent of FDI inflows has been going to natural resources extractions).

UNCTAD (2014) data shows that, though with some fluctuations, on average Africa has made rapid increases in FDI inflows over the last three decades. The continent's inward FDI flows rose from US$400 million in 1980, reaching US$2.8 billion in 1990 to US$9.6 billion in 2000; to a peak of US$58.9 billion in 2008. Due to financial and economic crisis FDI inflows in Africa dipped to S$52.9billion in 2009 and US$43. 6 billion in 2010 before peaking again at US$50 billion in 2012. By 2011, the largest recipients of FDI in Africa were Nigeria, South Africa and Ghana accounting for about 50 per cent of the total FDI inflows in Africa.

The top five recipients by 2013 were South Africa (US$ 8.2 billion), Mozambique (US$ 5.9 billion), Nigeria (US$ 5.7 billion), Egypt (US$ 5.6) and Angola (US$4.3 billion). Over the last two years there has been an increase in FDI flows in some other countries like Tanzania, Angola and Zambia to mention few. There is an argument in the literature that the FDI flows to Africa tend to follow the Official Development Assistance – ODA, that is, there is a positive and significant relationship between the official development assistance and the FDI (Yasin, 2005). However this is not the case with data from UNCTADstat as can be seen from the figure 9, while the major recipients of ODA are the Eastern African countries and the Western African countries, North Africa seem to be the major FDI destinations in the last decade.

Figure 9: **Africa's regional comparison of the ODA received and the FDI inflows**



Source: Researcher's manipulation of the data from UNCTADstat, 2014

With the growing discoveries of new natural resources like gas and oil ensures the continuing growth pace of FDI inflows in Africa. The predictions by the Economist Intelligence Unit (Economist Intelligence Unit, 2013) are that due to stable political environment and arising investment opportunities in oil and gas in Ghana, the country will experience a continual increase in FDI flows. Nigeria will also experience an increase in FDI flows due to its immense growth potential and the fact that it is the largest African consumer market. The EIU has estimated an annual net direct investment of Nigeria at US$ 11 billion by 2016.

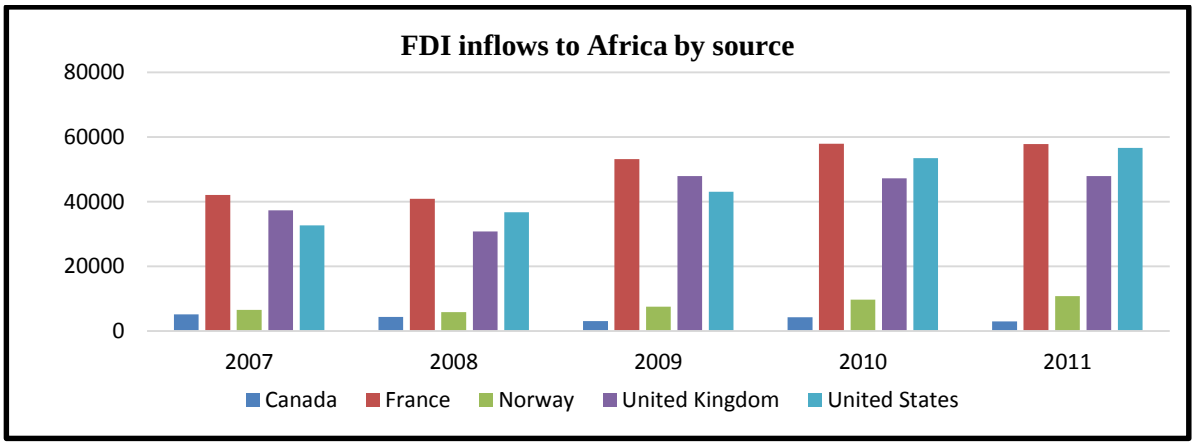
On the Eastern part of Africa, with sustained strong economic growth of about 7 per cent Tanzania has emerged as one of Sub-Saharan Africa's top FDI destinations, in 2011 alone it attracted over US$700 million of FDI inflows (EIU, 2013). Reasons being its sustained economic growth due to growth of mining industry and the increase in exports and high gold prices in the world market which enhance foreign exchange earnings. In the recent years the country has had high investments in infrastructure, high commitment in the implementation of key economic reforms as well as tightening monetary and fiscal policy so as to ensure inflation and exchange rates are stable (EIU, 2013). All these, plus the new discoveries of natural gas, are creating attractive opportunities and environment for the foreign investors.

The main sources of FDI inflows to Africa are United Kingdom and France (accounting 22 percent of the continent's FDI inflows) United States and Canada (accounting 68 percent of African FDI inflows), as well as Norway and the BRIC[9] countries whose influence in Africa has increased exorbitantly in the recent years. From developing countries, Africa has in the recent years experienced increased inflows in FDI from Malaysia, South Africa, China and India with the stock of $19 billion, $18 billion and $16 billion and $14 billion respectively in 2011 (Broadman and Isink, 2007). Malaysia has investments in all sectors across the continent,

[9] To include Brazil, China, South Africa, India

including agribusiness and finance particularly in East and West Africa. Thus the major interregional source of FDI in the continent is South Africa which is the second wealthiest country in the continent after Nigeria. With the coming of these new countries in the picture, FDI inflows in Africa are becoming more diversified. Of recent China and India have become among the front runners in investing in the continents, they are among the major five FDI source countries for Africa (Broadman and Isink, 2007).

Figure 10: Foreign Direct Investment flows to Africa by country of source in US$ millions



Source: OECD data, 2014

The contributing factors that encourage investors to Africa are the continent's riches in natural resources such as oil, minerals, gas and other primary commodities. Besides, due to the policy liberalisation that countries in Africa have undergone is another factor. A good example is the flows FDI in financial and automotive sectors in South Africa which has been due to liberalization in the financial sector as well as the trade policies. Ghana, Tanzania, Angola to mention a few, have also attracted FDI in mining sector due to reforms in their national mining codes(UNCTAD, 2013b). This goes hand in hand with the fact that regulations guiding investments particularly FDI are no longer bureaucratic in many of the African countries (e.g. Tanzania, Ghana and Senegal).

However there are still some other efforts that are required of the Africa in order to sustainably continue with this pace of FDI inflows; there are several investment deterring factors like the ongoing political instability in DRC and Sudan. A reduction of higher rates of corruption is also an issue that need to be taken care of for Africa to continue receiving FDI sustainably. Kandiero and Chitiga (2006) note that comparing to other developing regions like Asia and Latin America, Africa is lagging behind in receiving FDI inflows because of the perception of high corruption, weak governance and poor infrastructure. On average Africa's share of global FDI inflows was 2.6 per cent (from 1980 to 89); 1.9 per cent (from1990 to 1999) and it was 3.2 per cent from 2000 to 2009 (Kandiero and Chitiga, 2006b). Comparing these same periods of time, the Asian region received FDI inflows 14.2 percent, 19.1 percent, and 19.1 percent of total global inflows, respectively (Anyanwu, 2011). Some other reasons that hinders includes lack of adequate skilled human capital, unstable infrastructure and higher tariff rates, as well as the inefficient financial system in many African countries (Darley, 2012).

Data from the UNCTAD (2013) show that in 2012 FDI inflows grew at 5 per cent over the previous year. However the growth differed among different African regions, Northern Africa, Central Africa and Eastern Africa experienced higher growth rates, while FDI flows declined in West Africa and Southern Africa. In *North Africa* FDI flows rose by 35 per cent to US$16.62 billion in 2012 due to a rise in investments in Egypt, it attracted net investment inflows of US$2.8 billion in 2012. However in 2013, the region's FDI fell to US$15.49 billion due to political unrest in Egypt. *Central African countries* experienced an increase in FDI inflows by 23 per cent on the previous year, which were contributed much by an increase in FDI flows to the Democratic Republic of the Congo, where inward FDI flows flew from $1.7 billion to US$3.3 billion. Due to recent discoveries of natural resource in the *East African countries*, FDI inflows increased from US$ 4.8 billion in 2011 to US$6.2 billion in 2013, this being to large extent the recent investments in gas reserves in Tanzania and Oil fields in Uganda. In 2013 FDI

flows to Southern Africa countries doubled relative to the 2012. (See table 6 for more detailed analysis).

Table 6: FDI inflows by regions of the World (in billion US$)

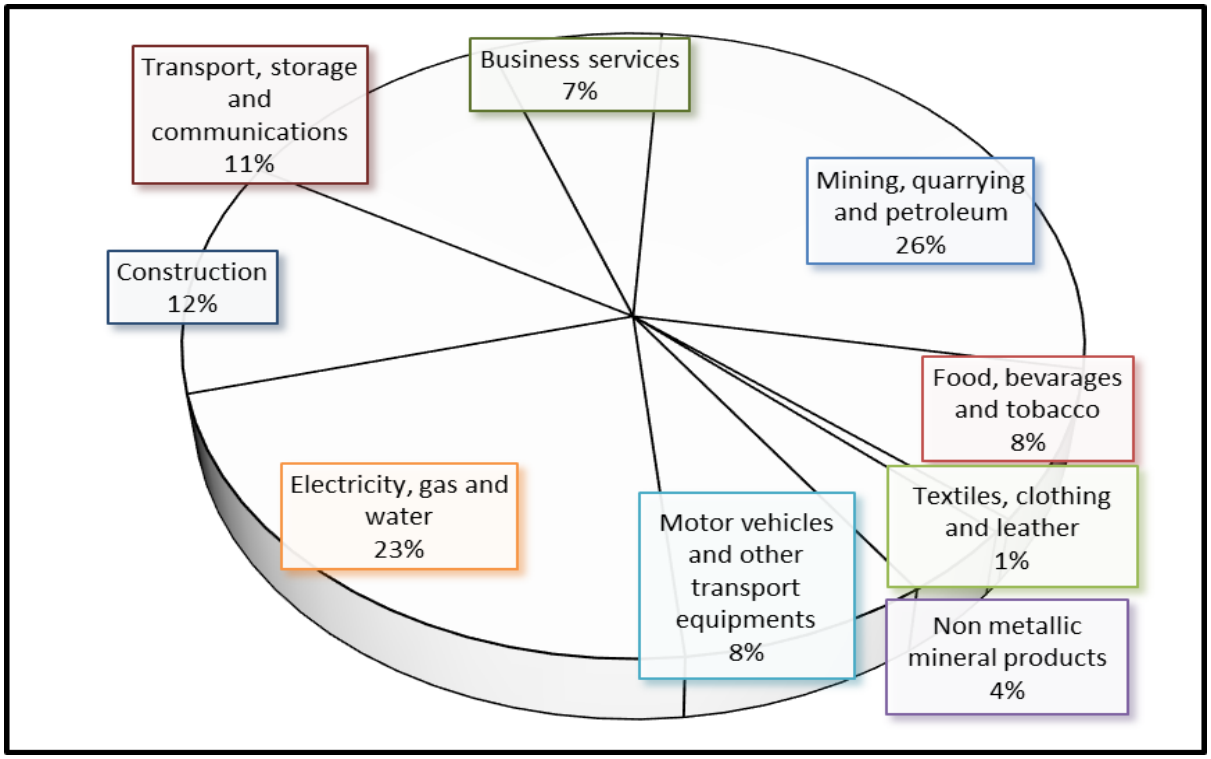
	1990-'99	2000-09	2010	2011	2012	2013
World	**403.15**	**1174.44**	**1422.25**	**1700.08**	**1330.27**	**1451.97**
Developed economies	**279.95**	**758.96**	**703.47**	**880.41**	**516.66**	**565.63**
Developing economies	**119.17**	**371.40**	**648.21**	**724.84**	**729.45**	**778.37**
Africa	**6.75**	**31.30**	**47.03**	**48.02**	**55.18**	**57.24**
North Africa	*2.01*	*12.49*	*16.58*	*8.51*	*16.62*	*15.49*
West Africa	*2.13*	*6.50*	*12.02*	*18.65*	*16.58*	*14.20*
Central Africa	*0.13*	*3.16*	*9.39*	*8.53*	*9.90*	*8.17*
East Africa	*0.41*	*2.26*	*4.51*	*4.78*	*5.38*	*6.21*
Southern Africa	*2.06*	*6.89*	*4.53*	*7.56*	*6.70*	*13.17*
Asia	**70.15**	**229.86**	**409.02**	**430.62**	**415.11**	**426.35**
East and South-East Asia	**65.23**	**167.40**	**313.12**	**333.04**	**334.21**	**346.51**
Latin America and the Caribbean	**42.01**	**109.40**	**189.51**	**243.91**	**255.86**	**292.08**

Source: UNCTAD, FDI/TNC database, 2014

Despite the fact that for some decades the sectoral distribution on inward FDI stock as well as flows in Africa has been showing the resource seeking, there is a growing number of success stories of manufacturing FDI in Africa such as the automotive sector in South Africa, the leather industry in Ethiopia, the garment business in Lesotho and pharmaceuticals across East Africa (UNCTAD, 2013b).

According to the 2013 World investment report, the diversification has been boosted up by the sustained economic and population growth which attract market seeking kind of FDI especially in consumer-oriented industries such as finance, foods, tourism, transport, information and communication technology. Diversification in the FDI sourcing has enhanced the process of this diversion from resource extractive oriented to other sectors like telecommunication, service sector like banking and tourism. Besides, the intra-African investment however small it is, tends to go to services and manufacturing industries. The leading corporations are from such countries as South Africa, Kenya and Nigeria.

Figure 11: FDI inflows in Africa by industry in 2013



Source: Researcher's calculations of the World Investment Report data, 2014

2.5.1 Intra Africa FDI Outflows

Despite the share of intra African trade in the global trade being constant around 11 to 14 per cent over the last decade; it has however increased fourfold since 2000. This has been due to the increased intraregional investments done by emerging firms in the region. Such firms are Anglo Gold Ashanti, MTN, Bidvest, Shoprite, Pick'n'Pay Aspen Pharmacare and Naspers of South Africa (UNCTAD, 2014). These companies have investments in some neighbouring African countries in the telecommunications, mining and retail sector. Together these companies have doubled the South African outward FDI to US$ 5.6 billion.

Other companies include the Simba groups and Dangote of Nigeria, which are active in agriculture, cement and oil refining industries; Sonatrach of Algeria; Orascom of Egypt and Sameer group and Comcraft group of Kenya. These companies have investments in building materials, chemical industries, manufacturing, distribution, high tech, construction, transport

and financial services (UNCTAD, 2014). All together these intraregional investments have increased the outward FDI flows from Africa as well as intra-regional trade. According to World investment report by UNCTAD (2014), during the period of 2003 to 2008, intra Africa greenfield investment accounted of 10 percent of the total greenfield investments in the continent. Of this share, South Africa share was 3 per cent, Kenya (1 per cent) and Nigeria (1 per cent) and the rest of Africa (5 per cent). From 2009 to 2013, the average share of intra Africa greenfield investment rose up to 18 per cent (South Africa – 7 per cent, Nigeria – 2 per cent, Kenya- 3 per cent).

Of interest is that, unlike other foreign investments in Africa, many of the intra African investment projects are concentrated in either manufacturing or service sectors. 97 per cent of these are active in the non-primary sectors. They are active in building materials, electric and electronic equipment, retail industries, agro-processing, telecommunication and textiles (UNCTAD, 2014). These positive indicators for the continent provide an avenue for the future economic growth initiatives through the regional economic communities in Africa. This is for the reason that the interregional investments strengthen the bond between countries as these green field investments integrate smaller African economies into global production processes. African economies which are landlocked and the non-oil producers such as Lesotho, Rwanda, Burkina Faso and Guinea Bissau are not attractive to foreign multinational corporations which, in most cases, have their eyes on the those countries which are rich in natural resources. Besides, most of these economies are small countries with low per capita incomes and small population which means they are quite small markets for large multinational companies. The intra African FDI to these economies represents at least 30 per cent of their total FDI inflows; hence intra-regional investments are their vital source of foreign capital (UNCTAD, 2014).

2.6 Africa Regional Economic Groups.

Africa has several intra- and inter-regional economic and international trade traditions which are yet to be fully realized to its full potential. With this knowledge African leaders have always wanted to accelerate regional integration in the continent. The 1991 Abuja treaty provided for the setup of the African Economic Community (AEC) through coordinating, harmonising and progressively integrating the economic activities. It was also a realization of the fact that many of the African regional economic communities or inter-regional integration arrangements are in essence neighbourhood regional integration agreements. This is justifiable by the fact that these countries are poorly connected. Many roads, railways and air networks are not efficiently connected. Most of the transportation infrastructure is still designed following colonial patterns, which were meant to transport primary products to the port/harbour.

Until recently efforts are being made to rectify the poorly developed cross country connections, but again this is done between neighbouring countries. The resultant of which it becomes much easier to have trade agreements with the countries sharing borders than otherwise so as to reduce the transaction costs of trade. Whether these efforts can guarantee the future stronger integration of the continent as a whole, it remains to be a matter of how committed will the actors be.

The determination of government leaders in Africa is to strengthen these regional integration arrangements with the aim of having an African Union in the future through the existing regional economic communities (RECs). The current active regional economic groups in Africa include, ECOWAS, EAC, COMESA, SADC, SACU[10], WAEMU[11], IOC[12], and

[10] SACU is the Southern African Customs Union
[11] WAEMU is the West African Economic and Monetary Union
[12] IOC is the Indian Ocean Community

CEMAC[13]. One thing worth noting is that, despite their large in number, these arrangements are characterised with significant membership overlap. One country can be a member to more than two arrangements, sometimes with conflicting objectives and political motives in it (see table 7). For example the Democratic Republic of Congo is a member of CEMAC, SADC as well as ECCAS. This is what Broadman (2007) call "spaghetti bowl", a threatening factor which discourages some foreign investors to the continent. It is of course done bona fide by African countries, definitely as a way of speeding up their economic growth through intra-regional integration. But in most cases countries find that they are actually confusing foreign and domestic investors because they don't find it to be conducive hence ending up reducing the pace of its integration and trade.

However there are efforts currently going on to address this issue, the recent one includes the 2008 tripartite summit of the heads of state and governments of SADC, COMESA and EAC countries in Kampala, Uganda (Hartzenberg, 2012). The aim is to establish a Tripartite Free Trade Area bringing together 26 member states from the three regional economic communities. Though the challenge remain on the implementation process as many of these agreements in Africa has convincing political commitment but without effective implementation.

African integrations follow a linear market integration paradigm (Melo and Tsikata, 2014), a stepwise integration of goods, labour, capital markets and monetary and fiscal integration. They typically start with establishing a free trade area (FTA), followed by a customs union (CU), then a common market (CM) and finally economic and monetary union(EMU), integrating their monetary and fiscal matters so as to establish economic union (Hartzenberg, 2011).

[13] CEMAC is the Economic and Monetary Community of Central Africa

A ***Free Trade Area*** entails agreements between economies for the purpose of removing all trade in goods barriers within the member states. It is taken to be first stage of economic integration, where members enjoy a free or rather a reduced restrictions on trade. This type of arrangement is characterised with high degree of trade diversion chiefly if market information is not perfectly distributed throughout the respective market. RECs under this stage among the African RECs include the Common Market for Eastern and Southern Africa (COMESA), Southern African Development Community (SADC).

A ***Custom Union*** is regarded as the second stage in the linear market integration paradigm. As a higher stage of economic integration, at this stage the interdependence of economies increases, while making all efforts to eliminate the weaknesses of the FTA (trade diversion problems). At at this stage the member countries apply common external tariffs. Given the applicable common tariff structure member countries benefit because losses and gains due to imports and exports are reduced. RECs under this stage among the African RECs include the Southern African Customs Union (SACU) and the Economic and Monetary Community of Central Africa (CEMAC).

A ***Common Market*** is a third stage in the list, the main difference with the pervious stage (custom union) is that at this stage, there is free mobility of resources (factors of production) within the member countries. This stage is sometimes referred to a single market (i.e. free trade area + common external tariffs +free mobility of factors of production). The RECs closer to this stage among the African RECs include the East African Community (EAC).

An ***Economic and Monetary Union*** is the highest stage where member countries integrate their monetary and fiscal matters so as to strengthen their economic union. Each member country surrenders monetary power (central bank) for the union. Therefore at this stage

member countries have a single market plus a common monetary policy and sharing a common currency.

Table 7: Regional economic integrations in Africa

RTA Name	Date	Coverage	Initial goal	Status (2014)	Country members
Common Market for Eastern and Southern Africa (COMESA)	1994	Goods	CU	FTA	Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe.
East African Community (EAC)	2000	Goods and Services	EMU	CM	Kenya, Tanzania, Uganda, Burundi and Rwanda
Economic and Monetary Community of Central Africa (CEMAC)	1994	Goods	EMU	CU&MU	Cameroon, the Central Africa Republic, Chad, the Republic of Congo, Equatorial Guinea, Gabon, and Sao Tome & Principe.
Economic Community of West African States (ECOWAS)	1975	Goods	EMU	FTA	Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo
Southern African Customs Union (SACU)	1910	Goods	CU	CU	Botswana, Lesotho, Namibia, Swaziland, South Africa
Southern African Development Community (SADC)	1992	Goods	CM	FTA	Angola, Botswana, Congo DR, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe.
West African Economic and Monetary Union (WAEMU)	1994	Goods	CU	CU&MU	Benin, Burkina Faso, Cote d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo
Economic Community of Central African States (ECCAS)	1983	Goods	FTA	CU&MU	Angola, Burundi, Cameroon, Central African Rep., Chad, Congo-Republic of, DR Congo, Eq. Guinea, Gabon, Rwanda, Sao Tome & Principe

Source: World Trade Organisation (WTO), United Nations Economic Commission for Africa (2014).

Though not perfectly, CEMAC could be listed at this stage because it is a customs and monetary union agreement and the member countries use one single currency, the CEMAC franc which is pegged with the Euro. Besides the WAEMU member countries uses common currency known as western Africa CFA Franc also pegged with Euro.

2.6.1 Intra RECs trade in Africa

The importance of regional economic communities (RECs) cannot be undermined for the growth of international trade in any economy. The creation of trading blocs could simultaneously reduce tariffs so as to avoid trade diversion (Krugman, 1991). For some decades now, Africa has a relatively lower intra REC trade as compared to the rest of the world. In 1994 for instance, APEC (69.9 per cent); the ASEAN (21.2 per cent); NAFTA (47.6); EEA (68.6

per cent), EU (61.7 per cent); while UEMOA West Africa (12.0 per cent); SADC (6.7 per cent), ECOWAS (8 per cent), EAC (13.4 per cent) (. Though, these rates are not strictly comparable across groupings because the large variation could be explained well by the differences in the degree of development, size, and weight in international trade of the different countries of the groupings. Despite this explanation, it is surprising that the continent has embraced the importance of regional integration since independence and there is a good number of RECs, however this has not so far increased inter-regional trade significantly. The extent of intra-African trade is weaker than what it should have been given the common historical, social, cultural, and language characteristics shared by African countries (Hartzenberg, 2011).

Table 8: Intra REC exports from 1995 to 2012 (US$ in millions)

RECs	Average 1995-'02	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CEMAC	131.2	220.7	213.8	261.3	301.8	569.2	709.8	595.3	830.4	754.8	709.3
COMESA	1506.1	2138.8	2425.9	3398.5	4039.1	4709.3	6929.9	6832.7	8876.3	9332.2	9296.7
EAC	552.9	826.1	921.5	1133.3	1061.2	1411.7	1940.5	1798.8	2221.8	2594.7	3086.4
ECCAS	173.4	268.1	272.6	349.8	409.2	962.8	971.3	1037.8	1393.8	1061.8	990.0
ECOWAS	2593.2	3629.7	5078.9	6010.8	6566.2	7338.6	9872.0	8203.5	9782.5	10635.7	12529.9
IGAD	488.1	755.8	700.9	982.8	980.1	1148.2	1468.4	1418.9	1832.5	1999.9	2059.1
SACU	2540.9	3727.0	4454.4	3587.1	3459.7	4654.1	5274.1	5765.8	5024.0	5434.3	4176.0
SADC	6960.8	9359.5	11597.1	11230.9	12974.3	17139.8	20980.8	19443.2	22344.7	25791.8	24336.6
WAEMU	966.9	1363.4	1690.6	1716.9	1894.6	2113.1	2647.5	2295.4	2533.9	2645.2	3124.1

Source: UNCTADstat, 2014

Explanation to this could be the poor preparation of and lack of commitment to the regional agreements by most of the RECs in Africa. Other factors include similarity of production structure and traded goods, lack of adequate transportation infrastructure compounded by distance and land locked-ness of many of its countries, heavy reliance on trade taxes, lack of market information, the lack of adequate trade financing schemes at the regional level, dependence on few commodity exports which are essentially primary commodities, the low quality of bureaucracy, and lengthy trade-related procedures. More over trade among African

countries is very sensitive to political events and relationships among these countries. Any political misunderstanding between countries even if they belong in the same economic group/agreement, results into stoppage of any trade linkage.

Worth to note is that, the initiation of many of these regional economic groups are political ambitions, only later they translate to the implementation of regional integration agreements which in essence are designed to eliminate tariff and non-tariff barriers to smoothen trade. As a result on average only about 13 to 14 per cent of the continent's trade is done amongst African countries. Even though African intraregional trade flows have been generally low compared with other regions, over recent years there have been some growth trends. In the period between 2000 and 2012, the mean value for the intra-bloc exports within Africa was 19 percent in the EAC, 13 percent of total exports in SADC, 10 per cent of total exports in IGAD, 9 percent in ECOWAS, 7 per cent in SACU, 6 percent in COMESA, 2 per cent in CEMAC and 1 percent in ECCAS (UNCTAD, 2014).

In fact for almost all the RECs intra trade flows have increased, especially for the EAC (see table 8 and 9). In 2000 the intra-REC exports accounted for 18 percent of total exports in the EAC while it was 21 per cent in 2012. Nevertheless according to Hartzenberg,(2011). , for each REC, these exports are dominated by one or a few countries: for instance in 2009 67 per cent of the intra-regional exports in COMESA came from only four countries, Kenya (27 per cent), Egypt (18 per cent), Uganda (10 per cent), and Zambia (10 per cent); of the intra-regional exports in the EAC, 73 per cent were from Kenya; 62 percent of exports SADC were from South Africa; 77 percent of exports in ECOWAS were from only two countries Nigeria (45 per cent) and Côte d'Ivoire (32 per cent); and in ECCAS, 64 percent of exports came from Cameroon.

Unlike exports, in most of the blocs the imports as a percentage of total RECs imports shows a decreasing trend since 2000, this is possibly due to the integration of Asian countries,

specifically China. Most of Chinese firms are now utilising the African market, and in fact there has been an increase of importations from China in the last two decades.

Table 9: Intra REC exports as a percentage of total RECs exports 2000 to 2012

RECs	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CEMAC	1%	1%	2%	2%	1%	1%	1%	2%	2%	2%	2%	2%	2%
COMESA	5%	6%	6%	6%	5%	5%	5%	5%	5%	7%	7%	10%	7%
EAC	18%	17%	18%	19%	19%	19%	16%	18%	19%	19%	20%	20%	21%
ECCAS	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	1%	1%
ECOWAS	9%	10%	11%	10%	10%	10%	8%	8%	9%	10%	8%	6%	8%
IGAD	11%	11%	12%	12%	9%	10%	9%	7%	7%	8%	9%	10%	13%
SACU	7%	7%	8%	9%	8%	6%	6%	6%	6%	8%	5%	5%	4%
SADC	14%	14%	15%	15%	15%	12%	12%	12%	12%	15%	13%	12%	12%
WAEMU	15%	13%	12%	15%	15%	14%	14%	15%	15%	13%	12%	11%	14%

Source: UNCTADstat, 2014

The intra-EAC imports in 2000 was 13 per cent, by 2012 it has declined to 9 per cent. The same trend can be observed for IGAD countries declined by 2 per cent (from 9 per cent in 2000 to 7 per cent in 2012) and SADC in which imports declined by 4 per cent (see table 10 and 11)

Table 10: Intra REC imports as a percentage of total RECs imports 2000 to 2012

RECs	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CEMAC	3%	3%	4%	4%	4%	4%	4%	5%	4%	4%	4%	3%	3%
COMESA	5%	5%	6%	6%	5%	6%	6%	5%	6%	6%	7%	6%	6%
EAC	13%	12%	11%	12%	11%	10%	8%	8%	8%	9%	9%	8%	9%
ECCAS	2%	2%	3%	2%	2%	2%	2%	3%	2%	3%	3%	2%	2%
ECOWAS	12%	12%	13%	13%	13%	13%	12%	10%	11%	10%	10%	9%	10%
IGAD	9%	8%	7%	7%	5%	5%	5%	4%	4%	4%	5%	4%	4%
SACU	12%	12%	11%	11%	11%	8%	7%	7%	8%	10%	9%	7%	7%
SADC	19%	18%	19%	18%	18%	15%	14%	15%	16%	16%	16%	15%	15%
WAEMU	10%	11%	11%	12%	12%	10%	11%	9%	10%	10%	10%	10%	10%

Source: UNCTADstat, 2014

However for the same period the total imports, the intra-bloc imports have shown a growing trend. This means that although the percentage of intra bloc trade drop but the gross imports have increased for these countries which could be attributed to the growth in their incomes (purchasing power). Between 1995 and 2002, intra-REC imports averaged 9.5 US$ 8,469.9 million in SADC, US$1709.9 million in COMESA, US$ 736 million in the EAC, US$ 2,275.8

million in ECOWAS, and US$3,889million in SACU. In 2012, all the RECs experienced their imports increasing threefold though decreasing relative to the total imports of a respective economy (UNCTAD, 2014).

Noteworthy is also that for each REC, significant amount of these imports were destined to one country or a few countries. In the year 2009 for instance 66 per cent of imports in SADC were destined to South Africa (21 percent), Zambia (18 percent), Zimbabwe (17 percent), and Mozambique (11 percent); and in ECCAS, 52 percent of imports were destined to Gabon (29 percent) and Chad (24 percent); in COMESA, 47 percent of imports were destined to Sudan (13 percent), Democratic Republic of Congo (12 percent),Uganda (12 percent), and Egypt (11 percent); in the EAC, 67 percent of imports were destined to Uganda (40 percent) and Tanzania (27 percent); in ECOWAS, 58 percent of imports were destined to Cote d'Ivoire (23 percent), Ghana (23 percent), and Nigeria (12 percent) (Hartzenberg, 2011).

Table 11: Intra REC imports 1995 to 2012 (US$ in millions)

RECs	Average 1995-'02	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CEMAC	174.0	254.7	286.4	307.3	440.3	690.1	745.8	651.5	871.0	880.8	838.7
COMESA	1709.9	2313.9	2629.3	3946.2	4726.1	4850.0	6926.5	6804.4	8989.3	9135.7	10230.9
EAC	736.0	861.1	992.9	1228.7	1212.5	1597.3	2117.9	2066.5	2430.4	2781.1	3273.8
ECCAS	218.1	321.1	362.2	415.1	571.9	1022.8	1002.1	1198.1	1517.2	1161.7	1207.3
ECOWAS	2275.8	3385.4	4246.7	5416.6	6142.7	6471.9	9864.9	6919.8	8370.2	9320.9	10895.2
IGAD	671.0	797.4	783.1	1124.0	1203.8	1227.4	1578.2	1448.4	1779.8	1686.6	1650.7
SACU	3889.5	4986.9	6436.5	6021.4	6439.0	6686.8	9214.0	8877.4	9567.6	10242.6	9402.4
SADC	8469.9	11597.2	14239.1	15033.8	17004.9	20211.8	26750.2	23039.2	26786.0	31189.1	32042.0
WAEMU	741.8	1241.4	1498.8	1496.9	1700.7	1828.0	2555.6	2169.9	2380.1	2457.9	2918.4

Source: UNCTADstat, 2014

In the recent years, Africa has also seen the growth of cross-country investments/FDI. Most of these investments are on manufacturing and service sectors, whose share varies widely from one REC to another. However, with exception of SADC, the intra-REC investments in manufacturing and service sectors account for small percentage than it is for the investments from all other parts in Africa. For the period 2009 to 2013, on average about 37 per cent of all

the total FDI in ECOWAS countries were from Africa , 36 per cent in EAC; 18 per cent in ECCAS, 17 per cent in SADC, 15 per cent in COMESA and 1 per cent in UMA.

For these RECs to help boost up the continents economy through investment and trade, deliberate measures need to be taken by African leaders. Of recent there have been some efforts promote regional integration. If successful, the establishment of the tripartite free trade Agreement (FTA), will have remarkable impact on African economy. This is because it is designed to include together the three large RECs in the continent (COMESA, SADC and EAC) which will mean creating a market of a total of 26 African economies. The tripartite roadmap is provided in three phases, one is the implementation of the FTA for trade in goods and movements of business persons; second the discussion of infrastructure and industrial development which will also focus on the issues related to investments, services, intellectual rights, competition policy and trade development and competitiveness. Phase three will cover investment issues primarily on the aspects of tariff and non-tariff barriers to trade (UNCTAD, 2014).

Moreover, in 2012, a summit of African Union leaders endorsed a new action plan for the establishment of continental free trade area. All these will be a boost to the growing intra African investments which as a matter of fact diversifies the orientation of investments in the continent from the extractive- primary sectors to manufacturing, banking and business services, telecommunications and retail industries. Investment in these industries could benefit more from these efforts leave alone the enlarged market that will be a good avenue for the growth of these companies.

2.7 Conclusion

Africa's economic performance has been a discussion focal point in various literature, several research has been done on why Africa's trade has a relatively disappointing economic

performance over the past decades. While a trace of historical facts can explain a lot of this, specifically such factors as reliance on very few export commodities chiefly primary commodities, weak institutional capacities and governance disciplines and unreliable infrastructure has been taking the upper hand.

Until late 1990s many of the African economies were struggling with reforming their economic policies including trade policies. These efforts were for the purpose of going in tandem with the world economy which is market oriented. For most of these economies trade liberalization had to be taken to be the only economic struggle for growth, they forgot that it has to go together with some other reforms that serve to offset or dilute the consequences of trade liberalization. This could ensure that economies do not suffer from the negatives as well as avoiding trade becoming an outlier relative to other sectors in the economy.

Nevertheless, as a result of these efforts, there are a lot of good stories on Africa's economy today. The economic growth rates for many countries are higher than any other region in the world, nearly half of the economies, saw the growth rates of more than 5 per cent over the past two years. The intra-regional trade and investment continues to grow and becomes more diversified, though only few economies hosts the giant dynamic companies that are the main actors (i.e. South Africa, Nigeria, Kenya and Morocco).

The continent has a good number of regional economic communities which plays a role of enhancing investments and trade within the region. The only challenge is that these communities are yet to realize their full potential. For these RECs to help boost up the continents economy through investment and trade, deliberate measures need to be taken by African leaders. Of recent there have been some efforts promote regional integration. If successful, the establishment of the tripartite free trade agreement (FTA), will have remarkable impact on African economy. This is because it is designed to include together the three large

RECs in the continent (COMESA, SADC and EAC) which will mean creating a market of a total of 26 African economies. The significant challenge with these RECs is the financial difficulties as contribution from member states does not suffice, hence most of them rely to external donors like the EU for their survival. Hence they cannot perform their responsibilities independently and in time, even on issues like intervening in peace keeping in the event of conflict arising within member countries.

However there are lots of efforts that need to be done before Africa should experience sustainable economic growth. To be able to avoid setbacks from the commodity price volatility, countries in Africa need to embark on more diversification in their exports composition as commodity price volatility is external to these countries and it is actually beyond the scope of their domestic policies as they are price takers. To attract more trade and investment as well as industrialization which are very pertinent, structural transformation and improvement in infrastructure are inevitable. Also African economies need to fight weak institutional capacities and governance disciplines which results into undesirable discretionary behaviours and corruption.

CHAPTER THREE

INTERNATIONAL TRADE THEORIES AND THE GRAVITY MODEL

3.1 Introduction to trade theories

Trade is an exchange of goods and services and the associated payment settlements. It can be between two parties within the same national territory or across national borders. International trade is among the fastest growing economic activities in the world, it has great impact on the majority of countries' incomes. Trade accounts for a significant share of most countries' GDP, in 2007 it accounted for 57.3% of the global GDP. During the same year, the world merchandise exports were around 14 trillion dollars, while the world exports of commercial services were 3.5 trillion dollars (World Bank, 2011). Besides having economic influence, trade has global political and social influences; this is based on the fact that lots of today's negotiations and agreements have an implicit goal of trade. Hence the world tranquillity is partly attributed to trading activities going on in the world.

Economic theories on international trade provide explanations on the pattern and structure of global trade; they give answers to why economies trade what they do. The literature on international economics groups these theories in various ways; one of these is grouping theories into old (or classical) and new (or modern) trade theories (Sen, 2010; Brown et al., 1993; Morgan and Katsikeas, 1997; Harrison et al., 2000). The classical theories include all the variants of comparative advantage (Absolute advantage, Ricardian comparative advantage theory, factor proportion theory, specific factors theory and product life cycle theory).

Some other literature categorises into theories that explains the inter-industry trade (all variants of comparative advantage) and those that explains intra-industry trade which are based on product differentiation, economies of scale and increasing return to scale (Balassa, 1966, 1986b, a; Bernhofen, 1999; Webster, 2000; Havas, 2010; Brülhart, 2009; Brander, 1981).This

is the most used categorisation as it explains international trade in the light of the nature of the goods and services involved in the trading activity.

3.2 The Inter-Industry Trade Theories

Theories under this category include those that assume differences in production costs as a result of differences in productivities across countries are the reason behind trading activities. They also assert that cost differences are the result of differences in the availability of factors of production and endowments. These theories give the rationale for countries specializing in the production and exportation of certain kinds of goods while importing different kind of goods. They therefore fit in explaining the trade pattern between economies with dissimilar factor endowments such as between developed and developing countries (North-south trade).

Absolute advantage theory is the oldest in this category. The theory asserts that countries tend to specialize in producing and exporting those goods they can produce more cheaply and import those that they can produce at a higher 'real cost' relative to trading partners. With specialization each country shifts all its resources to the efficient industries and in that way increase the efficiency level. The result would be for the labour resource becoming more skilled (Webster, 2000; Robock and Simmonds, 1989). Labour was the only factor of production and hence any exchange of a commodity will have to base on the proportion of the labour hours required for its production (Dunn and Mutti, 2000). It is therefore expected with specializing in goods which have an absolute advantage that a country will be able to produce goods for its own consumption and subsequently exports the surplus (Morgan and Katsikeas, 1997). *Comparative advantage theory*, a basic Ricardian model explains the rationale for the existence of trade between countries based on their comparative advantage. A country has a comparative advantage in producing a good if the opportunity cost of producing that good in terms of other goods is lower in that country than it is in other countries (Krugman et al., 2012). According

to this theorem, even if a certain country has an absolute advantage in the production of both commodities, the less efficient commodity can be left aside for the country to gain from international trade. These differences on the opportunity costs among countries offer the possibility of a mutually beneficial relocation of world production. Therefore, with comparative advantage the decisive factor for which commodity to produce and export is not having an absolute advantage but rather the relative prices of the factor of production determined by an opportunity cost (Webster, 2000; Robock and Simmonds, 1989; Krugman and Obstfeld, 2003).

However, the gains from trade depends on the condition that, country's exports to another country falls short of the unit labour requirement the country need in order to produce a commodity it imports (Maneschi, 2004). Because the essence of the theory is based on the fact that, participation in international trade is not just the act of exchanging goods, but rather the consequence for production in both countries (Webster, 2000).

The theory is criticised on the grounds of its assumptions which cannot explain the many transactions that dominates today's global trade. Krugman, et al. (2012) points out some other shortfalls of the model; *first* the model expects an extreme degree of specialisation that is not there in the real world. *Second*, the model does not consider the fact that international trade has an effect on the distribution of income within countries, consequently the gains from trade cannot be said to be enjoyed equally for the country as a whole. *Third*, the model misses an important aspect in the trading system, the role of differences in resources among countries; it only considers the role of labour productivity as being the cause of trade between countries. *Fourth*, it does not consider the role of economies of scale as being the cause for countries to trade between each other; thus leaving it unable to explain why there exist large trade flows between apparently similar countries like Canada and USA for instance.

As limited as it is, the comparative advantage theory gives a good explanation of quite a good number of international trade transactions going on especially between developed countries and developing countries. This is based on the fact that, the two have dissimilar level of economic productivity. All the same, comparative theory does not give the idea as to how the differences in costs of production and prices of production factors arise, is just suggesting that such differences are the causes for the necessity of specialization and hence international trade (Robock and Simmonds, 1989). Factor Proportion theory takes that as its focal point, and attributes differences in comparative costs to factor endowment differences among countries.

Factor Proportion theory (Heckscher and Ohlin model) put much emphasis on the interchange between the proportions in which different factors of production are available in different countries and the proportions in which they are used in producing different goods (Krugman et al., 2012; Krugman and Obstfeld, 2003; Webster, 2000). The theory asserts that trade patterns in the world are explained by the differences in factor costs which differs across countries. It relates the bilateral trade flows between countries to differentials in their endowments (Baskaran et al., 2010).

Factor costs differences results from the differences in countries' endowments of one factor relative to their endowment in other factors. In a country where labour is abundant relative to land and capital, labour costs would be lower as compared to land and capital. Conversely, if labour were to be scarce, then it would be more expensive as compared to land costs and capital costs. According to this theory, it could be expected that countries would outshine in the production and exportation of products which uses their factor of production which is relative less costly as compared to some other factors (Daniels and Radebaugh, 1995). Consequently countries will be importing those commodities which require factors with which they are poorly endowed. Such kind of specialisation would lower their production costs while gaining from trade.

Hence the theory predicts that a country tends to be a net exporter of those goods that require factors with which they are abundantly endowed; whereas being net importers of those goods requiring factors with which they are poorly endowed (Baskaran et al., 2010; Wood and Mayer, 2001). This is because differences among countries on their factor endowment give rise to differences in the relative production costs between countries. While the differences in relative production costs gives rise to differences in pre trade prices and consequently generate trade between economies (Webster, 2000).

It can be seen here that this theory makes a continuation of the concept of comparative advantage by considering factor endowments and the costs of production, and probably is the most influential model of comparative advantage. According to Krugman et al (2012), it considers comparative advantage as being a result of the interaction between countries' resources (the relative abundance of factors of production) and the technology of production (which influences the relative intensity with which different factors of production are used in the production of different goods). The abundance in this theory is explained in relative terms rather than absolute, it is by comparing the ratio of one factor of production to another in both countries.

Though empirical tests tend to reject this model (Baskaran et al., 2010), it remains to be most logical and appealing theory for explaining the causal observation in the global production and exports particularly in the dissimilar economies case. Taking the case of Hong Kong, the most densely populated areas in the world, where relatively there are more people than the amount of land. In 1960s and 1970s, the most successful industries were those that used a technology which used little land as compared to number of people. It has for a long time specialised in the production of clothing which was housed in multi-storey factories where workers would share minimal space. Space limit could not allow her to compete in the production of

automobiles for instance, as they require much more space per worker (Daniels and Radebaugh, 1995). Faced with increased land rents and labour costs in 1980's she shifted most of her labour intensive factories to China mainland, where there was a large land mass and good for industrial activities. Today Hong Kong has become the largest trading centre in the world mainly on the part of re-exports, which again do not require much of her land size. It is a world's largest re-export centre for products manufactured in China mainland.

Early empirical criticism towards this theory was given by Wassily Leontief in 1954, with his input – output studies of American economy. While it was traditionally supposed that America was capital abundant relative to labour, and so according to Heckscher and Ohlin theory he expected to find that America would have capital intensity, on contrary findings revealed that more successful American exporting industries had higher labour intensity compared to the importing competing commodities (Alaba, 2003). This came to be known as *Leontief paradox* which stood as a major criticism to this theory, however it was later challenged as being a mere misunderstanding of the H-O theory (Goldberg, 2009).

Moreover, the assumption that factors of productions are identical between countries renders the theory weak. Labour factor for example, in reality labour skills are very different within and between economies for the reason that different people have different quantity and kinds of training and education (Daniels and Radebaugh, 1995). Besides, factors are not immobile anymore, with the free trade era the mobility of factors of production is an indispensable element in international trade. Likewise assuming identical production technologies among countries is not supported by the real life today; which makes this model (just as it is the case with the previous model) fail to successfully explain the recent patterns of the global trade.

3.2.1 General criticisms to comparative advantage tradition

Although the comparative advantage tradition started being challenged as not fitting the reality as far back as in 1950's (Leontief, 1953), more serious attacks increased and became relevant from 1980's. Theories under this tradition became inadequate in explaining some of the realities of international trade. This is based on the fact that their assumptions are simplified and they do not consider some issues such as the relevance of economies of scale which are very pertinent in explaining international trade patterns. Comparative advantage tradition relies on constant return to scale which is irrelevant to the fast global trade transactions.

The world trade volume is more concentrated between economies of similar size and technology something which omits the relevance of trade explained by the comparative advantage tradition. Today trade between dissimilar economies accounts to a very small percentage of the total global transactions. Countries transact in similar kind of products, taste and preference matters a lot in explaining the pattern of trade and not comparative advantage any more. To a great extent the assumption that countries will produce and trade dissimilar products only is not a reality anymore.

3.3 The Intra Industry trade theories

Despite these theories having failed to explain the current trend and patterns of international trade, they contain an explanation that is relevant to international trade; they only fail to explain the modern issues in international trade. Overtime there has been a number of modern international trade theories that have emerged that take account of such factors as government involvement and regulation (Morgan and Katsikeas, 1997). Explanations that these theories fail to justify are the fact that this increase has been seen especially within industrialised countries which has got almost the same level of economic development.

Explanations were developed in late 1970's and 1980's by researchers such as Helpman (1981), Krugman (1979) and Lancaster (1980) in order to account for some facts like the increased ratio of global trade to GDP, and trade being more concentrated among industrialised countries and the fact that trade among industrialised countries is largely intra-industry trade (Bergoeing et al., 2001; Helpman, 1981; Krugman, 1979). According to the report by Bergoeing et al (2001) for the period between 1961 to 1990, the ratio of trade to GDP within the OECD countries increased faster (from 5.3% in 1961 to 11.2% in 1990) than that of trade to GDP worldwide. The new trade theories or intra industry theories were specifically developed to explain these facts particularly by introducing the concepts of economies of scale and imperfect competition.

While theories under the comparative advantage tradition depend on perfect competition where markets have many buyers and seller as well as trade in homogeneous products, intra industry trade theories rely on imperfect competition. Trade between two imperfectly competitive economies with identical tastes, technology and factor endowment is mutually beneficial through increasing returns to scale (Krugman, 1980). Imperfect competition may take a form of monopoly (a market with only one seller); or oligopoly where few sellers operate the market. And these give rise to two kinds of models under Intra industry trade that can explain international trade taking place in similar economies.

The literature presents these two types of models as 'large numbers' and 'small numbers' explanations of intra industry trade (Bernhofen, 1999). The former explanation is based under monopolistic competition, while the later provides a homogeneous-product explanation of intra industry trade in segmented duopolistic markets. Hence, the large and small connotes the number of firms under each kind of market. In essence a distinguishing feature between the two kinds of market is that a firm under monopoly earns higher profits than collective firms'

profits in a perfectly competitive market; but it sells less of the goods at higher price than perfectly competitive market. On the other hand the firms under oligopoly earns higher profits, charges higher prices and sells a smaller quantity than in a perfectly competitive market while earning lower combined profits, charges lower prices and sells higher volumes than would a monopoly (Webster, 2000). Therefore, intra industry trade explanation is through two ways; trade resulting from consumers' preferences for varieties (monopolistic market) and trade resulting from rivalry of oligopolistic firms.

3.3.1 Trade resulting from "Consumers' taste for variety"

According to Bernhofen (1999), intra industry trade under the monopolistically competitive model results from the interaction between consumers' preferences for different varieties and scale of economies. Hence, firms produce and trade slightly different commodities in order to satisfy consumers taste for variety because 'taste for variety' among consumers is one of the determinants of trade under the intra industry trade theories. Since each customer wants to get as much as possible, they get more satisfaction when they have more varieties (Webster, 2000). But it would be very costly for the economy to satisfy each individual's taste for the multitude of varieties, because economies of scale would be wholly unexploited. This is because for economies of scale, resources can be efficiently utilised when fewer goods are produced but in large quantities rather than many varieties each with few quantity (Dixit and Stiglitz, 1977). Besides; "*…the willingness of consumers to pay more for increased variety leads to shorter production runs for each variety than would be justified if consumers were concerned only with minimum cost"(Webster, 2000: p.27).* A trade-off is then required for consumers, to choose between not incurring costs and getting the desired varieties. Hence consumers taste will not be satisfied because economies of scale make it too expensive. With this cost aspect, the taste for variety in aggregate comes in. Since economies of scale does means that it is not viable cost wise to produce goods according to each and every consumer's taste for variety,

consumer's resorts to varieties that are closer to the ideal variety. Consequently, consumers will be forced to buy whatever variety is closer to their ideal (Webster, 2000), so this is in a way a restriction to customers on their demand for the ideal variety.

For intra-industry theorists, the incentive to trade between economies comes as a result of the restriction that consumers encounter on the number of available varieties, whether individual or aggregate. The models that are based on the consumers' taste of variety are based on the assumption of two identical countries initially not involved in trade. Due to economies of scale the taste of variety (whether individual or aggregate) is not fully fulfilled. The assumption is also that because consumers will be willing to pay for additional variety, the economies of scale will not be fully exploited. In order to satisfy consumers, the two countries are assumed to enter into trade (Dixit and Stiglitz, 1977; Lancaster, 1980).

Kelvin Lancaster asserts that intra-industry is solely a result of the diversity in consumers' preferences. It is diversity of preferences rather than identical preferences that leads to gains from trade due to economies of scale. This diversity in preferences causes a loss of economies of scale and gains from trade arise from the reduction of these losses (Lancaster, 1980). By allowing trade between each other the two countries will be made a single market of twice the size than if trade occurred within one country only. Consumers from both countries will either have access to twice the number of varieties produced at the same cost as before trade; or they will have access to same number of varieties as before but with lower prices due to improved exploitation of economies of scale (Webster, 2000; Lancaster, 1980).

Therefore, though in similar countries, international trade in this sense makes countries better off as consumers will be able to simultaneously consume more varieties at lower cost than before engaging in trade.

The model is built upon the assumption that, there are large number of potential products, and that all individuals have the same utility function as they share the same additive and symmetric preferences such that;

$$U = \sum_{i=1}^{N} u(C_i) \quad (3.1)$$

Where; C_i is consumption variety i, defined over a large number N of potential varieties. The number of goods actually produced (n), is assumed to be large but smaller than the potential range of products such that $n < N$. Only one factor of production, labour is assumed to exist in the economy. All firms are assumed to be solving the same problem and have the same cost function such that;

$$l_i = \alpha + \beta x_i \quad (3.2)$$

Where; $\alpha, \beta > 0$, and $i = 1 \ldots, n$; l is the labour used in producing the ith product and x_i is output of the product. α, and β, are the fixed and marginal costs which are in terms of labour. The theory assumes that output of each product equals the sum of individual consumptions. Identifying individuals to workers, output will equal consumption of representative individual times the labour force, such that;

$$x_i = Lc_i \quad (3.3)$$

Where; $i = 1 \ldots n$;

The economy is also assumed to be characterised with full employment so that total labour force is exhausted by labour used in production. Hence;

$$L = \sum_{i=1}^{n} (\alpha + \beta x_i). \quad (3.4)$$

Firms are also assumed to be maximising profits though there is a free entry and exit of firms so that in equilibrium profits will always be zero.

Assuming the world of two countries with the same characteristics above, with each country having one firm which each produce one different product; and that these two countries enter

into trade as a result of consumer preferences explained above, gains from trade will occur because the world economy will produce a greater diversity of goods than would either country alone, offering each individual a wide range of choice.

Given these assumption and assuming transportation cost is zero; at equilibrium the economy of the two countries will have same wage rate as well as same price of any good from any of the two countries. At full employment condition, the total number of goods produced will be;

$$n = L\,(1-\theta)/\alpha; \quad n^* = L^*(1-\theta)/\alpha. \tag{3.5}$$

Where; L^* and n^* represents a foreign country labour force and number of goods produced respectively. Consumers will now be able to consume both products, the home produced n as well as those produced by a foreign country n^*, while maximising the same utility function (*i).* Hence they will be better off as they will get varieties of products while the prices remain the same as before.

3.3.2 Trade resulting from rivalry of oligopolistic firms

The small numbers model was proposed by Brander (1981). According to this model the intra industry trade results from incentives by firms to capture some of the foreign monopoly rents. The two way trade is a results of strategic interaction among firms, basically the model asserts that firm's exports are driven by profit motives which make trade competitive (Bernhofen, 1999). Accordingly the pattern of trade is then assumed to be determined by the interaction of increasing returns to scale, transport costs, and firms' imperfectly competitive behaviour (Brander, 1981).

Theoretically the model makes an assumption of two identical countries, which were not in trade previously; that is, each country under monopoly as each country has a single good produced by a single producer. Based on the difference between the two kinds of markets, the

desire to move into oligopoly market will make such a country sell more than in a monopoly situation. This is because the two countries will have a combined market. However the sales will be at a lower price because of an increased supply, and both countries would gain by creation of duopolies (industries with two suppliers rather than one) in each of their markets. On the other hand consumers in both countries will benefit as they will buy goods at lower prices. International trade will in this case introduce actual or potential competition from foreign rivals which force them to respond.

The literature has developed a model in which the rivalry of oligopolistic firms results into international trade between two similar countries with identical products (Brander, 1981; Brander and Krugman, 1983). This kind of trade is considered as cross hauling and reciprocal dumping, where each firm dumps into other firm's home markets. Each firm perceives each country as a segmented market and makes distinct quantity decision for each (segmented market perception by Helpman, 1982).

3.4 Gravity model and international trade

The gravity equation is an application of the Newtonian equation that describes the force of gravity in physics. The gravity equation is trying to explain the volume of trade the same way that physicists explain the gravitational force of attraction with a simple equation relating the different quantities. It transforms mass to national income/GDP while maintaining the notion of physical distance. The same way planets are mutually attracted in proportion to their sizes and proximity, it is the same way that countries trade in proportion to their respective national incomes and their geographical proximity. Thus the model draws much of its inspirations from the gravitational force equation in physics by Newton (De Groot et al., 2004); the equation associates the gravity force with which two bodies attracting each other proportionately to the product of their body masses and inversely to the square of their distance. As an analogy, the

gravity equation is used to explain bilateral trade flows between two countries in light of countries' economic size measured by their GDP (mass), and countries' geographical distance from each other (distance or economic location).

Newton's Law of Universal Gravitation

$$F_{ij} = \frac{GM_iM_j}{D_{ij}^2} \quad (3.6)$$

Where*; F*= attractive force; *M* = mass; *D* = distance: *G* = gravitational constant

Gravity equation specification similar to the Newtonian Law

$$X_{ij} = \frac{KY_i^{\propto}Y_j^{\beta}}{T_{ij}^{\theta}} \quad (3.7)$$

Where; X_{ij} =exports from *i* to *j*; or total trade (i.e. $X_{ij} + X_{ji}$)

Y = economic size (GDP, POP)

T = Trade costs

Gravity model traces back to the Nobel laureate Jan Tinberg in 1962 and Poyhonen in 1963; they were among the first authors to apply the model in explaining the flow trend of the bilateral trade among nations, particularly between European countries (Zannou, 2010; Deardorff, 1998b; Baldwin, 2004). It has since then been used to explain international trade flow between a pair of countries as being proportional to their economic 'mass' measured by their national GDPs and inversely proportional to the geographical distance between them. The model has been regarded to have provided 'some of the clearest and most robust empirical findings in economics' (Rose, 2000).Besides it has been very popular in the international trade studies because the data for its variables are relatively easier to obtain and there are established standard practices that facilitate the researchers' work in using this model. In the literature, the

patterns of international trade particularly the bilateral trading patterns have been best explained by the use gravity models. Vast literature on international economics that is available today use gravity model particularly studies on bilateral trade openness and FDI studies (see for example Zannou, 2010, Guttmann and Richards, 2006, De Groot and Linders, 2004). The literature claim that, initially gravity model had no theoretical explanation; it is due to its extraordinary stability and power to explain bilateral trade flows that various researchers were prompted to search for its theoretical base as given in the following sub section.

3.4.1 Gravity model in the perspective of the international trade theories

Empirical studies on international trade have used the fit of the gravity theory to test for the international trade theories. In the early days, the model was regarded as a mere representation of an empirically stable relationship that exists between the size of economies, their distance and the volume of trade. By then the prominent theories of international trade entailed the Ricardian model whose explanation of trade patterns relied on differences in technology between countries; and the H-O model whose explanation is based on the differences in factor endowments between countries.

The international trade theories both new trade theories of product differentiation as well as the classical Heckscher-Ohlin theory of comparative advantage have been proved to provide a theoretical justification for the gravity model of bilateral trade (Helpman and Krugman, 1985; Deardorff,1998; de Groot and Linders, 2004). Early notable effort for the provision of the theoretical explanation to the gravity model is the work of Anderson (1979) with his famous Armington assumption. Other studies that has greatly contributed to the establishment of a theoretical foundation for the gravity model by showing that the gravity equation can be derived from a number of different international trade models includes the work of Helpman(1985), Bergstrand (1989), Deardorff (1998) and Evenett and Wolfgan (1998). For that reason, in their most general form these models are consistent with standard theories of

international trade. They advocate that the degree of trade between two countries depends on the supply conditions in the source country, the demand conditions in the host country and some other factors which may stimulate or hinder bilateral trade.

In giving the theoretical justification of the gravity model two of the international trade models can be referred here, the classical Heckscher and Ohlin model and the differentiated products model. Recalling from the previous section (i.e. discussions on international trade theories), the Heckscher and Ohlin model is based on the assumption that differences among economies works as drivers to trade resulting to trade pattern. This implies that trade is larger and gains are larger when there are larger differences in endowments across countries. The differentiated product model which is in the realm of new trade theories does not refute this fact, it however recognises the existence of the role of increasing return, economies of scale as forces behind trade and the fact that trade may flourishing even between similar economies.

Though the original version of Heckscher and Ohlin cannot successfully explain the north-north trade between similar size economies because capital abundant countries will import only from labour abundant economies; David (1997) shows that by extensions of the Heckscher and Ohlin model to assume multiple factors, it can also explain the north-north trade. Besides, the relative endowments as explained by the Heckscher and Ohlin model determine the set of country partners with which an economy may possibly trade with, whereas the distance may determine which of that set will be chosen (Haveman and Hummels, 2004).

By utilizing the differentiated products model, Anderson (1979) and Baldwin (1994) tried to ascertain the relationship between the bilateral trade flows and the product of two countries' GDPs. Anderson's work provided a model where goods were differentiated by country of origin (based on Armington models) and define consumer's preferences over all the differentiated goods. This means at whatever price, each country will consume at least some of every product from every country. Since all products are traded and all countries are involved

in trading, hence at equilibrium the home and foreign demand for a differentiated good each country produces, will equal to each country's national income. Therefore how much a country exports or imports will depend on the size of its national income (GDP), while trade costs, particularly, transport costs are regarded as deterrent to trade flows between countries.

As shown by the work of Bergstrand (1985), gravity equation is regarded as the direct implication of the trade model that is built on the monopolistic competition model by Krugman (1980). Under monopolistic competition model, countries with similar size trade differentiated goods because consumers have preference for variety. Thus goods are not differentiated by country of origin (Armington assumption) or location of production, but rather firm's location is endogenously determined and economies are specialized in the manufacturing of different sets of goods. Helpman (1987) uses the gravity model to show that the monopolistic competition model predicts greater trade for economies that are more similar in economic size and suggests that within the OECD the growth of trade is greatly explained by the convergence in size of the member economies. However despite the fact that the non-OECD engage in very little of the intra-industry trade as compared to the OECD, yet Hummels and Levinsohn (1995) show that specialization in these (non-OECD) countries does the same function as the role played by differentiated goods in boosting intra-industry trade among the OECD countries.

Under the imperfect substitute model, where each firm produces a product that is an imperfect substitute for another product and has monopoly power in its own product, consumers show preference for variety (Krugman and Helpman, 1985). And when the size of the domestic economy doubles in terms of market due to trade, consumers increase their utility for they will have more varieties. As pointed earlier in this chapter trade can provide the same effect by increasing consumers' opportunity for even greater variety. Consequently, when two countries have similar technologies and preferences, obviously they will trade more with each other in order to increase the number of varieties available for consumption.

3.4.2 A survey of gravity model as used in the examining bilateral trade flows

Gravity equations have for a long time been the most fruitful way to formalise the modelling and prediction of trade flows between countries (Matyas, 1997), as well as examining explanatory factors and policy implications on them (Kepaptsoglou et al, 2010). Recognising the importance of doing such modelling and prediction particularly in international economics, various researchers have conducted a considerable amount of research on the analysis and measurement of different determinants of bilateral trade levels.

Type of data and estimation methods used: Studies that have used gravity model to examine the determinants of bilateral trade have been using cross section data as well as panel data. Egger (2002) note that until 2000's very few authors used panel data analysis, many of the authors employed a cross section data analysis. However studies that use cross section data are flawed by the fact that in the gravity model exporter, importer and time effects need to be included in the specification so as to control for any factor affecting trade that is specific to the exporter, importer, as well as time specific (Mátyás, 1997). Cross section studies do not include the effect of time in the analysis while it is an important source of trade flows variation resulting into inconsistent modelling results. The most natural representation of bilateral trade flow is the three-way specification. Eliminating time in the specification jeopardises the proper estimation of parameters by gravity model as it is also an important dimension of variations in the data analysis. Some other advantages includes the possibility of capturing interactions over variables in time and studying individual effects between trading countries (Nowak Lehmann et al., 2007).

It is also argued that using panel data (over-time bilateral trade data) helps in mitigating the biasness generated by the heterogeneity across countries. Whereas in a cross section analysis, country-pair propensity to trade may only be controlled for by observed country-pair characteristics like common currency and common official language, in panel data analysis,

the country pair heterogeneity can be controlled for using country pair fixed effects (such as belonging to the same regional trade agreement) or country pair random effect depending on the research focus. Hence most of the studies have used estimation techniques such as OLS with fixed effects (Kandogan, 2005; Bun and Klaassen, 2007), some other studies have used OLS alone (Breuss and Egger, 1999; Kang and Fratianni, 2006). More over other studies have used fixed effects alone or Random effect alone (Egger, 2002).

Something worth noting in the bilateral trade flow data is the issue of zero trade flows; it is an estimation issue that affects all the gravity estimation exercise of bilateral trade. The zero trade flows might imply that there was no trade at all between a pair of countries, or there are missing values in the record that are wrongly recorded as zero. Zero observations might also be due to the reporting country explicitly recorded as zero, or as a result of rounding errors. Considering that the gravity equation in a multiplicative nature, best practice has been to formulate the log-linear function before any estimations can be done. The problem with zero trade flows arise in the transformation process to log linear, whereas they are dropped out as the natural logarithm of zero value is undefined.

Conventionally the handling of this issue has been dropping out individuals/countries with significant zero bilateral trade flows observations in the sample. Besides some other options has been to substitute zero trade flows with a small constant so that the double-log model can be estimated without dropping countries out of the sample (see Raballand, 2003). Alternatively the option could be doing an estimation of the model in levels (estimating the non-linear gravity equation) so that you do not need to transform the data into log linear (see Westerlund and Wilhelmsson, 2006). Or some other studies have used Tobit model (see Linders and de Groot (2006). With exception of using the non-linear model, all these options are prone to criticisms[14].

[14] For a detailed review about criticisms for each of the mentioned approach, see *Linders and de Groot (2006)*, pages 3 to 6.
Also, chapter three of a practical guide to trade policy analysis by the *WTO and UN (2012)*
Frankel, 1997, Regional trading blocs in the world economic system, pp 145-146. He provides four alternatives.

Dependent and explanatory variables: The most common dependent variables used in most of the studies applying gravity model in their analysis are exports, imports, total trade (exports + imports) and bilateral trade flows (Sohn, 2005).On the other hand the *explanatory variables* often used in the specification of the gravity model include country's market size, country's income levels, population, area size and GDP per capita purchasing power, country surface area, population and geographical distance between countries. Kepaptsoglou et al, (2010) refers to these variables as representing of demand and supply of the two trading countries. This concurs with the contention of Tinbergen who claimed that gravity model signifies three stuffs; the total supply capacity of the exporting country to the world market, the total potential demand of the importing country to the world market, and the resistance to trade between the two trading countries (Tinbergen, 1962).

GDP per capita signifying the purchasing power of the importing and exporting countries, in a way this determines the capacity or demand of each country. Baltagi et al (2003) incorporated three new variables in the gravity model known as the similarity index of two trading partners GDPs as a measure of relative country size, the sum of two GDPs as a measure of bilateral overall country size and the absolute difference in relative factor endowments between two trading partners. All these are resultants of manipulation of two countries GDPs and GDP per capita. They used the sum of two country's GDPs to estimate the impact of overall bilateral size hence determining the capacity of each country to supply to the other.

The second group of explanatory variables that feature most in the dataset of many studies are referred to as the resistances or impedance factors. These are factors that impede and support the immediate movement of commodities between trading countries (Drysdale and Garnaut, 1982), they positively or negatively affect bilateral trade flows in either way (Kepaptsoglou et

Bikker and Devos, 1992, an international trade flow model with zero observations. Pp. 379 -380.

al., 2010). The theory categorises these into objective and subjective resistances to bilateral trade flows. The latter originates from the imperfect information available to businessmen, from internal constraints on profit-maximising behaviour and from the particular processes through which firms engaged in international trade take decisions that affect the volume or commodity composition of trade (Drysdale and Garnaut, 1982).The objective resistances are those that can be conquered with some costs, hence resulting into trading costs like transportation costs.

Trade impediments and preference factors that are usually included in the specification of the gravity model, entails such variables as transportation costs (such as freight costs, tariffs, and quality of infrastructures), time-invariant dummy variables (such as common language, border adjutancy, FTA membership (e.g. EU, ECOWAS, NAFTA, EAC, and SADCC), geographic characteristics (e.g. landlocked, island, and coastal), common colonial history, and region of the world (e.g. Africa, Americas, Asia, and Europe). Baltagi et al, (2003) measures bilateral transportation costs in terms of the difference between imports (at c.i.f.) and exports (at f.o.b).

Several studies (Deardorff,1998; Guttmann and Richards,2006; Rose,2000, et c.) have included such variables as remoteness which indicates the position of one country in relation to its trading partners, exchange rates between trading partners (i.e. the extent of volatility of exchange rate tends to influence the volume of bilateral trade), and performance of borders services. The latter entails the measurement of how efficient are the port services, custom environment and the general country regulatory environment. Studies have also included such factors as technological distance between trading countries (Filippini and Molini, 2003). Countries tend to trade more when they are closer technologically, hence greater technological gap discourage trade flows; though it might in certain cases be an incentive to trade like the

case with East Asian Countries used the technological gap as an opportunity by importing high tech products so that they could copy the technology.

3.5 Gravity model studies on African trade

Research works on Africa's trade by use of gravity models assert that high trade costs makes African countries relatively isolated, that is less integrated to the world economy because trade costs is one of a non-tariff barriers to international trade (Behar et al, 2013). Trade costs for these countries are attributable to the low developed roads, ports and railway lines telecommunication network as well as the border clearance delays in the customs. Limao and Venables (2001) establish that variations in infrastructure leads to 40 per cent variation in transport costs. Their gravity model estimations reveal that a country improving its infrastructure from a median of 75th percentile is likely to increase its trade levels by 60 per cent. The efficiency of the ports has an effect of the freight costs as is asserted by Clarck et al., (2004) that a deterioration of port efficiency and seaport infrastructure in general from 25th to 75th percentile is associated with a rise in freight costs by 12 per cent.

The overland transportation of commodities being so difficult and costly in SSA discourages the trading activities resulting to each country remaining largely isolated from another (Amjadi and Yeats, 1995; Limao and Venables, 2001; Henderson et al., 2002). These studies contend that the relatively low level of SSA's exports is basically due to high transport costs. Just to vindicate the importance for Africa's regional infrastructure integration, Limao and Venables (2001) asserts that poor road conditions accounts for 60 per cent of transport costs for landlocked countries, as opposed to 40 per cent for coastal countries. The same results have been proved by Coulibaly and Fontagne (2006) on their examination of the impact of geography and infrastructures on bilateral trade flows. They find that sea distance and road distance has a statistically significant effect on bilateral trade flows.These studies complement

the previous assertion that lower degree of trade potential amongst countries (which is caused by lower levels of GDP) provides a complete explanation to lower intra Africa bilateral trade levels (Foroutan and Pritchett, 1993). They therefore argue that there is no evidence that policy or infrastructural weakness intra-SSA differentially low trade flows.

Longo and Sekkat (2004) examine the intra- African trade by using gravity model test the impact of infrastructure availability, economic policy and internal political tensions in African countries. They also prove that intra-African trade is negatively affected by poor infrastructure, economic policy mismanagement, and internal political tensions. They assert that except for political tensions, the identified obstacles are specific to intra-African trade, as they do not find them having an impact on African trade with developed countries. Together with these finding in some other studies (Musila and Sigué, 2010; Akbarian and Shirazi, 2012), gravity model has been used to examine the extent of the effect corruption has on African bilateral trade flows and Middle east and Latin American trade flows. Both studies proves that corruption adversely affect the flow of exports and imports among countries.

Using the augmented form of the gravity model, Zannou (2010) examines the factors that influence the volume of the bilateral trade between ECOWAS (Economic Community of West African States) countries. He uses intra-ECOWAS community trade data for the period from 1980 to 2000. His results from the pooled gravity model that reveals that the proximity factors (common language official, contiguity and sharing common currency), economic growth, demographic factors and openness factor increased intra- ECOWAS trade; whereas factors such as landlocked-ness, exchange rate and distance hampered it. Two dummy variables are also included in the model to measure the impact of West African economic and monetary union (WAEMU) on the flow of goods within ECOWAS region; as well as impact of countries in the sample belonging to the Mano river union (MRU) organization. Positive and significant

coefficients for the former dummy confirmed the beneficial effects of monetary unions for free trade agreements on international trade volume; whereas the latter gave negative coefficients reflecting the impact of the organisational weaknesses of the Mano River Union on intra ECOWAS trade flows.

Another study by Coe and Hoffmaister (1999) concludes that the lower levels of African trade is explained by the standard gravity model determinants of bilateral trade. Their results show that holding constant the country's composition of exports, the linguistic ties with developed countries, the degree of openness and the country's access to sea; Africa's lower levels of trade are due to the economic size, population and the geographical distance. They confirm this by modelling the gravity model using bilateral trade data between 84 developing countries (of which 42 were African countries) and 22 industrial countries for the period from 1970 to 1995.

Recent trends of the bilateral trade with China has also attracted researchers (Zafar 2007; Dumludag et al., 2007; Obstfeld 2009; Pilling 2009 and De Grauwea et al., 2012) to explain the reasons for such a booming trade linkage. By employing standard gravity model De Grauwea et al., (2012) perform an analysis to identify effects of the quality of governance of China's African trade partners on China's trade with Africa as well as African trade to other major African trade partners (France, Germany, UK, and USA). The sample size include 53 African countries for the period from 1996 to 2009. They use traditional gravity variables to regress on the China–Africa trade data as well as on African trade with France, Germany, the UK, and the USA. Besides, their augmented gravity model includes a set of indicators to capture the quality of governance in the African countries.

Results suggest that distance and landlocked-ness affects African trade negatively, whereas aggregate GDP and sharing the same official language boost African trade. Besides African countries tend to trade more with their former European colonies. Moreover, the role of

governance in the African trade is significant, where substantial exports from France, Germany, the UK and the USA goes to those African countries with efficient governance structures. However their work reveals also that on contrary China imports more from African countries with weak governance structures (De Grauwe et al., 2012). The issue of weak governance confirms the previous findings such as Zeufack (2001) who finds that the poor performance of African firms is caused by poor institutions rather than skill intensity, and he concludes that the lower level of manufactured products exports in Africa results from the prevalence of bad policy environment in most countries which deters the acquisition of the comparative advantage necessary to export in the global market (Zeufack, 2001).

Yet some other studies on bilateral trade flows such as the Anderson and Marcouiller (2002) have included insecurity variables like the transparency of government economic policy, the enforceability of commercial contracts, and a composite security index (measuring the security of doing business in a certain country). They find that lower quality of governance deters bilateral trade flows in the sense that it increases transaction costs. Some other studies measures this variable in terms of the quality of governance(De Grauwe et al., 2012). De Grauwe et al (2012) reckon that besides the standard gravity variables, the quality of governance plays a major role in the volume of bilateral trade flows in Africa.

Gravity models have also been used to examine the reasons why do African countries fail to maximise the African growth and opportunity Act (AGOA). Using the US imports from 36 African countries for the period of 12 years, Didia, et al., (2015) examines the flow and composition of trade between USA and AGOA-eligible countries. Besides the traditional gravity model variables, they find a positive impact of AGOA to exports of the beneficiary countries. In a similar study on the impact of AGOA, Tadesse and Fayissa (2008) use an augmented gravity model by including sets of trade-facilitating and trade-inhibiting variables.

These includes the stock of immigrant population from each African nation residing in the U.S., economic openness index whether English is the official language in the beneficiary SSA country, a dummy variable that indicates if each SSA country has access to the sea, and a dummy variable for AGOA. Their findings reveals that AGOA has enhanced the propensity of U.S. imports from eligible SSA countries while increasing SSA exports to the U.S. However they conclude that for the African countries to benefit more from AGOA African countries need to enhance their openness both in their product and foreign exchange markets, enhance their communication infrastructure, and improve human capital by training and capacity building, as well as enhancing their transportation network to be able to reduce the negative effect of geographic distance and landlocked-ness (Tadesse and Fayissa, 2008).

This account of studies that analyse African trade by gravity models reveal one aspect worthy noting; despite the believed positive effect of trade openness in the economic performance of African countries (Osabuohien, 2007; Hoeffler, 2001), implications of gravity model have not been used to study trade openness for the African countries. A seminal paper by Guttmann and Richard (2006) using an openness equation, studies the determinants of trade openness in Australia. Openness equation use nearly all the standard gravity model variables, the only notable difference is that it examines the aggregate trade rather that the bilateral trade. The argument put forward is that gravity model is most appropriate in explaining trade at the bilateral level, but when used to make inferences about country's total trade, it provides conflicting results (Guttmann and Richard, 2006).

They use pooled cross section regression on the OECD countries data from 1971 to 2000, findings shows that population, a measure of distance to potential trading partners and GDP per capita are the most important factors to explain country's openness. Besides Australia's

lower openness relative to other OECD countries is explained mostly by its geographical size and its distance from potential trading partners.

Recognising the importance of such study for policy implications on boosting up trade openness in the African economies, chapter four of this study examines trade openness factors for Africa. Though the analysis uses the same openness equation, this study employs a panel data analysis, and estimates the parameters by use of the panel data estimation techniques. Besides, consequently the augmented openness equation is used, to include such factors as mineral rent (% GDP), agriculture (% GDP), logistic performance index (LPI) together with its components (quality of infrastructure, customs procedures, shipping, competency of logistic industry, ability to track and trace shipments and timeliness of shipments reaching destinations).

Inclusion of LPI and components is motivated by the fact that for a developing country with an average size logistic improvements would raise exports by 36 per cent (Behar et al., 2013) and any improvement in customs clearance that may reduce waiting times by a day would be equivalent to 0.8 per cent reduction in ad valorem tariffs (Hummels, 2007b). Moreover, the transit delays of just a single day would be equivalent of adding bilateral distance by 70 km which reduce trade by 1 per cent (Djankov et al., 2010). It has also been empirically proven by gravity framework that, a country improving its infrastructure (road, rail, telephone infrastructure and shipping) from the median to the 75th percentile would increase its trade by 60% (Limao and Venables, 2001).

As noted above there is growing interest of research on the booming bilateral trade relations between the emerging economies (BRIC) and African countries. However, most studies concentrate on examining the 'China -Africa trade' forgetting the rest of the emerging countries in the groups of the BRICS. Despite the fact that China is the prominent compared to the other BRICS countries, yet Africa is increasingly trading with India, Brazil and Russia as well

(Kimenyi and Lewis, 2011; Samake and Yang, 2011; Broadman and Isik, 2007). Building on this, chapter six of this research uses gravity models to examine the contributing factors for the Africa – BRIC bilateral trade, as well as Africa – OECD bilateral trade.

3.6 Conclusion

The analysis of the evolution of international trade theories from old trade doctrines to the new trade theories only reveals that global trade cannot be explained solely with one category of theories. The classical theories seem to explain one level of global trade, which is the North-South trade, whereas the new trade theories explain trade occurring between countries with similar level of economy and technology. The new trade theories advocates that, because of economies of scale and increasing returns to specialization in industries; there are likely to be only a few profitable firms as these characteristics create barriers to entry for other firms.

Comparative advantage advocates specialization between countries based on their comparative advantage. With this specialisation which is basically due to the difference between the two countries' labour productivity, each country is expected to gain from exchange (trade). Without trade, home consumption possibilities are the same as production possibilities. As limited as it is, the comparative advantage theory gives a good explanation of quite a good number of international trade transactions going on especially between developed countries and developing countries.

The Hesckcher and Ohlin theory asserts that trade patterns in the world are explained by the differences in factor costs which differs across countries. It relates the bilateral trade flows between countries to differentials in their endowments. Factor costs differences results from the differences in countries' endowments of one factor relative to their endowment in other factors. Though empirical tests tend to reject this model it remains to be most logical and appealing theory for explaining the causal observation in the global production and exports

particularly in the dissimilar economies case. Meaning that, when a certain country exports a capital intensive commodity, then it must be true that capital is relatively cheap in that country

The intra industry (new trade) theories do not contradict the theory of comparative advantage, but instead identifies a source of comparative advantage. While theories under the comparative advantage tradition depend on perfect competition where markets have many buyers and seller as well as trade in homogeneous products, intra industry trade theories rely on imperfect competition. Trade between two imperfectly competitive economies with identical tastes, technology and factor endowment is mutually beneficial through increasing returns to scale. The intra-industry is solely a result of the diversity in consumers' preferences.

According to these theories, this diversity in preferences causes a loss of economies of scale and gains from trade arise from the reduction of these losses. By allowing trade between each other the two countries will be made a single market of twice the size than if trade occurred within one country only. Consumers from both countries will either have access to twice the number of varieties produced at the same cost as before trade; or they will have access to same number of varieties as before but with lower prices due to improved exploitation of economies of scale. The pattern of trade is then assumed to be determined by the interaction of increasing returns to scale, transport costs, and firms' imperfectly competitive behaviour.

Empirical studies on international trade have used the fit of the gravity theory to test for the international trade theories. And for that matter gravity equations have for a long time been the most fruitful way to formalise the modelling and prediction of trade flows between countries (Matyas, 1997), as well as examining explanatory factors and policy implications on them (Kepaptsoglou et al, 2010). Recognising the importance of doing such modelling and prediction particularly in international trade, the current research conduct a research on the

analysis and measurement of different determinants of bilateral trade levels in the African countries.

CHAPTER FOUR

THE DETERMINANTS OF TRADE OPENNESS IN AFRICA

4.1 Introduction

One of the topical issues in the international trade literature is trade openness. Many discussions dwell on the effects of trade openness on macro-economic variables such as productivity, GDP growth, GDP per capita, and inflation. Amongst the major driving forces behind interests in these discussions is globalization, which makes it possible for a reduction of barriers to international trade. The reduction of barriers is based not only on the reduction of the costs of transportation through sophisticated technologies but also in countries adopting the outward oriented strategies particularly developing countries. However this does not mean that transportation costs cease to be one of the factors that determine trade costs, because for the case of African countries with particular reference to the countries in Africa, transportation infrastructure set up still determines the levels of its involvement in the regional as well as in international trade. This study focuses on examining the determinants of trade openness in these countries and establishes the major determining factors for the level to which Africa is open to international trade.

A survey of data, particularly of the World Bank data, shows that Africa's shares of trade are consistently lower than any other region of the world. The basis of the study is therefore on the recognition that there is a need to understand the reasons for the lower levels of Africa's share in the global trade, which entails the understanding of African trade and countries characteristics; identifying the factors that affects African trade and hence its level of openness to international trade. Later as a comparative analysis, the study selects one country from one of the well performing RECs[15] in Africa, and a regional bloc with countries that have recorded

[15] Regional Economic Communities

high economic growth rates of above 5 per cent. The study examines how Tanzania compares to the rest of the countries in the sample, as according to World Bank data it had the higher percentage of trade openness (76 per cent) amongst the EAC member countries in 2012. In the same year, Kenya had 71 per cent, Uganda (62 per cent), Rwanda (47 per cent) and Burundi (46 per cent). Besides it Tanzania is a country with a large land area and the most populated among the EAC members.

The literature suggests that the level of openness of a country is determined by, inter alia, population size, total surface area, geographic remoteness from trading partners, the degree of trade policy liberalization and the stage of its economic development. In examining these factors for the African countries, the study adopts an openness model from the study of Guttmann and Richards (2006), which is estimated using panel data approach for 49 African countries in the Africa from 1989 to 2009. The study however extends the model to include some important variables that currently explains much of African countries exports. Realising the increased growth of mining sector exports for many of African countries, mining sector as a proportion of GDP is included in the model; also agricultural production (measured as a proportion of countries' GDP), and the multiplicative dummy variables that measures the magnitude effect of location effect on African regional blocks (i.e. East, Central, South, West and North Africa). Generally, these variables have proved to be able to explain a substantial proportion of African trade.

The chapter employs fixed and random effects panel data estimation techniques. Factors that are found to have significant coefficients hence important in explaining Africa's level of trade openness include population, GDP per capita, economic location, and mining sector as a proportion of GDP and agriculture as a proportion of GDP. The chapter provides the first empirical analysis on the factors that correlate with trade openness of Africa, given the scant

research on trade openness for African countries especially on the determinants of trade openness.

The rest of the chapter is organised as follows; next is the review of the literature on the concept of trade openness and its measurement. Data and economic specifications is done in section three, section four presents the empirical results, section five discusses the results and finally section six concludes.

4.2 Trade openness importance and measurement

4.2.1 The concept of trade openness and its importance

The literature (Marelli and Signorelli, 2011; Yanikkaya, 2003; Edwards, 1993), define trade openness as a ratio of total trade (imports + exports) to a country's national income (GDP). Yanikkaya (2003) holds that, much attention on the degree to which countries are open to international trade is driven by the fact that a lot of empirical studies have as their conclusion that openness to international trade yields higher growth rates. Besides it is because of the terrible failures of the import substitution policies that were adopted by most developing countries in the 1970's as a strategy towards economic development.

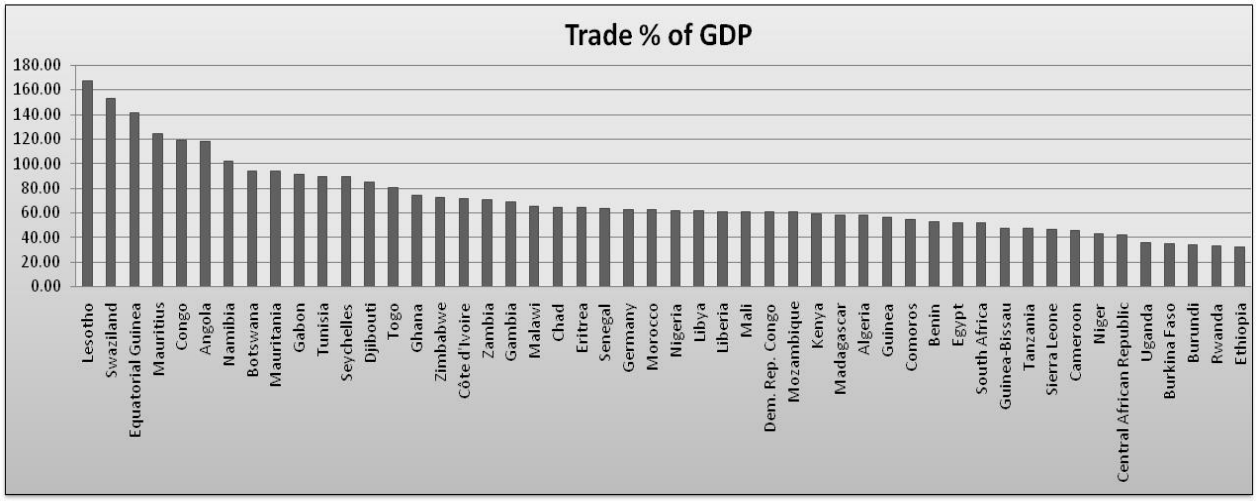
Through opening up their economies, countries enhance their economic growth through the integration of markets and technologies which improves their productivity and exports. Internationalisation makes countries opt policies to reduce tariffs on trade of agricultural products, which in turn increases the demand, production, and trade of those products (Cabrera-Schneider, 2009). With an open economy, the vulnerability brought by negative imports is balanced by a significant benefit of productivity and competitiveness, drawn from international trade. Besides, higher levels of openness tend to stimulate more foreign investment, hence opening more sources of employment for the local workforce, it also bring along new technologies which positively affect productivity levels.

The literature presents economic openness as either commercial openness or financial openness. Besides they are also termed as trade openness and capital account openness (Yanikkaya, 2003; Fereidouni et al., 2011; Eichengreen and Leblang, 2008). The two are sometimes intertwined and most often one induces the other; a country being open to trade could induce a greater financial openness level of a country by attracting in (through investment) capital flows in the financial sector of that particular country. Aizenman and Noy (2003) find that an increase by one standard deviation of commercial openness is associated with a 9.5 per cent increase in de-facto financial openness (as a percentage of GDP). Financial openness to the international economy is often measured by the sum of gross private capital inflows and outflows (Aizenman and Noy, 2003).

Economic theory indicates that the more a country has a freedom of international exchange the more it can benefit from openness in terms of producing larger output and achieving higher income. This is in line with Ricardian theory which asserts that international trade brings about more efficient use of a country's resources by importing goods and services that otherwise is expensive to produce within the country, hence enhancing the general economic growth of a country (Georgios, 2002; Yanikkaya, 2003; Gwartney, 2001; Niroomand and Nissan, 1997).

It is also asserted that in most cases greater economic openness promotes entrepreneurial and innovativeness activities based on the fact that there will be a strong desire for efficient production and competitiveness in the international market. Gwartney (2001) points out that openness may induce countries to have sound institutions and policies in place so they can be competitive in creating conducive environment for trade and investment activities. Obviously in the globalised world, no investor would be in favour of investing in a country characterized by hostility towards business investors, monetary instability, legal uncertainty, high taxes, and low quality public services (Gwartney, 2001).

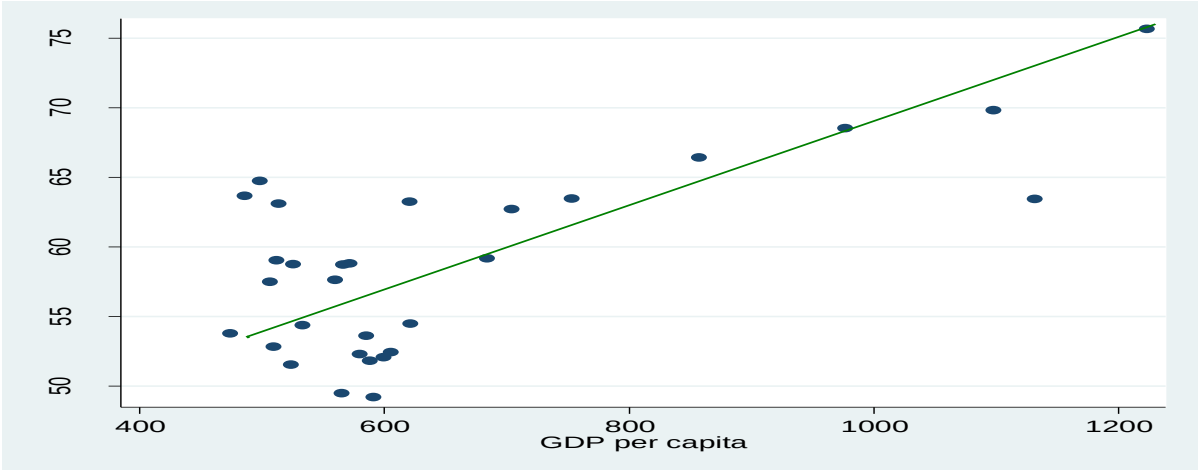
Figure 12: Trade openness degrees for African countries (average for 1989- 2009)



Source: Author's calculations based on World Bank development indicators, 2014.

Consequently, it is worthy studying about trade openness since in theory and in practice, higher degree of trade openness tend to be associated with higher per capita incomes and rapid economic growth. For example, as depicted in the study by Gwartney, for the period from 1980-1998, the highly ranked open economies in the world had a GDP per capita ($23,387) which was more seven times than the least open economies.

Figure 13: Trade openness as related to GDP per capita in Africa (average for 1989- 2009)



Source: Author's calculations based on World Bank development indicators, 2011

Looking at its growth in the same period, the most open economies' GDP per capita grew at an annual rate of 2.5 per cent while for the least open economies was around 1 per cent. The same scenario can be depicted from the SSA countries as shown in figure 1 above. SSA countries have undergone major economic reforms since 1980's which had much to do with the liberalisation of their economies. Despite the fact that to some extent such efforts has marginalised some economies, but the big picture reveals a positive linkage to the growth of GDP per capita.

4.2.2 Measures of trade openness and policy

Despite the vast literature that explores trade openness relationship with various economic variables, many authors' finds contrasting results due to the difficulty in measuring trade openness (Yanikkaya, 2003; Manole and Spatareanu, 2010; Squalli and Wilson, 2011). This problem has had an impact on even questioning the validity of the empirical findings on the issue of openness because different studies have given different measures of trade openness (Kandiero and Wadhawan, 2003). Besides, measuring trade openness has been an issue because empirical studies have explained trade openness in several different ways as well as using several ways to capture and measure the nature of trade. This in turn has resulted into having many approaches to measuring the degree of trade openness and trade policy(David, 2007).

Rose (2004) offers a useful taxonomy and groups these measures into seven groups; outcome based measure of trade ratios (trade as a GDP ratio); adjusted trade flows (also outcome based); price based (measures based on price outcomes); non-tariff barriers (incidence based); composite indices (combining tariff and non-tariff indicators with other economic and political indicators) and informal and qualitative measures. A quick look into the above classification reveals the fact that the first three are outcome based and takes consideration of the trade flows and price levels, the rest of the measures are based on trade restrictions or rather policies.

Yanikkaya (2003) categorizes these measures into two types, measures based on trade volumes and those based on trade restrictions, which determine the level of protection of a particular economy. Another literature include trade dependency ratio and export growth as outcome based trade openness measures (Balassa, 1982). This part discusses two categories, trade openness measures that are based of trade share and those based on trade restrictions.

Table 12: Categories of trade openness measures; advantages and disadvantages

Category	Measures	Advantages	Disadvantages
Trade share	Imports as a percentage of GDP (M/GDP)	• Easier to measure trade flows • Reliable and detailed data on trade volumes • Data available for an extended time period	• It is one dimensional measure of trade openness. • Uses current price figures which are prone to changes in macro-economic variables • No theory behind
	Exports as a percentage of GDP (X/GDP)		
	Total trade as a percentage of GDP (X+M		
	Trade dependency ratio		
Trade restrictions	Import-weighted average tariff rates	• Highly visible restrictions of trade • Most direct indicators of trade restrictions	• Difficult to get reliable and systematic data. Data is available for a limited set of countries and years. • Relatively difficulty to work with data on trade restriction.
	Average tariff		
	Average coverage of quantitative restrictions		
	Collected tariff ratio		
	Rate of export growth		

Trade share (TS): Under this category, the traditional measures includes: M/GDP (that is, import trade share as a percentage of GDP) and X/GDP(that is, export trade share as a percentage of GDP) (Squalli and Wilson, 2011). The most used and popular measure considers aggregate exports and imports share of country's GDP (trade openness = (X+M)/GDP). In line with the previous categorizations this measure is outcome based. It expresses trade in terms of its share of particular country's income (Squalli and Wilson, 2011). Many studies have used volumes of trade in GDP as proxies for trade openness (Frankel and Romer, 1999; Dollar et al., 2001; Irwin and Tervio, 2000; Squalli and Wilson, 2011; Marelli and Signorelli,

2011; Kandiero and Chitiga, 2006a; Rose, 2004). Essentially this measure shows how open a country is to the world trade.

These measures are advantageous and the most preferred to other measures because it is easier to measure trade flows and prices rather than barriers. Besides it is easier to get reliable and detailed trade volume data with which an index can be established. These measures are also more preferred because data on trade flows can be collected and disseminated on regular basis (normally annually) and for many countries. This makes easy for a researcher to make comparisons across several countries. The availability for these data extends as far back as 1950's for the case of developed countries and 1970's for developing countries hence making it easier for users to use them.

A big disadvantage for using trade share as a measure is that it is one dimensional measure of trade openness. It considers the economy's relative trade performance comparing with the total economy's activity. As a result, economies like USA and Japan with huge trading volume, but their share to their total economic activity being very low by world standards, are considered as closed which is insensible (Squalli and Wilson, 2011). Besides the use of outcome measures is challenged that they do more with reflecting the integration levels rather than capturing the effects of institutions that influences trade openness(Alesina and Wacziarg, 1998). Furthermore David (2007) note that these measures do capture neither trade policy nor the effect of it; and they are not based on any particular theory, it is only a matter of how easier data can be obtained. Besides they can best be considered to be the measures of country size and the integration into international markets.

Lloyd and McLaren (2000) points out that, the measure has two flaws, one is that the numerator and denominator uses current prices which are prone to divergence over time due to changes in exchange rates, inflation and interest rates. The second is that the measure depends on two

sets of factors which are different, the non-policy variables[16] and policy variables (which entail the levels of trade restrictions). Therefore a country might have high trade ratio as a result of being small in size (i.e. smaller denominator value) or because it has rich in resources which are valuable and highly demanded by other countries (hence higher values of the numerator); or high demand of foreign goods which imply higher import value (Lloyd and MacLaren, 2002). Moreover size and trade restrictions might not be the only set of factors to explain the degree of trade openness. Factors such as history, geography, structure of the economy (especially the weight of non-tradable services) and integration in global production chains. For countries like Hong Kong where much of the goods from the mainland China goes through, have the most high levels of trade openness because of the higher proportion of re-exports (entrepot trade). For proper computation of country's total exports the re-exports value need to be deducted from because they do not undergo any value-added processes.

Trade restrictions measures: This category includes measures that use trade restrictions as a proxy to trade openness. These include such measures as import-weighted average tariff rates (Edwards, 1998; Clemens and Williamson, 2002), average tariff, average coverage of quantitative restrictions (QRs) and collected tariff ratios (CTR), which are defined as ratios of tariff revenues to imports (Foroutan and Pritchett, 1993; Anderson and Neary, 1994; Ingco, 1997).

It is difficult to find reliable systematic data on trade policies across countries, it is also difficult even to collect and work with data based on trade restriction as compared to trade share measures. Hence when using trade restriction or barriers as a measure for trade openness, results could be questionable for their reliability (Kandiero and Wadhawan, 2003; Kandiero and Chitiga, 2006a; Dollar et al., 2001).

[16] These are the resource endowments, country size, taste, technology and other comparative advantage determinants.

Based on the fact that it is easier to measure trade volume as well as getting reliable systematic and detailed data, this research will adopt the former group (outcome based and that takes consideration of the trade flows and price levels) more specifically trade ratios. This is because data are available for long period of time from 1970's and across countries in which case it will be easier even to make a cross country comparison and analysis. Problems with trade restriction measures can be more significant with the African countries where record keeping is a problem, leaving trade volume measures preferable for this study.

Moreover, a research to be systematic presupposes gathering and using systematic data, trade ratio as a measure of trade openness will be preferred over other measures, which according to Kandiero and Wadhawan (2003), Kandiero and Chitiga (2006) cannot escape the issue of being questionable in their reliability. This is also based on the fact that using trade volume measures enables a researcher to capture macro-economic shocks, differences in tastes etc, whereas using other measures such as composite measures may reflect poor economic management and they are primarily affected by geographical characteristics.

4.3 Economic specifications, hypothesis and data sources

4.3.1 Openness equation specifications

The use of gravity models (Zannou, 2010, Guttmann and Richards, 2006, De Groot et al., 2004) has best explained the patterns of international trade, particularly the bilateral trading patterns. The model establishes that trade between two countries tend to increase relative to the size of their national income and decrease the further they are from each other (De Groot et al., 2004; Frankel and Rose, 2002). The incomes shows the economic size of the exporting country to determine the quantity of goods that it can produce and export, while to the importing country determines the capacity of its market to purchase the imported goods. The distance variable represents the transportation costs that determine the volume of goods to be traded.

Adjustments to the model are possible through the research that incorporates new explanatory variables in order to capture more country specific characteristics such as population (Linnemann, 1966b), income per capita and contiguity (Sanso et al., 1993; Frankel and Wei, 1998; Frankel et al., 1995b; Eichengreen and Irwin, 1998; Vicard, 2011a). This resulted into an augmented gravity model with variables that are used in most current literature like that of Gutmann and Richards (2006), Zannou (2010) and Vicard (2011).

Though used to examine bilateral trade between economies, it is possible to use the estimated gravity equation in order to attain inferences about aggregate country trade. However, Guttmann and Richards (2006) argue that the use of gravity models to examine aggregate country trade offers contradictory results. Thus, they opted for an openness equation, which uses most of the gravity model variables. In the same line of thought, this study makes use of gravity model variables as regressors that determine the aggregate trade levels of a country and therefore its openness to international trade. The openness equation used in this study is extended to include such other determinants as mining as a proportion of GDP, agriculture (% GDP) and the regional multiplicative dummies of African continent.

The primary variables of consideration in the trade openness equation consider openness as a function of the economic, geographic and policy related characteristics (Guttmann and Richards, 2006). Consequently, the study considers such variables as *economic characteristics* (GDP per capita), *institutional characteristics* (trade policy), and *natural characteristics* (geographical distance, surface area, and population size). The mining, agriculture and the multiplicative dummies are incorporated in the model when conducting a robustness checks. Except for trade policy all variables are in natural log form so as to enable smooth linear estimation of parameters. Accordingly, the general linear model can be presented as follows:

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log\ (economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 log(area_{it}) + \beta_5 trade\ policy_{it} + \mu_{it} \quad (4.1)$$

Where; β represents the coefficients of the variables and μ_{it} is the error term.

The table below (table 13) provides an account and description as well as the data sources for all the variables that will be used in this chapter, it therefore include the primary variables as well as the variables that will be used in the robust tests.

Table 13: Variable description and sources of data

Variable	Description of a variable	Source
Trade openness	Measures aggregate trade (sum of exports and imports of goods and services) as a ratio of GDP.	World Bank development indicators (WDI)
GDP per capita	Used as a proxy for economic development level of a country. The data are in constant US$2005.	World Bank development indicators (WDI)
Population	Used as a measure of total population of a country	World Bank Development Indicators (WDI)
Economic location	Measure of remoteness of a country from its potential trade partners. The variable is computed by the researcher as a simple weighted-average of distance to all possible trading partners (remoteness)	CEPII gravity database (distance values) and the World Development Indicators (GDP values)
Area	Used as a measure of a country's total area, including areas under inland bodies of water and some coastal waterways.	World Bank Development Indicators (WDI)
Trade policy	Measures the degree of the liberalization of countries trade regimes. Constructed from simple average of three components of freedom to trade internationally.	Institute of Economic Freedom(IEF)
Mining rent (%GDP)	Mineral rents are the difference between the value of production for a stock of minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.	World Bank development indicators (WDI)
Agriculture (%GDP)	Agriculture includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.	World Bank development indicators (WDI)
Exchange rate	Exchange rate refers to the official exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).	World Bank Development Indicators (WDI)
Logistic performance Indicator(LPI)	Logistics Performance Index overall score reflects perceptions of a country's logistics based on efficiency of customs clearance process, quality of trade- and transport-related infrastructure, ease of arranging competitively priced shipments, quality of logistics services, ability to track and trace consignments, and frequency with which shipments reach the consignee within the scheduled time. The index ranges from 1 to 5, with a higher score representing better performance.	World Bank Development Indicators (WDI)

4.3.2 Estimation techniques

Different from Guttmann and Richard (2006) who uses cross section with dummies, this study uses panel data approach to estimate the econometric model. Considering the possibility of using a balanced and unbalanced panel data in the econometric analysis, even in cases where there are missing data or where data are limited in terms of restricted time frames still using

panel data analysis yield a meaningful empirical research. Besides, the use of panel data gives room to the possibility of expanding the sample size and the gain of more degrees of freedom, which is important when a relatively large number of regressors are employed. More to that, the use of panel data corrects the shortages that can arise when only cross section data is used or when only time series data is used. Issues like the potential endogeneity of the variables used and controlling for individual specific effects.

The major estimation methods for panel data are fixed effects model and the random effects model. The random effects model addresses the endogeneity problem by instrumenting potentially endogenous variables while estimations by the fixed effect method deals with controlling the individual specific effects(Tsangarides, 2001). Therefore, with fixed effects model the slope coefficients are assumes to be constant for all countries. Besides, though the intercept does not vary over time (i.e. fixed effects), they are assumed to vary over individual countries hence there is heterogeneity among countries(Hsiao, 1985). Different from random effect model, with the fixed effect model all the time invariant differences (e.g. area) between individual countries are omitted. Therefore, the fixed effect model can be presented as follows;

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log(economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 trade\ policy_{it} + \alpha_i + \mu_{it} \quad (4.2)$$

Where; $openness_{it}$ represents trade openness, i is the ith cross-section unit and t is the time of observation. The intercept, α_i takes into account the heterogeneity influence from unobserved variables; μ_{it} is the error term.

Under the random effect model, the variations across countries (individual fixed effects) are assumed random and uncorrelated with the explanatory variables in the model. The slope coefficients are assumes constant for all cross section units, whereas, the intercept is a random variable, i.e. $\alpha = \alpha_i + \varepsilon_i$. Where, α is the mean value for the intercept of all countries and ε_i is a random error term which reflects the individual differences in the intercept value of each

country. It is a model that is useful when one feels that the variations across countries might affect dependent variable because time invariant variables are included in the model. Therefore, the random effect model can be presented as follows;

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log\ (economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 log(area_{it}) + \beta_5 trade\ policy_{it} + \alpha + \mu_{it} + \varepsilon_i \quad (4.3)$$

Before embarking to any discussion of the empirical results, a decision must be taken as to which of the two techniques between the fixed effects and the random effects provides efficient and consistent estimates of parameters. To decide this, *Hausman test* is used to check a model that gives efficient and consistent estimates of the coefficients. It involves testing the null hypothesis that the coefficients estimated by the random effects model are the same, which means they are expected to yield similar coefficients with those of fixed effects. The alternative hypothesis is that the fixed effects model is efficient. If the results are not significant (that is, Prob>chi^2 larger than 0.05), then it will be justified to use random effects; otherwise if the results are significant (Prob>chi^2 less than 0.05), the use of fixed effect model will be justified for use.

4.3.3 Description of variables and hypotheses

The dependent variable *trade openness* is measured by aggregate trade as a GDP ratio [(export + imports)/GDP] covering the period from 1989 to 2009. However, it is good to note here that all data for all the variables are arranged in a four five year averages so as to reduce the noise in the data as well as to simplify the empirical analysis.

The independent variables include GDP per capita used as a measure of the level of economic development. Studies find that the growth of GDP per capita is positively and significantly related to trade volumes of an economy (Yanikkaya, 2003). It shows the capacity of a country to produce and export, trade between a pair of countries is empirically proved to be the positive

function of the two countries' combined GDP (Rose and Van Wincoop, 2001). It is expected that the level of economic development of a particular country determine the volume of trade of the same; this suggests a positive sign of a coefficient. Zannou (2010) finds that an increase in income per capita of a country has positive effects on the ECOWAS intra community trade. The study therefore hypothesizes that;

H1: Economies with higher economic development are more open to international trade than otherwise

Geographical variables include *economic location, total area and population size*. Empirical studies find that the level of trade between countries is a negative function of the distance between trading pair countries (Rose and Wincoop, 2001), large geographical area as well as higher population tend to provide countries with more opportunities within their countries and therefore reducing their levels of external trade volumes (Rao and Kumar, 2009; Zannou, 2010).The literature postulates that countries that are closer to the rest of the world tend to have more trading volumes than countries remotely located. Thus is expected for such countries to have higher degrees of trade openness, hence positive relationship (Guttmann and Richard, 2006).

The other two variables then are predicted to have a negative relationship to trade openness. However for the population variables, many studies that examine bilateral studies finds a different relation depending on if a country is an importing and exporting country (Kimino et al., 2007; Zannou, 2010). As for the total area it has been argued in the literature, countries with large geographical area are expected to have different climatic conditions and wide range of natural resources hence chances are that such countries will produce a more diversified range of products internally resulting into less motivations to external trade (Guttmann and Richard (2006).

H2: Countries located closer to trading partners are more open to trade than otherwise

H3: Countries with large total area are less open than geographically small countries

H4: Countries with smaller population have higher trade openness level than countries with higher population.

The study will use *trade policy* variable. It is expected that more liberal trade policy positively influence the level of openness for a country.

H5: Countries with liberal trade policy have higher trade volumes.

4.3.4 Data sources and sample size

Data for GDP per capita, area and population were obtained from World Bank development indicators. Economic location is computed using the equation (4.4) below adopted from the study by Guttmann and Richards (2006). The computation involve distance data available from the CEPII database, which provides the distances of countries from all their potential trading partners.

$$Economic\ Location = \sum_{j \neq i}^{l} \frac{w_j}{dis\tan ce_{ij}^{\alpha}} \qquad (4.4)$$

Where; *distance* is the Great world circle distance (the shortest path following the surface of the earth) between the capital cities of two countries. *J* is the sample of countries, *i* is the home country, *j* is the potential trading partner. w_j is the weight of country *j* in world GDP (excluding the GDP of country *i*); the variable α in the equation above corresponds to the absolute value of the coefficient on the distance term in gravity model. The mean value for the distance to all the potential trading partners for the African countries is 7,553 kilometres.

Countries in the Eastern and Southern part of the continent (such as South Africa, Mauritius, Lesotho, Mozambique, Swaziland and Madagascar) are shown to be the most remote with the

Table 14: Descriptive statistics for distance in the African regions

Africa's Region	Observations	Mean	Std. Dev.	Min	Max	Country	Distance in km.
Northern Africa	6	6705.072	163.49	6554.08	6968.26	Algeria	6642.11
						Egypt, Arab Rep.	6645.84
						Libya	6579.57
						Morocco	6840.57
						Sudan	6968.26
						Tunisia	6554.08
Western Africa	15	7343.73	145.81	7078.59	7537.76	Benin	7256.79
						Burkina Faso	7165.73
						Cote d'Ivoire	7389.42
						Gambia, The	7446.72
						Ghana	7335.19
						Guinea-Bissau	7466.07
						Guinea	7537.76
						Liberia	7521.32
						Mali	7277.24
						Mauritania	7318.82
						Nigeria	7127.18
						Niger	7078.59
						Senegal	7437.13
						Sierra Leone	7509.49
						Togo	7288.53
Eastern Africa	15	7901.50	530.14	7065.15	8907.35	Burundi	7520.56
						Comoros	8109.1
						Eritrea	7065.15
						Ethiopia	7244.48
						Kenya	7552.02
						Madagascar	8539.84
						Malawi	8018.11
						Mauritius	8907.35
						Mozambique	8573.75
						Rwanda	7474.46
						Seychelles	8195.48
						Tanzania	7720.32
						Uganda	7424.62
						Zambia	8020.1
						Zimbabwe	8157.19
Southern Africa	5	8511.23	137.35	8326.93	8694.83	Botswana	8447.85
						Lesotho	8694.83
						Namibia	8326.93
						South Africa	8513.96
						Swaziland	8572.59
Middle Africa	8	7352.35	224.72	6989.73	7711.08	Angola	7711.08
						Cameroon	7243.69
						Central African Republic	7202.94
						Chad	6989.73
						Congo, Dem. Rep.	7514.84
						Congo, Rep.	7510.88
						Equatorial Guinea	7268.42
						Gabon	7377.23

Source: Author's calculations on the World Bank data, 2013

mean value on 7901.50 and 8511.23 kilometres and has the countries with as high as 8,907 kilometres (see table 14). Countries in the northern part of the continent (such as Tunisia, Libya, Algeria, Egypt and Morocco) represents the least remote countries with a mean value of 6705.1 kilometres and has countries with as lower distance as 6,554.1 kilometres. Given the computation of the economic location, which represents the reciprocal of the distance variable, the higher value for economic location (which is 6.41e-07 for our sample) represents the more favourable economic location. The mean value for economic location in the sample is 5.47e-08.

The trade policy variable was constructed from the 'freedom to trade internationally' area of the Economic Freedom of the World Index produced by the Institute of Economic Freedom (IEF). The area has three components: taxes on international trade (i.e. revenue from trade taxes, mean tariff rate and standard deviation of tariff rates), regulatory trade barriers (i.e. non-tariff trade barriers and compliance costs of importing and exporting), black market exchange rates and international capital market controls (i.e. foreign ownership/investment restrictions, capital controls and freedom of foreigners to visit).

The construction of the trade policy variable is therefore a simple average of the three components. The index is then presented in five year interval from 1989 and scales from 1 to 10; lower numbers indicates less liberal trade policy while higher rates indicates more liberal trade regimes. According to IEF, a country will have a higher rate of the trade policy if it has low tariffs, easy clearance and efficient administration of customs, freely convertible currency and few controls on the movement of capital.

To have a meaningful research results, the sample countries were to have full data in almost all the sample period to be considered. So the sample period as well as the number of sample countries is determined by the availability of data. The goal is to minimize the number of

missing data in the dataset. Therefore out of the total 54 African countries available, the sample of 49 countries are included in the dataset, following the omission of countries with completely no data as well as those with several missing data. Considering most of the African countries have no full data for 1960's, 1970's and 1980's, the sample period had also to be decided basing on the available data. The selection of a sample period had also to take into consideration the inclusion of as many countries as possible. A consistent flow of data relevant for this study for the majority of African countries starts from 1989, and since the available data for trade policy is until 2009, the sample period therefore is from 1989 to 2008 inclusive, that is, 20 years.

These data are then averaged over four five –year time periods (1989-1993, 1994-1998, 1999-2003 and 2004-2008) in order reduce the noise and to simplify the empirical analysis. Besides since the effects of business cycle have been proved to last for an average period of five years these averages will also serve the purpose of removing the business cycle effects. According to the National Bureau of Economic Research (NBER) which has designated nine business cycles covering from 1945 to 1991, the average expansion had a duration of a little over four years, while the average recession lasted just under one year (NBER, 2002). Below is the descriptive statistics and the correlation matrix for the variables in the econometric models.

Table 15: Descriptive statistics for the variables

Variable		Mean	Std. Dev.	Min	Max
***ln*Openness**	Overall Between Within	4.18	0.49 0.39 0.29	2.67	5.35
***ln*GDP per capita**	Overall Between Within	6.41	1.13 1.08 0.35	4.54	9.74
***ln*Population**	Overall Between Within	15.75	1.45 1.45 0.14	11.17	18.78
***ln*Area**	Overall Between Within	12.31	1.93 1.94 0	6.13	14.73
***ln*Economic location**	Overall Between Within	-17.88	1.51 1.49 0.29	-20.92	-14.26
Tradepolicy	Overall Between Within	4.37	1.51 1.07 1.07	0.54	7.68

The coefficients in the correlation matrix table below are not that bad; with exception of the correlation between area and both log of population and log of economic location, all other coefficients are below 0.5. However, since area is not dropped in the regressions estimates by fixed effects techniques, the coefficients should have no problem so far.

Table 16: Correlation matrix of the variables

	lnOpenness	*lnGDPp*	*lnPopn*	*lnArea*	*lnecon.location*	*tradepolicy*	*Mineral*	*Agriculture*	*Exch. rate*
lnOpenness	1.00								
lnGDPp	0.32	1.00							
lnPopn	-0.44	-0.32	1.00						
lnArea	-0.29	-0.12	0. 74	1.00					
lnecon.locat.	-0.20	0.39	0. 27	0. 64	1.00				
tradepolicy	-0.04	0.09	0.16	0.17	0.15	1.00			
Mineral	0.19	0.36	0.09	0.29	0.24	-0.07	1.00		
Agriculture	-0.36	-0.59	0.00	-0.01	-0.31	0.09	-0.38	1.00	
Exchange rate	-0.16	-0.22	0.07	0.04	-0.15	0.28	0.01	0.19	1.00

4.4 Empirical Results

Table 17 provides regression results for the equation (4.2) and (4.3). The model used follows the empirical work by Guttmann and Richards (2006). All variables are in natural logarithms except for the trade policy variable because it is an index. The results of the fixed effects model shows that the errors μ_{it} are correlated with explanatory variables [i.e. *corr (u_i, X)* = -0.995]. The test (F) shows that the model fits the data well, as it is below 0.05 (i.e. 0.000), it also shows that all coefficients in the model are different from zero. The regressors in the model shows the explanatory power over the dependent variable (trade openness), because they are all significant at one percent level with exception of trade policy, which is not significant.

With the random effects model, differences across countries represented by the error term μ_{it} are not correlated with explanatory variables [*corr (u_i, X) = 0*] as assumed to be zero (i.e. differences across countries are uncorrelated with the regressors). The regressors in the model

are all not significant. Deciding which estimation method to use, table 17 presents the Hausman test results. Hausman test is used to decide between the fixed effects and random affects technique, to check which of the two models is the most efficient that gives efficient and consistent estimates of the coefficients.

Table 17: Regression results for Fixed Effects Model *(a)* and Random Effects Model *(b)*

	(a)	***(b)***
ln(economic location)	1.08***	-0.04
	(0.22)	(0.10)
ln(GDP per capita)	-0.92***	0.13
	(0.21)	(0.09)
ln(population)	1.26***	-0.07
	(0.27)	(0.09)
trade policy	-0.01	0.00
	(0.03)	(0.02)
ln(area)	-	-0.00
		(0.39)
R –square	0.19	0.23
No. of Observations	196	196
No. of panel groups	49	49
Hausman test: Chi2	30.5***	

Note: The dependent variable for these regression results is trade openness. ***, **, * denotes significance level at 1%, 5% and 10% respectively; standard errors in parenthesis.

The main rationale for this test is to test whether in the model, the unique errors differences across countries are correlated with the explanatory variables or not. The null hypothesis is that the error terms in the model are not correlated with explanatory variables (i.e. both individual and time effects are not correlated with the explanatory variables). If they are correlated (rejecting the null), then random effect model is not suitable. From the test results, we look to see whether the estimates from the fixed effect model and random effect model are significantly different from each other. If they are, the probability of obtaining a chi-square value (of as much as 30.52 or greater in our case in table 17) will be less than the critical value, and then we conclude FEM is to be preferred.

The results shows that the [Prob>chi2= 0.000] is less than 0.05, hence significant. The null hypothesis is therefore rejected which means the unique errors are correlated with regressors. For this study therefore, fixed effects is an efficient and consistent technique over random effects technique, and it is used for as an estimation technique and for analysis in the rest of the study. Fixed effect technique is most preferable whenever the interest is only to analyse the impact of variables that vary over time and in the dataset, that contains individual members with heterogeneous characteristics.

Besides, the technique is said not to work well with data for which within-cluster variation is minimal, for slow changing variables over time or the time invariant variables (e.g. area). Thus, different from other empirical studies (e.g. Guttmann and Richard, 2006), this study will exclude the variable area. Moreover, since this study uses aggregate data to identify variables that are more correlated to SSA level of trade openness, fixed effect technique is much more convincing as it allows heterogeneity in the dataset rather than the random effects. This is particularly important when the interest is on policy analysis using aggregate data (Wooldridge, 2009).

Despite the exclusion of area in the regression analysis, the variable has an explanatory power to the degree of trade openness of a country. In the study by Guttmann and Richards the coefficients for the variable area are highly significant and take a negative sign. The implication is that the large the size of the country the lower the degree of trade openness, that is geographically large countries may be endowed with varieties of resources and might have variant climatic conditions within the country which means they are capable of producing wide range of goods internally hence might need less from the external markets (Guttmann and Richards, 2006).

Looking at the data for the variable area for African countries, there is much deviation in size between countries (see table 15). The area variable might also be relevant in explaining trade openness in the African countries.

4.5 Empirical analysis

The results in table 17 show that with the exception of trade policy, the coefficients for all the variables are highly significant at one percent. The coefficient for the level of economic development as measured by *GDP per capita* takes unexpected negative sign, indicating a negative relationship and it is highly significant at one percent. This corresponds to Guttmann and Richards (2006), whose findings suggests that countries with larger GDP per capita tend to have low levels of openness. However, this is contrary to the argument that suggests that those countries with high economic development level trades more, which could also be true for African countries where in 2007 Seychelles (with a GDP per capita of USD 10,591 in 2008) had the higher degree level of openness. Compared to other African countries, it had the highest GDP per capita average of USD 7,835 (World Bank, 2011).

This also contradicts the fact that much global trade is intra-industry (i.e. trade in differentiated products) and it is more apparent between developed countries with high level of economic development. Besides, it contradicts the evidence established by gravity models that trade between two countries tend to increase relative to the size of their national income (De Groot et al., 2004; Frankel and Rose, 2002). Therefore the relationship between GDP per capita and trade openness is further examiner in the coming section of this chapter.

As expected, the parameter estimates on the *economic location* variable has a significant positive coefficient, implying that countries located closer to the rest of the world tend to trade more, hence more open. This variable is a reciprocated distance variable as used in the gravity

models, so the expected sign is positive and not negative as in the original gravity models. Therefore the results confirms the findings by Guttmann and Richards (2006) as well as the traditional gravity models using the distance variable has a negative sign indicating the fact that the more a country is distant from the rest of the world it tend to have less trading activities than otherwise.

The parameter estimate for the *population* variable takes the expected sign; it is positive and highly significant. This suggests a positive relationship between the country's total population and the level of openness. Implying that highly populated countries trade more and countries with smaller population trade less. This is contrary to the findings previous studies who find it to be negatively related to trade openness perhaps being less populated is associated by having fewer opportunities for trade within-country trade hence resorting to external trade (Guttmann and Richard, 2006).

However some studies that examine bilateral studies provide evidence that population variable have different relation depending on if a country is an importing and exporting country (Kimino et al., 2007; Zannou, 2010). This might be a different case for African countries, having high population is not meant to having varieties of opportunities hence reducing the involvement in external trade. Besides, of recent Africa has become a good market/destination for goods from the emerging countries, particularly China. According to World Bank (2013) the highly populated countries included Nigeria (169 million), Ethiopia (92 million), Eqypt (80 million), Democratic Republic of Congo (66 million), South Africa (53 million) and Tanzania (48 million), and they also the leading destinations of China's exports to Africa.

Contrary to what has been hypothesised, *trade policy* has a negative relation to trade openness though the coefficients seem to not have any significant explanatory power on trade openness in Africa. Further examination of this aspect is done in the upcoming sections.

4.5.1 Relationship between GDP per capita and trade openness

A closer examination of the two variables shows that their correlation is negative after other variables are added in the equation. Considering the fact that, the correlation between trade openness and the GDP per capita could be dependent on whether other relevant regressors are included in the model or not, yield the results in table 18 below. The coefficient for the GDP per capita variable is at first positive though not significant. However it turns negative and becomes significant only after the inclusion of economic location variable.

This suggests a possibility that location could have an impact on the explanatory power of the GDP per capita. Thus the interactive variable of GDP per capita and economic location was created and included in the regression. Column five shows that the variable has positive coefficient and significant at one per cent. However the GDP per capita still remains negative and significant with an increase in the coefficient size. Other variables remain the same with some slight change in the coefficients, though the variable economic location is dropped for collinearity. Therefore these results suggest that the relationship between trade openness for the African countries can be explained better with consideration of the economic location of a country in question. This is logical based on the fact that for the African countries with relatively poor infrastructure, the economic location (how close it is to potential trading partners) matters a lot on how much will a particular country trade and not just GDP per capita alone.

Moreover, despite the fact that in the original estimation results, the coefficient for the variable economic location shows the expected positive relationship with openness and it is significant, it is necessary to consider the implication of geographical regions within the continent considering that Africa has a vast landmass. Due to this it can be expected that there could be some differences on marginal effects of regional groups' location on their trade openness levels.

So the intention is to see if for instance in West African countries economic location will have more effect on their trade volume than it is for the countries in the Southern part of Africa.

Table 18: Fixed effect regression results on the relationship between trade openness and GDP per capita

	1	***2***	***3***	***4***	***5***
ln(economic location)	-	-	-	1.08***	*dropped*
				(0.22)	
ln(GDP per capita)	0.10	0.04	0.04	-0.92***	-2.00***
	(0.07)	(0.08)	(0.08)	(0.21)	(0.42)
ln(population)	-	0.03	0.42*	1.26***	1.26***
		(0.19)	(0.23)	(0.27)	(0.27)
trade policy	-	-	-0.03	-0.01	-0.01
			(0.03)	(0.03)	(0.02)
ln(area)	-	-	*dropped*	*dropped*	*dropped*
ln(GDPper capita*economic location)	-	-	-	-	1.08***
					(0.22)
R –square	0.10	0.17	0.18	0.19	0.19
No. of Observations	196	196	196	196	196
No. of countries	49	49	49	49	49

Note: The dependent variable for these regression results is trade openness. ***, **, * denotes significance level at 1%, 5% and 10% respectively.

Looking at table 14 there are quite notable differences in the mean values of the regional distance from their potential trading partners with the southern part of Africa being the most unfavourably located (8511.23 km.), followed by Eastern Africa (7901.50km.), Middle Africa (7352.35km), Western Africa (7343.73km), while northern Africa being relatively in a favourable location with a mean value of 6705.07 kilometres.

To examine this, the chapter make use of multiplicative dummies of African regions (i.e. interacting economic location to regional dummies. However as it can be seen from the results in table 19, there are no significant differences on the coefficients of economic location variables. It can be reckoned as well that the primary variables have not changed; they have all remained significant and maintaining the same signs. Looking at the R-squared, there are some slight changes from 16% to an average of 20%, this could be the result of adding more variables

to the model. Further regression test is done to check the robustness of the variables and again to see if there will be any improvements in the R-square values.

Table 19: Fixed effect regression results on the relationship between Openness and economic location of African regions

	(1)	***(2)***
ln(economic location)	1.08***	1.01***
	(0.22)	(0.26)
ln(GDP per capita)	-0.92***	-0.91***
	(0.21)	(0.22)
ln(population)	1.26***	1.24***
	(0.27)	(0.28)
Trade policy	-0.01	-0.01
	(0.03)	(0.03)
Central Africa_ location	-	0.09
		(0.22)
West Africa_ location	-	-0.04
		(0.28)
South Africa_ location	-	-0.71
		(0.69)
North Africa_ location	-	0.41
		(0.46)
R-square	0.19	0.19
No. of Observations	196	196
No. of panel Groups	49	49

Note: The dependent variable for these regression results is trade openness. ***, **, * denotes significance level at 1%, 5% and 10% respectively.

4.5.2 Further robustness checks

In order to test for the robustness of the key results, a number of variables were added in the basic regression model. In the first stage[17], was the inclusion of the dummy variables for common colony and common language, number of embassies abroad, whether a country is a landlocked or not, and the World Trade Organisation membership.

These variables were included because it is argued that for countries that share the same characteristics in terms of language and colonial history, their transaction costs in trading

[17]The tables of results are presented in the Appendix 1at the end of this chapter.

activities becomes less, hence easier to trade with each other. Thus, the more a country has trading partners that share with it a common official language or have the same history with many countries, the more open is expected of that country (Zannou, 2010). Zannou finds a positive and significant coefficient for countries with a common official language, indicating that sharing a common official language tends to result into more trade volumes.

Also included is the variable that tests if the number of embassies abroad correlates with a particular country's level of trade. This is motivated by the fact that it is believed that embassies and consular services promote trade between countries (Rose, 2007). Rose finds that for each additional consulate abroad, bilateral trade increased by 6 per cent to 10 per cent; and that the creation of an embassy has more effects than consulates. However, the results were not statistically significant though the coefficient was positive.

Motivated by the fact that trading volumes tend to be affected with whether a country is a landlocked or not (transaction costs), the variable landlocked was included but was interacted with economic location to avoid it being time invariant. Besides a dummy of whether a country is a WTO member or not, with the expectations that a country being a member of WTO would have higher degree of trade openness than a non-member would. Based on the four five – year periods, the main concern was whether a country was a member at a particular period in time. In both variables, the coefficients take the expected sign, however not significant. However, the results indicated that despite the inclusion of these variables the primary variables in the original model were robust.

In the *second stage* of robustness checks, maintaining the primary variables from the original model a set of new variables is included. The results can be seen from table 30 below. The coefficient for the variable trade policy is still not significant and takes a negative sign while the expectation and the conventional wisdom would be a positive sign, since favourable trade

policies are expected to affect trade volumes positively (as previously stated in the hypothesis). This is surprising considering the many efforts done so far by African countries to liberalise their economies. As discussed in chapter two, the level of trade restrictions has become lower and lower each year since the adoption of the Structural Adjustments programmes (SAP) programme in the thresholds of the 1980's. It would be expected that the openness level be significantly explained by the reduction of the tariffs and non-tariffs trade restrictions.

Table 20: Fixed effect regression results on the robustness check

	(1)	***(2)***
trade policy	-0.00	-0.01
	(0.03)	(0.03)
ln(GDP per capita)	-0.96***	-0.83***
	(0.21)	(0.22)
ln(economic location)	0.99***	0.87***
	(0.22)	(0.24)
ln(population)	0.94***	0.83***
	(0.29)	(0.31)
Agriculture, value added (%GDP)	-0.01*	-0.00
	(0.28)	(0.00)
Mining (% GDP)	0.01**	0.01***
	(0.00)	(0.00)
Exchange rate	0.00	0.00
	(0.00)	(0.00)
Central Africa _ economic location	-	0.34
	-	(0.44)
West African _ economic location	-	-0.33*
	-	(0.18)
North Africa _ economic location	-	0.12
	-	(0.27)
South Africa _ economic location	-	-2.19
	-	(1.96)
R-square	0.22	0.26
No. of Observations	196	196
No. of panel groups	49	49

Note: The dependent variable for these regression results is trade openness. ***, **, * denotes significance level at 1%, 5% and 10% respectively.

One explanation to this would be probably it indicates that despite the many efforts to liberalise their trade policies, still most of the African countries are wrestling with the basic liberalisation

measures; none of the countries have set or implemented policies completely (Sharer, 1999b) and which significantly impact productivity and therefore external trade. There are a few countries (that is, Uganda, Tanzania, Ghana and Mauritius) that are often mentioned in the literature to have successfully liberalised their trade regimes, however they face big challenges in sustaining the reformed policies. One of the reasons cited by Ancharaz (2003) is the higher degree of dependence on trade taxes to support government budgets because most of them are still struggling to stabilise their macroeconomic issues. On the other hand, there are some African countries (like Zambia, Nigeria and Senegal) where the reforms could not fetch a *political will* to support their effective implementation as they were not at the best interest of the political ruling parties.

Thus, trade reforms in the African countries has generally been so slow, inconsistent and flawed by reversals (Ancharaz, 2003). Furthermore, Ancharaz attributes this slowness to balance of payments problems, political pressure for infant-industry protection and policy maker's desire to maintain political support within their constituencies.

Moreover, it may be logical to reason that the working of these liberalised trade policies would depend on the quality of institutions, infrastructure and human capital. However, these variables standing alone have been described as influencing economies' trade volumes. In view of the fact that human capital enhances technological progress (Tsangarides, 2002), it is sometimes also argued that with high quality human capital, an economy can enhance its trade volumes. It is therefore expected that human capital be positively related to the degree to which countries trade internationally. The variable is measured by the total school enrolment(Mankiw et al., 1992).

In theory, good institutional systems reduce the uncertainty and transaction costs. Trade costs in international trade, inter alia, are determined by how effective institutions are in their

respective economies (De Groot et al., 2004). Poor legal and property rights, bureaucracy and corruption are said to be detrimental to international trade just as it is for economic growth and development (Neeman, 2008). The literature uses corruption and an index for office abuse for private gain as proxy for quality of institutions(Cinyabuguma and Putterman, 2011; Mauro, 1995). These variables were included in a separate regression[18], however results were not significant though their coefficients took expected signs.

Table 20 also presents interesting results for real exchange rate, mining as a proportion of GDP and agriculture (value added) as a proportion of GDP. The inclusion of agriculture is because it is the major sector to most of African economies, and on average, it accounts for more than 30% of GDP to most of the African countries, while employing more than 60% of the population (World Bank, 2011). It is unfortunate however, that in world trade ratios, agriculture accounts for a very low percentage. Actually, the growth of agricultural trade has been declining significantly (Aksoy and Ng, 2013).

While the manufacturing sector in African countries has been reported to be growing at a good pace since 1990's, agricultural sector and particularly agricultural trade has been reported to be suffering from protectionism practices in the world market. Consequently, an African economy with high agricultural proportion of its GDP is expected to be negatively associated with the trade openness, because agricultural products are not dominant in the trade ratios anymore. This is what can be seen from the regressions results (table 20). The parameter estimate agriculture as a percentage of GDP in negatively related to openness, and in both cases (model *4.1* and *4.2*) it is significant.

[18] Results are reported in the appendix 2 at the end of this chapter.

Another variable of interest in the table 20 is the variable measuring mining as a percentage of GDP. It indicates a positive relationship with the trade openness and it is highly significant in both cases. In the first case, it is significant at 5 per cent and in the second case, it is significant at 1 per cent. Presumably this shows the fact that mining sector has been growing tremendously in the recent decades for most of African economies. According to UNCTAD report (2011), in 1970 mining industry contributed 4.8 per cent of the Africa's GDP while in 2008 it was 25.08 per cent. Besides, extractive industries which includes mining, quarrying and petroleum, ranked in among the top five industries that contributed to FDI projects in 2010 (World investment report (2012). This provides an indication that mining influences the trade volumes of many of the African countries trade.

The variable exchange rate (real) was included in the model expecting that it significantly affect trade openness negatively. This is based on the argument that in most cases exchange volatility discourages trade (Ethier, 1973; Abbott, 2004). This is because exchange rate volatility increases risk, which discourages economic activities and hence trade in terms of exports and imports. However, there are other studies, which have different conclusion on this relationship, whereas they ascribe a positive relationship to trade volume. The argument is that exchange rate volatility that results to risk increases the potential gains to trade, while some also argue that it increases the value of trader's option to export and hence increasing export volumes (Dellas and Zilberfarb, 1993; Broll and Eckwert, 1999). The results in both cases reveal that it is not significant and it takes a positive sign. Another explanation to this could be the dollarization effect whereby in most of the African countries with weak currencies, transactions are dominated by the US dollar hence the effect of fluctuations of the local currencies (which are normally measured in terms of US dollars) does not represent any threat to trading transactions.

4.5.3 How Tanzania compares with the sample countries

The openness equation used in the regression analysis in table 17 predicts that for the period 1989 -2008, Tanzania has an average openness ratio of 55.23 per cent, which is above the actual ratio of 54.33 per cent. This means that the model predicts the trade ratio that is slightly above the actual ratio, implying that the regression results predictions are almost the same with the Tanzania's trade ratios by international standards. Table 21 provides a picture on how Tanzania compares with the sample average of the African countries in the sample. What can be deduced here is the effects of the various determinants on trade openness that makes one understand why countries trade the volume they do. The first column measures the extent to which Tanzania differs from the sample of countries for each variable.

Table 21: Understanding Tanzania's openness (1989 – 2008)

	Tanzania's difference From average[(a)]	*Parameter estimate for variable*[(b)]	*Implied impact on Tanzania's log(openness)*[(c)]
	Relative to standard deviation of the variable		
Log(population)	1.07	0.65	0.69
Log(GDP per capita)	-0.74	-0.85	0.63
Log(economic location)	-0.44	0.65	-0.29
Trade Policy index	-0.12	0.01	0.00
Agriculture(%of GDP)	0.72	0.00	0.00
Mining(%of GDP)	-0.45	0.00	0.00
Exchange rate(annual average)	0.58	0.00	0.00
Total impact	n.a.	n.a.	1.03

Note:*(a)* the values in the first column shows the difference between the Tanzanian value and the mean value for the sample, divided by the standard deviation of the sample.
(b) Column two is the parameter estimate from table 17 divided by the standard deviation of the variable
(c) Column 3 presents the product of the first and the second column.

It can be realised that Tanzania does not differ substantially from the average of the rest of the countries in the sample in most of the variables. The exception is on the population variable, there is a substantial difference, where Tanzania seems to have large population compared to

the sample countries. Higher differences can also be seen in terms of GDP per capita and agriculture. The data indicates Tanzania having lower income level and higher ratio of agriculture relative to its GDP, implying that agriculture dominates the economy. It can also be observed that results shows that Tanzania have relatively less liberal trade regime than most of the African countries.

Based on the regression results presented in table 17, the second column of table 21 demonstrates whether a unit of one standard deviation of the variable has a relatively large or small effect on trade openness in the regression. The data reveals that for Tanzania, the variable population, income level and economic location are vital in explaining the levels of external trade, where GDP per capita surpasses all the other variables followed by population size and economic location.

In explaining the low level of trade openness for Tanzania, the third column provides values that assess which variables are most important. Likewise, in this column, the data suggest that Tanzania's population, lower income levels and economic location have an effect on its lower degree of trade openness. Population and GDP per capita accounts for more than half of the deviations from the sample average. The population being the highest accounting for approximately 67 per cent, the income level as measured by GDP per capita accounting for approximately 61 per cent and the economic location 28 per cent. Relative to the sample, Tanzania seem to have unfavourable economic location and this discourages trade as represented with a negative sign (-0.29) in the third column. Moreover, the implication for this is that trade openness ratio for Tanzania could improve if it could have lower population that would mean an increased in GDP per capita assuming it is constant with the change in the population.

4.6 Modelling logistic performance index (LPI) on trade openness in Africa

The discussions made earlier in this chapter have not considered the importance of logistic performance index in the degree to which African economies can be open to international trade. It is an indubitable truth that for successfully trade transactions, reliable, rapid and cheap movements of goods from one country to another is indispensable. Many studies have concentrated on the role of adverse geography and weak infrastructure on African trade levels. However, the cost and quality of logistics are influenced not only by infrastructure and the performance of public agencies, but also by the accessibility of excellent and aggressive private logistics services. These truths bring in the examination of the logistic performance in the African economies.

Global trade transactions today do not rely on the cost and time of transporting goods only, but rather the predictability and reliability of supply chains in a world of just-in-time production sharing(Arvis et al., 2007). The World Bank uses a logistic performance index to compare between countries the efficiency with which economies participate in global trading activities. According to the World Bank, the index represents an interactive benchmarking tool that helps economies to identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. The LPI comprises of such components as *customs procedures, logistics costs (e.g. freight rates),* and *infrastructure quality*, ability *to track and trace shipments*, *timeliness in reaching destination*, and the *competence of the domestic logistics* industry (Arvis et al., 2007).

Quality of infrastructure measures the quality of transport and information technology infrastructure for logistics. It is an essential component in the LPI index because the physical movement of goods entails the proficient and timely exchange of information by parties

concerned. The role of private sector through customs brokers and road transport operators has also a vital role on the LPI index.

Together with the capability of private logistics service providers, the LPI index also depend on the competence and diligence of public agencies responsible for border procedures. Weak institutions, inadequate regulations and the absence of competition have led to corruption and poor services to many borders of the African countries. Clearance processes in these borders are disturbed by the presence of corrupt operators who also hinders the emergence of competent local logistics operators who can work with international operators in global trade transactions. Taken together all these components ensure good logistic performance. The World Bank database provides data on all these LPI components together with the overall LPI for 2007, 2010, 2012 and 2014. It is a survey based on a worldwide survey of the global freight forwarders and express carriers who are the most active in international trade.

The importance of logistics performance on the African economies is unquestionable because their economic performance is relatively lower partly due to poor logistics performance. Poor ranking in the logistic performance index (LPI) by the World Bank is an indication for the weak transport and communication infrastructure, among other things. Much as the trade policy is not significant in the previous regressions results, previous studies have proved that foreign trade barriers do not account for the poor export performance for many of the African countries (Azita and Yeats, 1995)[19]. It has also been attributed to the fact that many African countries do not maintain or improve ports, ports procedures as well as transport infrastructure.

African countries exporters face a competitive disadvantage when comes the issue of transportation costs as large proportion of their foreign exchange earnings is used to pay for export transport costs. Infact for most of the African economies, poor transport and

[19]African exports enjoy OECD tariff preferences, the African Growth Opportunity Act (AGOA) etc.

communication infrastructure has been providing higher rates of protection than the tariffs do. Limao and Venables (2001) indicate the role geography and infrastructure plays on transportation costs to African trade flows. Their findings indicate that with a deterioration of infrastructure from the median to the 75th percentile, transport costs increased by 12 percentage points, whereas African trade volumes fell by 28 percent. They confirm that this fact is more serious for landlocked countries which mostly are in Africa. Thus the relatively lower levels of intra and inter African trade flows is largely explained by the poor infrastructure conditions.

Moreover, despite the argument by many studies (Kolko, 2000; Capling and Nossal, 2001; Cairncross, 2001),that distance effects on bilateral trade flows has been declining over time with the technological development, yet for most of the African countries this depend on effectiveness of institutions existing in a particular economy. Yes, technology may be modern than it was in the 1980s as well as 1990s but if there are weak institutions trade logistic performance will be weak as well. Thus this section models the role of LPI on the aggregate trade for the sample of African countries. This will be done by controlling for the primary trade openness variables examined earlier in this chapter.

Data and sample

Using a 5-point scale (from 1 (worst) to 5 (best)), the LPI aggregates more than 5,000 country evaluation. Sample period 2005 to 2012 based on the available data on the logistics performance index. The index has data for four periods, 2007, 2010, 2012 and 2014. It was not possible to include 2014 because it was not possible to obtain the data for rest of the variables as there is not database updated to 2014. The data were arranged in three year averages so that three periods were obtained for the whole sample period. This was done with the aim of being consistent and reducing the noise in the data as well as simplifying the empirical analysis.

Table 22: Descriptive statistics

Variable		Mean	Std. Devi.	Min	Max
Trade openness	Overall	81.28	33.55	28.89	170.83
	Between		32.94		
	Within		7.39		
GDP per capita	Overall	1779.23	2926.64	136.92	14489.32
	Between		2895.00		
	Within		542.64		
Area (sq.km)	Overall	589089.40	638710.20	460	2505810
	Between		642954.10		
	Within		0.00		
Population (total)	Overall	1.92e+07	2.67e+07	84177.67	1.60e+08
	Between		2.68e+07		
	Within		1407816		
Economic location	Overall	2.29	3.22	0.02	15.53
	Between		3.23		
	Within		0.28		
Trade policy	Overall	6.08	1.09	2.07	8.58
	Between		0.99		
	Within		0.45		
LPI	Overall	2.44	0.33	1.34	3.67
	Between		0.26		
	Within		0.20		
Infrastructure	Overall	2.20	0.39	1.27	3.79
	Between		0.29		
	Within		0.27		
Customs	Overall	2.24	0.33	1.33	3.35
	Between		0.24		
	Within		0.23		
Shipping	Overall	2.41	0.42	1.17	3.83
	Between		0.31		
	Within		0.29		
Logistic	Overall	2.37	0.39	1.33	3.73
	Between		0.29		
	Within		0.25		
Tracking	Overall	2.47	0.39	1.33	3.56
	Between		0.27		
	Within		0.28		
Timeliness	Overall	2.89	0.45	1.38	4.03
	Between		0.31		
	Within		0.32		

Looking at the descriptive statistics it was necessary for transformation of the data into natural logarithmic form. The correlation matrix table below indicates higher correlation coefficients for the LPI variables and the components, this is why in the regression each will be estimated separately while the primary variables remain intact.

Table 23: Correlation matrix for the variables

	lnOpenness	*lnGDPpp*	*lnarea*	*Lnpopn*	*lnecon. locatio*	*tradepolicy*	*Overall LPI*	*Customs*	*Infrastuc.*	*Shipping.*	*Logistics*	*Tracking*	*Timelines*
lnOpenness	1.00												
lnGDPpp.	0.41	1.00											
lnArea	-0.19	-0.16	1.00										
lnPopulation	-0.39	-0.35	0. 75	1.00									
lnecon. location	-0.01	-0.40	-0. 62	-0.66	1.00								
trade policy	0.06	0.27	-0.11	0.07	-0.24	1.00							
Overall LPI	0.19	0.32	0.08	0.15	-0.38	0.30	1.00						
customs	0.20	0.27	0.05	0.07	-0.27	0.31	0.86	1.00					
Infrastructure	0.16	0.33	0.03	0.08	-0.33	0.34	0.83	0.78	1.00				
shipping	0.16	0.19	0.04	0.17	-0.32	0.32	0.79	0.61	0.61	1.00			
logistics	0.14	0.23	0.07	0.12	-0.29	0.26	0.89	0.76	0.75	0.61	1.00		
tracking	0.12	0.31	0.05	0.11	-0.35	0.23	0.86	0.66	0.64	0.60	0.75	1.00	
timeliness	0.15	0.26	0.18	0.17	-0.36	0.13	0.77	0.61	0.49	0.51	0.63	0.61	1.00

Econometric model and estimations

The basic model,

$TO_{it} = c + \beta x_{it} + \varepsilon_{it}\ (i = 1, 2 \ldots N)$, (4.5)

Where; TO_{it} is the dependent variable and x_{it} is a 1x K- vector of explanatory variables, often has stochastic errors ε_{it} such that:

$E(\varepsilon_{ti}/x_{it}) = 0$ but $V(\varepsilon_{it}/x_{it}) = \sigma 2i$. (4.6)

The explanatory variables includes the overall LPI and the LPI components, that is, the quality of infrastructure, customs procedures, shipping, the competency of domestic logistic industry, the ability to track and trace shipments and the timeliness of shipments reaching destinations. However in modelling these variables, the primary variables (GDP per capita, surface area, population, economic location and trade policy) are used as control variables.

Ordinary least squares (OLS) estimates that ignore heterogeneity across individual countries are unbiased but inefficient. Efficiency can be attained from generalized least squares (GLS) estimation which is also supported by the Hausman test results in regression result table 24 below. The null hypothesis for the Hausman test is that the preferred model is random-effects

against the alternative the fixed effects. Essentially what is being tested is whether the unique errors (country-level effects) are correlated with the explanatory variables. So the null hypothesis is that the regressors are not correlated with unique errors (random effects). Rejecting the null hypothesis would mean that Prob>Chi2 is less than the critical value (0.05), which means it is significant.

However with this specification, the hypothesis that the country-level effects are adequately modelled by a random effects model is resoundingly not rejected. This implies that the country level effects are not correlated with the regressors, hence random effects is preferable to fixed effects model. The econometric model to be estimated is therefore;

$$TO_{it} = c + \beta x_{it} + \mu_{it} + \varepsilon_{it} \quad (4.7)$$

Where; TO_{it} is the dependent variable

X_{it} is a 1x K- vector of explanatory variables which includes the primary variables and LPI and its components.

μ_{it} and ε_{it} represents between and within countries error respectively.

Empirical results and discussion

Table 24 below presents regression results, whereas column 1 provides the results for the primary variables. Regression results for the primary variables are slightly different from the previous (table 17) because of the changes in the sample period as well as estimator. With the inclusion of the logistic performance index (LPI) as well as its various components, the coefficients for the primary variables remain highly significant with slight changes on the signs. While the coefficients for the economic location and population variable takes a negative signs, the coefficients for the trade policy variable becomes positive with significance of 1 per cent in column 1. With these results the implication could be that trade policy reforms may

positively affect trade openness depending on the logistic performance index and that of its components. The surface area remains insignificant like in the previous regression results.

In the second column, the LPI index is included as a regressor and the variable gives a positive coefficient with 10 percent significance level. This implies that for African countries that are relatively good logistics performers (such as South Africa) tend to trade more internationally. Besides such countries would most likely have better global value chain integration and attract export-oriented FDI which will results into more diversified exports. Good logistics performance tends to positively affect trading activities as it reduces transaction costs. However the association of LPI and trade openness can be thought of in a reverse way, that is, increased trade generate demand for better logistics, hence putting pressure on facilitating reforms and sustaining a market for modern services. For developing countries like most of the African countries, key logistic players (with high ranking in LPI) are those with experiencing high economic growth rates which results from exporting manufactured goods (Arvis et al., 2007).

Table 24: **Random Effects regression results on the impact of LPI on trade openness in Africa.**

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
lnGDPpp	-0.09***	-0.09***	-0.09***	-0.09**	-0.09***	-0.09***	-0.09***	-0.09***	-0.08***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
lnArea	0.02	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.02
	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
lnPopulation	-0.29***	-0.29***	-0.29***	-0.29***	-0.29***	-0.30***	-0.29***	-0.29***	-0.29***
	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
lnEconomic location	-0.19***	-0.19***	-0.19***	-0.19***	-0.19***	-0.20***	-0.19***	-0.18***	-0.20***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Tradepolicy	0.25***	0.22**	0.21**	0.22**	0.21**	0.21**	0.23**	0.24**	0.25**
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
lnLPI		0.17*							
		(0.09)							
lnInfrastructure			0.07		0.11*				
			(0.09)		(0.06)				
lnCustoms			0.02	0.10					
			(0.11)	(0.07)					
lnShipping			0.09			0.13**			
			(0.07)			(0.06)			
lnLogistic			-0.12				0.07		
			(0.11)				(0.07)		
lnTracking			0.17**					0.15**	
			(0.08)					(0.06)	
lnTimeliness			-0.08						0.01
			(0.08)						(0.06)
Hausman test: Chi^2	3.52								
R-Squared: Between	0.32	0.33	0.32	0.32	0.33	0.33	0.32	0.32	0.32
Within	0.31	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.31
No. of Observations	153	153	153	153	153	153	153	153	153
No. of Countries	51	51	51	51	51	51	51	51	51

Note: The dependent variable for these regression results is trade openness. ***, **, * denotes significance level at 1%, 5% and 10% respectively; standard errors in parenthesis.

In order to examine the component under the LPI that is most important, column 3 gives such regression results. Because the LPI components are highly correlated, the coefficients for the variables are not significant with exception of the ability to track and trace shipments. From the fourth column to the ninth column, the regression results consider the LPI components separately. Of course comparatively, the overall LPI has higher coefficients than the components; this may be because it provides a comprehensive picture of supply chain performance of countries in Africa as well as the overall reliability of the supply chain. As it is, the LPI has a significant role in determining the degree to which countries can trade internationally.

The coefficient for the variable that measures the ability to track and trace shipment is more significant (at 5 per cent) and has higher coefficient than the rest of the components. This could be because of the fact that the logistics performance is more about predictability of the deliveries. Today predictability and reliability are vital to the overall costs that firms incur in logistics. Moreover, regression results in (table 24) above show that the quality of infrastructure and shipping has positive and significant coefficients. This has an indication that quality infrastructure and good shipping connectivity tend to increase the level with which African countries trade internationally.

These results explain the most prominent reason for lower export competitiveness in the most of African economies. The quality of infrastructure and shipping connectivity is not that good for most of the African countries which makes them less connected. This hampers the trade activities in the continent especially the intra-African trade. As explained in chapter two of this research, nearly 80 per cent of the Africa's exports are destined for markets outside Africa, hence lower intra African trade. Efforts toward improving the connectivity within the continent

are required if African countries aims at boosting up their intra continental trade, attracting more FDI inflows and outflows and eventually enhancing their economic growths.

4.7 Conclusion

Estimated regression results indicates quite a number of important conclusions, first they confirm what the previous studies has established with regards to the influence of population size on the level of external trade. Population size has proved to be the most influential variable in this study, which is consistent with findings by among others Guttmann and Richards (2006) and Haveman and Hummels (2004). GDP per capita as a proxy for the level of economic development comes second, also confirms the traditional gravity models which establish that the level of external trade can be predicted by the level of development of a nation. However, they both take unexpected sign, different from the conventional wisdom. Though what can be concluded from the result in this chapter is that population has positive effects on the degree of country's trade openness. Furthermore, despite the globalisation initiative that in a way kills the distance effect in the international trade arena, still for most of African countries economic location is a factor that influence the intra and inter trade volumes in the continent.

Probably the most significant contribution of these results in the area of trade openness studies is the inclusion of the two variables, mining as a proportion of GDP and agriculture as a percentage of GDP. These variables are very substantial for African countries whose external trade has been mainly on primary goods and on natural resources extracts. Results depict the significance of the mining sector on the level of external trade considering the growth of the sector, particularly in the African countries, this is not surprising. Agriculture which has for decades been a predominantly core economic activity to majority of African countries, has also indicated statistical significant influence on the level of trade ratio of the sample countries.

Last but not least, the chapter makes a comparative analysis by singling out Tanzania. Results indicate that the most important factors that explain Tanzania's trade openness include population, income levels and economic location. Individually, population accounts for approximately 67 per cent, the income level as measured by GDP per capita accounting for approximately 61 per cent and the economic location approximately 28 per cent. Relative to the sample, Tanzania seem to have unfavourable economic location and this discourages trade as represented with a negative sign (-0.29) in the third column. Moreover, the implication for this is that trade openness ratio for Tanzania could improve if it could have lower population that would mean an increased in GDP per capita assuming it is constant with the change in the population.

The chapter has also examined the LPI index with its components, and as the results in table 24 indicates nearly all variables prove to be important in explaining trade openness in the African countries. The variables shows a positive relationship to trade openness. Improvement in the competitiveness of the index for the countries in Africa could render desirable results on boosting their trade volume as well as their economic growth levels.

Since the sample period examined under this chapter is relatively short, future studies should put further consideration on the element of logistics performance index considering the role logistics plays in reducing the costs of trading enhancing the global integration. The index is very relevant for international trade studies considering the "logistics gap" that is evident in most of the developing countries. It is also because implications from the study could have important insights to policy makers in governments, businesses, and civil societies so as to take corrective measures in creating competitive environment for international trade interventions in their respective economies.

Appendices

Appendix 1: Robustness checks with inclusion of dummy variables for common colony, language, embassies landlocked and the WTO membership

	(1)	*(2)*
ln(econloc)	1.069**	0.991**
	(3.53)	(3.07)
ln(gdpp)	-0.914***	-0.854***
	(-3.06)	(-2.73)
ln(popn)	1.192***	1.175***
	(4.10)	(3.90)
Trdpolicy	-0.001	-0.042
	(-0.57)	(-1.27)
ln(comlang)	-	-0.574
		(-1.28)
ln(comcol)	-	0.0062
		(0.18)
lnembassies	-	0.031
		(0.46)
lnlandleconl	-	0.110
		(0.77)
Wtomembership	-	-0.028
		(-0.82)
R-square: within	0.17	0.16
between	0.31	0.28
overall	0.19	0.17
No. of Observations	196	196

Note: ***, **, * denotes significance level at 1%, 5% and 10% respectively.

Appendix 2: Robustness Check with inclusion of quality of institutions, infrastructure and human capital.

	(1)	*(2)*
Trade policy	-0.04	0.89
	(0.07)	(0.13)
ln(GDP per capita)	-	0.88
	-	(1.28)
ln(economic location)	-	-0.41
	-	(1.21)
ln(population)	-	5.06
	-	(4.04)
ln(human capital)	-	0.41
	-	(0.09)
ln(legal& property rights)	-	0.21
	-	(0.69)
ln(infrastructure)	-	-0.53*
	-	(0.29)
ln(corruption)	-	0.16
	-	(0.15)
R-square: within	0.01	0.53
No. of Observations	100	37

Note: *, ** and *** denotes significance level at 10%, 5% and 1% level respectively

CHAPTER FIVE

THE EFFECTS OF TRADE OPENNESS ON ECONOMIC GROWTH IN AFRICA

5.1 Introduction

The examination of the relationship between trade openness and economic growth has received much attention in the debates in the theoretical and empirical literature (Yanikkaya, 2003; Awokuse, 2008; Mercan et al., 2013; Menyah et al., 2014; Seetanah et al., 2012; Ekanayake et al., 2003; Dollar and Kraay, 2001; Nannicini and Billmeier, 2011; Karras, 2003). The reason is obvious in the sense that economies would want to establish the direction of causality so that they can focus their priorities on the part that causes the other. This is a crucial aspect, particularly to policy makers, who would need to decide if they should encourage trade openness to speed up their economic growth or the other way round; they should primarily focus on economic growth that in turn will promote the degree at which they trade internationally (Kónya, 2006; Harrison, 1996).

The literature provides four possible propositions on the direction of causality on the two phenomena. The export led growth hypothesis (ELG), which is supported by most of the studies, provides that more exports results into higher economic growth rates (Din, 2004; Rodriguez and Rodrik, 2001; Hassan and Islam, 2005; Onafowora and Owoye, 1998). This hypothesis is complemented by the import led growth (ILG) hypothesis as suggested by Awokuse (2008), in which Case if the two are coined together will imply the country's aggregate trade hence trade openness. Most of the researchers supporting this hypothesis attribute positive effects of trade openness to economic growth. In a sense, this claims that openness (as measured by exports) enhances productivity in the economy through export promotion, importation of high quality technologies, as it is a prerequisite for the production of higher quality and competitive products and services. Besides, high quality technology has

positive effects on labour productivity and capital efficiency (Konya, 2006). In support of this proposition are studies such as Harrison (1996), Frankel and Romer (1999) and Rodriguez and Rodrik (2001) who examined the association between openness and economic growth and found a positive correlation between the two and in particular, the causality running from trade openness to economic growth.

Same conclusion also can be observed from studies like that of Din (2004) examining the ELG hypothesis in South Asian region countries, he found that there exists a long-run causality in Bangladesh and Pakistan with short run causality in some other Southern Asia countries. In addition, the study by Hassan and Islam (2005) finds a long-run uni-directional equilibrium relationship running from trade openness and economic growth. The study by Onafowora and Owoye (1998) who used Vector Error Correlation Model (VECM) in order to facilitate the dynamic analysis of the interactions among the variables, found that trade policies and exports have significant positive effects on the real output growth in Sub Sahara African countries. They concluded that the outward orientation strategy might benefit Sub Saharan African countries in terms of stimulating their economic growth, though it also requires suitable domestic policies that discourage import substitution strategies.

Another hypothesis is the opposite of the above, the growth-driven export (GDE). This hypothesis predicts that trade flows are induced by the level of economic growth of a country. Higher trade volumes are expected to be associated with the economies with higher levels of GDP per capita. Studies like that of Awokuse (2008) suggest that the export –led growth may be misleading while the import–led growth as well as the causality running from income levels leading to increased export volumes hypothesis are having relatively stronger empirical evidence. The study also accounts of the importance of realising the importance of ILG as ignoring imports which is a source of inputs for the production of imports as well as technological knowledge is misleading.

Furthermore, there is a hypothesis that postulates the bi directional causality, which means the causation runs from both sides. Empirical examples of studies supporting this hypothesis include Ekanayake et al., (2003) who found a bi directional causality between export growth and economic growth for both developed and developing countries. Examining the long run relationship between FDI, trade openness and economic growth Klasra (2011) observed a bi-directional causality between openness and economic growth in Pakistan. Some other studies include Dollar and Kraay (2001) in their study of 137 countries concluded that openness brings about enhanced and faster economic growth as well as reduction in poverty in poor countries.

The last hypothesis postulates that there is no relationship between trade openness and economic growth. Examples are the study by Sarkar (2007) who examined the relationship between openness and economic growth and found that there is no positive long term relationship between the two variables particularly in the less developed countries.

However, some other researchers show that higher trade openness brings about different outcomes to different countries depending on the level of development. It has strong positive impacts on real income for developed countries with high incomes while having detrimental impacts to low income countries (Kim, 2011). This view is also supported by studies done by (Caner and Hansen, 2004; Krugman and Venables, 1995). The contention is that, low-income economies benefit from trade liberalization but only if the opening up to international trade is carried out alongside with policy and institutional reforms toward investment, production efficiency, and financial development (Kim, 2011).

Consequently, most often many studies consider the two variables (economic development and openness) as a determinant of each other depending on the nature of study. While studies that examine the determinants of trade openness include the level of economic development (GDP per capita or economic growth) as an explanatory variable (Bajwa and Siddiqi,

2011; Onafowora and Owoye, 1998; Hoeffler, 2001), most of studies include openness as an explanatory variable to the growth models as well. A review of studies that has been conducted to examine the determinants of economic growth has included various factors with slight differences from one author to another. By use of panel data, Tsangarides (2002) finds that to both Africa and OECD countries, economic growth is attributable to various economic factors like initial conditions, the investment ratio, population growth, human capital development, trade openness, government consumption, political environment and financial development. Hoeffler (2001) concludes that investment and openness can strongly and positively affect the growth of countries' incomes. He examined the growth rate in a cross country regressions for the period 1965 to 1999 including such variables as trade openness, an interaction term between openness and initial GDP, log of life expectancy, measure of quality of public sector institutions, ratio of primary commodity export to GDP, average government saving as a proportion to GDP, land locked dummy, the difference in the growth rates of the workforce and the population, and the measure of tropical climate.

The most current studies such as Cinyabuguma and Putterman (2010), examining the economic growth in Sub Sahara included economic, geographical, institutional and social-historical explanatory variables. Their findings reveal that the slow growth in SSA is attributed to higher rate of corruption, civil wars, less political rights and less economic openness. Nevertheless, they also find that these factors are best explained by the social historical factors such as nature of religion, countries with larger Muslim populations are found to have slower growth. The nature of the colonial master also has an impact where countries, which were former British and French colonies, are found to have high growth rates than those were under Belgian, Italian and Portuguese colonies. Besides the, openness level was found to accelerate economic growth. Some other variables included were human capital development, malaria prevalence, and initial GDP per capita as a proxy for initial conditions.

In other studies, examining the effect of foreign aid to economic growth Hodlerand Knight includes aid inflows, ethnic characteristics, interaction term of aid and ethnic fractionalisation, regional dummies and investment, they find that foreign aid has a positive effect only on countries that are ethnically homogeneous, and negative effects on those economies that are ethnically fractionalised (Hodler and Knight, 2012). The reason behind being that aid promotes corruption and rent seeking in the heterogeneous societies than in their homogeneous counterparts. Marelli and Signorelli (2011), argues that economic growth is a function of the degree of openness and FDI flows, FDI stocks plus some control variables that influences the long run output per capita between countries (such as gross capital formation). Seetanah et al, (2012) ascribes five variables in their growth model. They measure economic growth by a country's GDP and claim to be attributed to the country's investment ratio, measure of openness, the quality of labour as measured by a secondary enrolment ratio, financial development and country's rate of foreign direct investment.

For this reason there is much in the literature that confirms the existence of the relationships that exists between economic growth and trade openness. Next, we revisit the literature on impact of trade openness on economic growth through examining the channels in which opening up into international trade helps in boosting economies economic growth.

5.2 Trade openness effects on economic growth and productivity

A large literature that examines the causality effect of trade openness and policy on economic growth, find positive effect of openness on economic growth. The recent examples include studies by Marelli and Signorelli (2011), Barboza (2008), Karras (2003), Harrison (1996), Nannicini and Billmeier (2011), Din et al., (2003) and David (2007), find that raising trade openness by 10 per cent permanently increases real growth rate of GDP per capita by 0.5 per cent. It can be argued that developing countries tend to benefit more from this because of the

fact that trade openness promotes transfer of technology from developed countries, which implies a positive spill over effect on world income distribution. Even the recent Chinese rapid economic growth is attributed to the country's increasing degree of opening up to international trade (Marelli and Signorelli, 2011). Moreover, the literature acknowledge that economies characterized with higher degrees of trade openness tend to grow faster than those with lower levels of openness (Barboza, 2008; Din et al., 2003) because trade openness enhances growth in a country's GDP per capita. Manole and Spatareanu (2010), reveals that countries (developing and developed) with less trade protectionism have higher growth of GDP per capita.

An empirical research by Edwards (1993) reveals that a higher level of a country's openness is associated with a higher level of economic growth, because among others a country open to international trade improve product quality and efficiency in production due to competition from foreign companies (Grossman and Helpman, 1991; Aizenman and Noy, 2003). Importing industries can also import technology and knowledge, where exporting sectors in turn can learn from this and improve their competitive position.

5.2.1 Channels through which trade openness affect economic growth

Rose (2002) presents three channels from economic theory investigating the link between trade and economic growth, they include government policy, domestic allocation and distribution and technology transfer. On the other hand, based on the neo-classical model of international trade David (2007) offers three channels including gains from exchange, specialization and economies of scale. Both consumers and producers will gain from trade openness due to increased imports of primary and intermediate inputs that will be at lower prices (gains from exchange). Moreover, by opening up borders, firms will direct resources away from the previously protected sectors to those that add more value to an economy and those that have a

competitive advantage hence utilizing resources more diligently to increase outputs (gains from specialization). On the firm level, firms that will survive competition after liberalizing the economy, realises an increase in output and achieve lower average total costs. This enhances their efficient use of resources, which lead to higher output (gains from economies of scale).

Revisiting the channels by Rose (2002), the *first* channel is the government policy. Higher degree of openness compels countries to pursue good quality microeconomic policies so as to create favourable environments for inhibiting capital flights and being in line with the international and inter regional agreements. Since good policies create a stable microeconomic environment, these countries are expected to positively affect their economic growth for they not only eliminate price uncertainty in their economies but also moderates public deficit and debt levels. Eventually this enhances the capacity of the domestic firms to compete internationally (Rose, 2002).

Secondly allocation and distribution channel. Open economies tend to have less price distortions because in economic theory, free trade facilitates price convergence of tradable goods across countries. The presence of trade restrictions generates price distortions that shift productions between economies leading to production processes that are not based on comparative advantage hence consumers end up paying higher prices on goods and services (David, 2007). Since price distortions have adverse effects on factor accumulation and growth, open economies are then expected to enjoy positive effects on their economic growth by having less price distortions. Trade openness is positively related to domestic rate of physical investment. Investments enhance *factor accumulations* which is a major factor in economic development, specifically for developing economies moving from low economic growth equilibrium to a path of sustained industrialization (Rose, 2002).

Lastly is the technological transmission. Knowledge spillovers are a driving force for sustained and long run economic growth. Trade openness can affect growth and convergence through technology transmissions, because open economies are more exposed to a worldwide stock of productivity-enhancing knowledge (Rose, 2002; Falvey et al., 2002). The literature asserts that national policies that reduces the degree to which an economy is intergraded to external trade strengthens the undersupply of innovation in that respective economy (Grossman and Helpman, 1991). Innovation is central to any improvement in total factor productivity in any economy. Madsen finds that empirically that 93 per cent of the total factor productivity in the 1990's for the OECD countries has been solely due to knowledge spill over through imports. In fact even the total factor productivity convergence among these countries over the period 1870 to 2004 has been associated with knowledge spill over through international trade (Madsen, 2007).

Learning from East Asian growth miracle, trade openness enhances direct imports of high–tech goods as well as greater interactions with the sources of innovations through high international communications and mobility among economies. This has a positive advantage as it is easier for domestic producers in open economies to imitate foreign technologies in their productive process. This alone translates into economic growth as it boosts the capacities of the developing economies to compete with more advanced economies in the global market. It also lead to great transformations in the product composition of output and exports, developing countries will transform from relying heavily on agriculture to heavy industries as well as high-tech goods.

Furthermore, open economies are in a better position to gain economically through efficient resource allocation. Efficient allocation of resources is associated with enhanced investments, productivity and growth (Kandiero and Chitiga, 2006a). In the long run such economic environment is likely to attract FDIs which is vital channel to economic growth. And, since

trade is positively related to FDI inflows, countries that desire to increase their FDI inflows levels should enhance their trade levels (Asiedu, 2006; Marelli and Signorelli, 2011). This is because trade and FDI are interrelated, as in most cases FDI is export oriented (Marelli and Signorelli, 2011). Thus, trade openness signals investors that a particular country is committed to stable and market oriented economic policies. Investors will see the possibility of importing intermediate goods for initiating new projects, be able to repatriate their profits as well as exporting the produced goods. With more FDI inflows, host economies obtain required financing resources for infrastructure development and rehabilitation of their economies.

Moreover, arguing in line with endogenous and neo classical growth models, FDI is positively associated with economic growth (Babatunde, 2011). With the FDI inflows, host countries benefit as they are being provoked to be competitive and to obtain new technologies, managerial expertise, marketing capabilities, which improve their human capital. Market competition enhances efficiency in the economy by reducing the degree of monopoly power that dominates most of the less open economies. FDI also enhances employment levels, managerial skills, diffuses technologies and fosters innovations in the economy (Kandiero and Chitiga, 2006a; Adhikary, 2011; Asiedu, 2002). Likewise quoting Kandiero and Chitiga (2006, pg. 355), FDI inflows "*stimulate capital accumulation through adding to domestic savings and raising the recipient economy's efficiency through improving resource allocation, deepening domestic financial markets and reducing local capital costs"*

With all these, countries strengthens their supply-side capabilities for producing and selling goods and services, which lead to their economic growth. Moreover, with FDI host economies increase the volume and efficiency of their physical investment, which eventually promotes economic growth through aggregate expenditure and increased fixed capital stock. This is because fixed investments in part depend not only on the internal saving rate but also on the foreign investments through FDI (Marelli and Signorelli, 2011; Adhikary, 2011).

Trade openness enhances export volumes that can be used to pay for an increased value of imports, which in most cases leads to a positive net value of exports. This results into higher local savings and higher accumulation of foreign exchange reserves which can be invested for further earnings (Marelli and Signorelli, 2011). It is also good to note that private and public capital stock formation depends on fixed investment, which as noted earlier is largely supported by a high saving rate and foreign investment. The *neo-classical growth model* suggest that developing countries with lower initial level of capital stock tend to have higher marginal rate of returns (productivity) and growth rates if adequate capital stock is injected. This is because when additional capital is injected in the form of long term investment the marginal productivity of investment is increased in the short-run and this increased productivity have a long run positive effects on economic growth (Adhikary, 2011).

Moreover, in line with transaction theory (i.e. a low transaction cost environment generates financial incentives because of higher return on investment; trade openness tends to influence the flows of international capital in terms of risk-return relationship. Investors will feel interested in committing long-term investment in a country with lower tariff and non-tariff barriers on investment and allows repatriating capitals and profits (Adhikary, 2011). It is however, good to note that openness can also result from the level of economic growth of a country; among others Frankel and Romer (1999) have argued that economies experiencing rapid economic growth resulting from reasons other than openness are in a better chance to engage in the international trade.

5.3 Growth model specification

The chapter aims at establishing the causality relationships that exists between trade openness and economic growth in African countries, particularly Sub Saharan Africa. The variables of interest here are therefore mainly trade openness and GDP per capita. However, it is inevitable

to examine the relationships in a growth model before testing for short run and long run relationships. Based on the Marelli and Signorelli (2011) study, the growth model to be used for this study is a function of trade openness, foreign direct investment, the workforce (population aged 15 to 64 as a percentage of total population), human capital development, initial conditions and gross capital formation. Note that from the original model of Marelli and Signorelli, there is an addition of the most prominent variables that are frequently used in the literature, the augmented variables include, initial conditions, the workforce (population aged 15 to 64 as a percentage of total population) and human capital development. Moreover, the standard economic theories considers capital formation as an important factor in accelerating economic growth, where as seen above the most recent growth studies considers the quality of human capital as being instrumental in economic growth. Thus the resultant general growth model is;

$$Y_{it=} \beta_0+\beta_1 E_{it} + \beta_2 TO_{it} + \beta_3 x_i+\varepsilon_{it} \quad (5.1)$$

Where *Y* represents economic growth; *E* are the control variables that affect economic growth in country *i* at time *t* (for this study are initial conditions, the workforce, foreign direct investment ratio, gross capital formation and human capital development). *TO* refers to a measure of level of trade openness; x_i stands for country fixed effects; and ε_{it} is an error term.

However, economic growth modelling has two potential problems of inconsistency, the omitted variable bias and the endogeneity problem. The former arises when country specific effects are wrongly assumed uncorrelated with the other explanatory variables mainly because of the dynamic nature of the growth models. On the other hand, the latter problem may arise due to a failure to control for endogeneity, which might result into inconsistent estimation results (Tsangarides, 2001). In this case, it means that the ordinary linear regression cannot be

used because the zero conditional mean assumption does not hold. In econometrics perspective, three main circumstances may result into the violation of this assumption, the endogeneity, omitted variable bias and the issue of errors in variables (i.e. measurement error in the regressors).To avoid all these potential problems, the model for this study is estimated by using the instrumental variables and two stage least squares for panel data models. This is done through two estimators, the fixed effects estimator and random effect estimator. With the 2SLS, we first conduct a one stage estimation that include all the variables in the model, and then thereafter a further examination is done by instrumenting the trade openness variables in a two stage Least square approach. After obtaining the regression results, we examine the direction and strength of causality between the two variables as well as assessing the short run and long run relationships that exists between trade openness and economic growth. In the latter, unit root tests are conducted to check whether the panel data are stationary.

5.4 Data and variables

The same measure of trade openness is used (the sum of exports and imports as a proportion of GDP). Concerning the economic growth, GDP per capita growth (annual percentage) is the widely used measure in the literature (Bajwa and Siddiqi, 2011; Dowrick and Golley, 2004) and is therefore used to measure the economic growth of the sample of countries under consideration. Since the data are averaged in five years, the initial condition variable is measured by log of real GDP per capita in the first year of the five-year period under each observation (Cinyabuguma and Putterman, 2011). The secondary enrolment ratio is used as a proxy for human capital development, which measures the quality of labour (Seetanah, 2009; Seetanah, 2011). The foreign direct investment flows and the gross capital formation variables are in percentage of GDP. As for the workforce variable, we considered the ratio of population workforce (aged 15-64) as a percentage of the total population. This is considered as the most active population cadre.

All data are from the World Development indicators (2013). Data are collected for 49 countries, which represent the sample size, and the sample period covering from 1989 to 2008 inclusive (that is 20 years). The selection of countries for the sample is based on the same criteria followed in chapter four, making sure that only those countries with full data in almost all the sample period are included. In essence the same sample of countries and sample period used in chapter four is used in this chapter because the variables used in the previous chapter are included in this chapter as well. The table below (table 25) provides an account and description as well as the data sources for all the variables that will be used in this chapter.

Table 25: Variable description and sources of data

Variable	Description of a variable	Source
GDP per capita growth (annual %)	This is a dependent variable. Annual percentage growth rate of GDP per capita based on constant 2005 U.S. dollars. GDP per capita is gross domestic product divided by midyear population.	World Bank development indicators (2013)
Trade openness	Measures aggregate trade (sum of exports and imports of goods and services) as a ratio of GDP.	World Bank development indicators (2013)
Initial conditions	A measure of GDP per capita in the first year of each "five year period average" as used in this study.	World Bank development indicators (2013)
Gross capital formation (% GDP)	The variable consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements; plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and 'work in progress.'	World Bank Development Indicators (2013)
Human capital development (% of gross enrolment)	Measures secondary school enrolment as a ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	World Bank Development Indicators (2013)
Workforce (population aged 15-64 as a percentage of total)	Used as a measure of a country's active population as a ratio of total population. Total population between the ages 15 to 64 is the number of people who could potentially be economically active. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of the country of origin.	World Bank Development Indicators (2013)
Foreign Direct Investment, net inflows(%GDP)	FDI measures the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP.	World Bank Development Indicators (2013)

All the data are then organised in a panel data form and are averaged in four five-year' time periods so as to reduce the noise in data and to remove the business cycle effects in the data as well as to simplify the empirical analysis. Panel data analysis is used because it can exploit both the time series, cross sectional dimensions of data, and has proved to provide more efficient estimations of parameters by considering wider sources of variation. What's more, the use panel data, which means combining the time series dimension with the cross-sectional dimension, avails a richer set of information to exploit the relationship between the dependent and independent variables.

The variable initial conditions are converted into natural logarithm before its usage in order to ensure that the data is normally distributed and properly skewed. The rest of the data are in percentages, hence, there was no need for transforming them into natural logarithms

5.5 Growth model estimations results

In order to analyse the link between trade openness and economic growth by using the growth model, the instrumental variables and two stage least squares for panel data models approach is employed. The two stage least squares method with instrumental variables is employed because some of the covariates in the model (5.1) are endogenous (i.e. trade openness).This approach provides five different options of estimators with their variation being based on the way they treat the country individual effects. These options include the two GLS random-effects (G2SLS and EC2SLS) model, the between-effects (BE2SLS) model, the fixed effects estimator (FE2SLS) and the first differenced estimator (FD2SLS) which take away individual effects by fitting the model in first differences. As in the previous chapter, we opt for the random effect and fixed effect estimators, but we conduct these estimators in two stages.

The first stage is to run the regression treating all the variables as if they were exogenous by using the one stage within estimator and the Generalised Least Square. Subsequently, in the second stage of the regression, the trade openness is instrumented using the primary variables

that have been used in the regression analysis in chapter four for equation 5.2 and 5.3 (that is log of economic location, log of GDP per capita, trade policy and log of population). The resultant equations are presented in the specifications below;

$$GDP\ per\ capita\ growth_{it} = \beta_0+\beta_1 log(initial\ conditions_{it})+ \beta_2(Gross\ capital\ formation(\%GDP)_{it})+ \beta_3(Human\ capital\ development\ (\%\ total\ enrollment)_{it})+ \beta_4(workforce\ (population\ aged\ 15\text{-}64\%total)_{it})+ \beta_5\ log\ (openness_{it})+ \beta_6(FDI\ ratio_{it}) +\varepsilon_{it} \quad (5.2)$$

$$GDP\ per\ capita\ growth_{it} = \beta_0+\beta_1 log(initial\ conditions_{it})+ \beta_2(Gross\ capital\ formation(\%GDP)_{it})+ \beta_3(Human\ capital\ development\ (\%\ total\ enrollment)_{it})+ \beta_4(workforce\ (population\ aged\ 15\text{-}64\%total)_{it})+ \beta_5(FDI\ ratio_{it})+ \beta_6[log(openness_{it})= \beta_7\ log(GDP\ per\ capita_{it})+ \beta_8 log\ (economic\ location_{it})+ \beta_9 log(population_{it})+ \beta_{10} log(area_{it})+ \beta_{11} trade\ policy_{it} + \beta_{12} Agriculture\ (\%GDP) + \beta_{13} Mining(\%GDP)\ ] +\varepsilon_{it} \quad (5.3)$$

Where; $openness_{it}$ represents trade openness, i is the *ith* cross-section unit and t is the time of observation, β represents the coefficients of the variables and ε_{it} is the error term.

The table below presents the results for the specifications of the equations 5.2 and 5.3. The Hausman test has been applied to decide on the two models, the fixed effects and the random effects. It is a test that tests the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. In this case the results shows that they are (that is insignificant, because the P-value, Prob>chi2 larger than the critical value .05) because the Prob>chi2 is 0.44 and 0.45 for one stage and instrumented 2SLS respectively. Therefore, for this specification, the Hausman test results in both cases do not reject the null hypothesis which means that the unique errors are not correlated with the regressors, hence the individual effects can adequately be modelled by a random effects model.

Table 26: Analysis of the Economic Growth of Sub Sahara Africa

	One stage estimator (xtreg)		*Instrumented 2SLS (xtivreg)*	
Modelling Technique:	***Fixed Effects***	***Random Effects***	***Fixed Effects***	***Random Effects***
ln*initial conditions*	1.03	0.20	0.88	0.21
	(0.98)	(0.28)	(1.00)	(0.28)
Workforce	0.24	0.07*	0.23	0.06*
	(0.19)	(0.03)	(0.19)	(0.04)
Human capital (% of total)	0.01	0.01	0.01	0.01
	(0.03)	(0.01)	(0.03)	(0.01)
Gross capital formation (%GDP)	0.17***	0.14***	0.18***	0.16***
	(0.06)	(0.03)	(0.06)	(0.04)
FDI flows (%GDP)	0.05	0.15***	0.06	0.13*
	(0.09)	(0.06)	(0.09)	(0.06)
Trade Openness	0.02	0.01*	0.05	0.02*
	(0.01)	(0.00)	(0.03)	(0.01)
Hausman test		5.82 (0.44)		5.72 (0. 45)
R-square	0.26	0.52	0.28	0.48
No. of Observations	196	196	196	196
No of panel groups	49	49	49	49

Note: The dependent variable for these regression results is the GDP per capita growth. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses.

In both cases, gross capital formation and trade openness variables are highly significant, gross capital formation being highly significant (at 1% level) and trade openness is significant at 10% in all cases. The FDI and the workforce variables are statistically significant in both cases under the random effect estimator. The workforce variable is only significant with the random effect estimator both in the first stage regression and in the instrumented G2SLS. This is consistent to the assertion that it is through a skilled workforce in the economy that foreign direct investment can have a positive effect on the economic growth (Borensztein et al., 1998). The Foreign direct investment (as percentage of GDP), is also highly statistically significant with the random effect model in the one stage estimation. All coefficients for these variables take

their expected positive signs implying a positive effect on African economic growth (Alfaro et al., 2004).

The variable initial condition shows relatively lower coefficients and in both cases, it is not statistically significant, which suggests that the variable has lower influence on the economic growth. Likewise, the quality of human capital variables is not significant in all stages of both estimators. However, they take the expected signs in all four cases. FDI flows variable is not significant with the fixed effect estimator in both stages, in the same way the workforce variable is also not statistically significant, though all take the expected positive signs.

The R-square value shows that the explanatory variables together explain approximately 27% deviations in economic growth in model under the fixed effect estimator while it is approximately 50 per cent with the Generalised Least Square estimator. The estimated coefficients on trade openness are positively and significant at 10per cent, indicating that an increase in the trade openness by one percent is associated with an increase in the economic growth of the African countries by 0.02 per cent. From the variables included in the growth model, the statistical results for both equations indicates that gross capital formation has more impact on economic growth for the African economies, followed by the level of openness and then FDI flows and the workforce (population aged 15-64) as a percentage of the total population.

Table 27 presents the alternative estimation using the instrumental variables and two stage least squares for panel data models using the "first" option. This option reports the variables in the model as well as the excluded instruments so that it is possible to examine the correlation of the instruments to the endogenous variable (i.e. trade openness).

Table 27: Using the 'xtivreg' with a first option

Modelling Technique:	**First stage G2SLS regression**	**G2SLS random effect IV regression**
Initial conditions	0.06**	0.21
	(0.02)	(0.28)
Openness		0.02*
		(0.01)
Workforce (population. aged 15-64 % total)	0.03	0.06*
	(0.26)	(0.03)
Human capital (% of total)	0.14	0.01
	(0.10)	(0.01)
Gross capital formation (%GDP)	-0.53**	0.16***
	(0.26)	(0.04)
FDI flows (%GDP)	1.63***	0.13**
	(0.40)	(0.06)
lnGDPper capita	-0.09	
	(0.11)	
lnPopulation	-0.21*	
	(0.11)	
lnArea	-0.01	
	(0.02)	
lneconomic location	0.07	
	(0.11)	
Tradepolicy	0.01	
	(0.02)	
Agriculture (% GDP)	-0.58***	
	(0.17)	
Mining (% GDP)	0.31*	
	(0.18)	
No. of observation	196	196
No. of panel groups	49	49

Note: The dependent variable for these regression results is the GDP per capita growth. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. The openness variable is instrumented by *ln*GDP per capita, *l*neconomic location, *ln*population, *ln*area, trade policy, Agriculture (%GDP) and Mining(%GDP).

The first stage regression results above suggest that three of the seven excluded instruments are correlated with trade openness at different levels, the agriculture ratio is highly correlated followed by log of GDP per capita and mining ratio. The exceptions are the log of population and log of economic location and log of area. However it can be noted that conditioning on other variables included in the model, trade openness seem to play a relatively less role in determining the economic growth of the African countries. The rest of the variables present the same picture as discussed in table 26 above except for the initial conditions variable. These estimation results on the log of initial conditions shows that the variable is statistically significant and have relatively higher coefficients, implying a significant impact on economic

growth in African countries. In any case the regression results indicate that trade openness and economic growth has positive relationship. Though the level of statistical significance is not that promising, still a positive relationship guarantees policy makers in the African countries that any effort to boost up trade levels in their economies will have desirable positive impacts on their economic growth rates.

5.6 Further examination on the nature of relationships and the direction of causality

This part will not only establish whether there is a short run or long run relationship between trade openness and economic growth for the African countries, but will also examining the existence of either uni or bi-directional causality between trade openness and economic growth. For this examination the extended sample period is used, from the previously used 1989 to 2008 now the sample period is 1980 to 2011. The reason being the variables that are of interest do not have missing values as it was the case with some of the variables in the previous dataset.

The first step is to test the data to detect if they have any unit root, to ensure that they are stationary. This will ensure appropriate model specification and an avoidance of arriving at misleading results (Onofowora and Owoye, 1998). Only after establishing that the data for the variables are not stationary at level is when cointegration tests can be done. If the data for both variables are stationary this could mean that they are also cointegrated and therefore the necessity of running the short run causality tests to establish the direction of causality. The Granger causality test is conducted to establish the causality direction, the test aims at determining as to whether the variables have a unidirectional or bi directional causality.

5.6.1 Tests for unit root for panel data

To conduct these tests the panel unit root tests are employed, which are essentially multiple series tests that have been applied to the panel data structures. The intention of testing for unit root aims at checking whether the data have their mean around zero.

There are various tests for testing the unit root in a dataset ranging from the Levin, Lin & Chu (2002), Breitung (2001), Im, Pesaran and Shin (2003), and Fisher type tests by Choi (2001). The study conducted all these tests to check for stationarity in the data. Despite the fact that the entire test gave same results, table 36 reports only two unit root tests (Im, Pesaran and Shin and Fisher type). These tests allow heterogeneity, in the sense that they allow for different autoregressive (AR) structure for all of the series in the panel. Under this group, there are Im, Pesaran, Shin (IPS *t*- bar tests) by Im, et al. (2003) and Fisher-type by Choi, (2001). These tests are both referred to as unit root tests with individual unit root processes, they has as the null hypothesis that all the panels have a unit root (Levin et al., 2002; Breitung, 2002; Im et al., 2003; Choi, 2001).

The choice of these two tests is also based on the nature of data, while their counterparts assume panels of data are balanced and therefore cannot be applied in a situation of unbalanced panel data, Im, Pesaran and Shin and Fisher type tests have proved to work perfectly with the unbalanced data panels, though there cannot be gaps in a panel. They are therefore chosen because the panel dataset in use involves a large number of African countries which in most cases does not have all the data for the whole sample period. These tests also have been recommended as performing well in combining individual unit root tests applied on each time series when the panel data that are heterogeneous and non-stationary are used. They thus derive the panel specific unit root from combining of individual unit root tests.

The Fisher type tests are devised for finite *N* as well as infinite *N*; they assume that each individual panel has different types of non-stochastic and stochastic component; and that the time series span are different for each of the panels. Both test settings, assume that the alternative hypothesis is that *some of the panels have a unit root while other panels does not*. Under the Fisher type tests settings, the main idea is to combine p-values from the unit root tests applied to each panel. For IPS *t*-bar test is a t-bar statistic based on the augmented Dickey-Fuller statistic (Dickey and Fuller, 1979), the test statistic is computed by the sample mean of the individual unit root tests for each panel. Therefore, while both tests combine information based on individual unit root tests, the crucial difference between the two is that the IPS test is based on combining the test statistics while the Fisher-type test is based on combining the significance levels of the individual tests (Maddala and Wu, 1999).

The framework

Consider a sample of *N* cross sections (i.e. countries) observed over *T* time periods (1980 - 2011). The stochastic process, y_{it} , is generated by the first-order autoregressive process:

$$y_{it} = (1 - \emptyset_i)\mu_i + \emptyset_i y_{i,t-1} + \varepsilon_{it}, \quad I = 1, \ldots N, \; t = 1, \ldots, T, \tag{5.4}$$

Where;

Initial values, y_{i0}, are given. The interest is in testing the null hypothesis of unit roots $\emptyset_i = 1$ for all *i.*

The equation (5.4) above can be expressed as;

$$dy_{it} = \alpha_i + \beta_i y_{i,t-1} + \varepsilon_{it}, \tag{5.5}$$

Where; $\alpha_i = (1 - \emptyset_i)\mu_i$, , $\beta_i = -(1 - \emptyset_i)$ and $dy_{it} = y_{it} - y_{i,t-1}$

The null hypothesis of the unit roots then becomes;

$H_0 : \beta_i = 0$ for all i (5.6)

Against the alternatives that allows for some of the cross section in the panel to have unit roots (i.e. at least one is stationary),

$H_1: \beta_i < 0 , \quad i=1,2,...,N_1, \quad \beta_i = 0, \quad i = N_1 + 1, N_1 + 2, ..., N.$ (5.7)

The formulation of this alternative hypothesis allows β_i to differ across cross sections, hence allowing for heterogeneity.

Table 28: Panel Unit root Tests Results 1980 -2011(by using Im, Pesaran and Shin test, and Fisher type test).

	IPS		**Fisher - ADF**		**Fisher - PP**		**Conclusion**
	Intercept	***Intercept and trend***	***Intercept***	***Intercept and trend***	***Intercept***	***Intercept and trend***	
Openness	-2.55*** (0.00)	-4.21*** (0.00)	159.37*** (0.00)	194.15*** (0.00)	145.49*** (0.00)	169.87*** (0.00)	I(0)
GDPpp growth	-21.31*** (0.00)	-22.04*** (0.00)	735.05*** (0.00)	757.76*** (0.00)	910.26*** (0.00)	1461.92*** (0.00)	I(0)
FDI (% GDP)	-10.68*** (0.00)	-10.19*** (0.00)	375.87*** (0.00)	354.04*** (0.00)	390.34*** (0.00)	346.52*** (0.00)	I(0)
Gross Capital Formation (% GDP)	-4.45*** (0.00)	-3.39*** (0.00)	212.81*** (0.00)	230.04*** (0.00)	189.93*** (0.00)	162.08*** (0.00)	I(0)
Quality of Human Capital (% of total)	-9.62 *** (0.00)	-6.92*** (0.00)	299.92*** (0.00)	239.51*** (0.00)	332.39*** (0.00)	336.37*** (0.00)	I(0)
Workforce (aged 15 - 64 % total population)	-3.15*** (0.00)	14.03 (1.00)	184.15*** (0.00)	58.68 (1.00)	110.92 (0.51)	16.05 (1.00)	I(0)

Notes: * Rejects the null of a unit root at the 10% significance level, ** Rejects the null of a unit root at the 5% significance level, *** Rejects the null of a unit root at the 1% significance level. Probabilities in parentheses.

The table above presents the results for the unit root test for all the variables of interest in both level and in first difference. The table presents only two unit root tests, but it is good to note as mentioned earlier that the test was done using all the unit root tests mentioned above. The results for all the tests were the same, that is, all the variables were stationary at level.

Therefore, this shows that despite the choice of the two tests, the data are proved to behave in the same way with the other unit root tests as well.

The results show that for all variables both IPS and Fisher type tests for unit roots reject the null hypothesis of non-stationary at level. For that reason, the tests results do reject the null hypothesis of non-stationary at level with both individual effect and individual linear trend effects. By the fact that both variables are rejecting the null hypothesis at the order of I(0), it means that trade openness and economic growth (as measured by GDP per capita) are integrated to the order of one I(0). Since they are integrated of the same order, it also mean that they are cointegrated as well.

5.6.2 Panel Granger causality test

So far, the relationships that exist between the variables have been established; however the existing relationship does not prove anything on the causality or direction of influence. A common sense logic of causality may start from the axiom that, time always forge ahead, never backward (Koop et al., 2000). Thus, since a certain event A happened before event B, one can conclude fallaciously that there is a possibility that event A caused the happening of event B (i.e. past events can cause the current events). But sometimes both the variables A and B fail to Granger cause each other, in this case they are said to be independent variables. There is also a possibility that A Granger causes B, meanwhile B Granger causes A (this is referred to as bi-directional causality).

Under Granger causality, if variable A (Granger) causes variable B, then changes in A must precede changes in B. Hence when regressing B on other variables (including the past values of B) if the lagged values of A are included and they improves the prediction of B, then it can be concluded that A (Granger) causes B. Similar case will be for the case where B (Granger) causes A.

The main idea under this test is to predict the existence and direction of causality; whether it is running from trade openness to GDP per capita or from GDP per capita to trade openness, or runs from both directions (bi directional). This is known as *bilateral causality* as there are only two variables under consideration, in case where more than two variables are involved, hence multivariable causation, the relevant technique would be the *Vector Autoregression* (VAR). Granger causality test involves the estimation of the following pair of regressions:

$$y_{i,t} = \alpha_{1,t} + \sum_{l=1}^{mly_i} \beta_{1,i,l}\, y_{i,t-l} + \sum_{l-i}^{mlx_i} \gamma_{1,i,l}\, x_{i,t-l} + \varepsilon_{1,i,t} \quad (5.8)$$

$$x_{i,t} = \alpha_{2,t} + \sum_{l=1}^{mly_i} \beta_{2,i,l}\, y_{i,t-l} + \sum_{l-i}^{mlx_i} \gamma_{2,i,l}\, x_{i,t-l} + \varepsilon_{2,i,t} \quad (5.9)$$

Where; index *i* refers to the country (*i = 1,..., N*), *t* to the time period (*t=1,..., T*) and *l* to the lag. $\varepsilon_{1,i,t}$,$\varepsilon_{2,i,t}$represents the white noise errors that may be correlated for a given country but not across countries. It is also assumed that y_t and x_t are stationary or cointegrated and in this case at first difference of GDP per capita and trade openness respectively.

With respect to this method, in country *i* there is one way Granger causality running from *X* to *Y* if in the first equation not all $\gamma_{1,i}$'s are zero but in the second all $\beta_{2,i}$'s (regression coefficients) are zero, there is one way Granger causality from Y to X if in the first equation all $\gamma_{1,i}$'s (autoregressive coefficients)are zero but in the second not all$\beta_{2,i}$'s are zero, there is two way Granger causality between Y and X if neither all $\beta_{2,i}$'s nor all $\gamma_{1,i}$'s, are zero, and there is no Granger causality between Y and X if all $\beta_{2,i}$'s and $\gamma_{1,i}$'s are zero. The evaluation of the null hypothesis that *x* does not Granger cause *y* can be done by estimating an equation in which *y* is regressed on lagged values of *y* and the lagged values of an additional variable *x*. To *reject* the null hypothesis that *x* does not Granger cause *y* (i.e. concluding that *x* Granger cause *y*), one or more of the lagged values of *x* must be significant. Despite the fact that Granger causality

tool has been considered to be imperfect, it is, yet a standard and helpful tool for assessing the causality relationship between two variables.

The most reported weakness of the panel Granger tests despite their advantages is the inappropriate assumption of *causal homogeneity*. Of course, this is true for most of the panel data analysis, the flaw of making inferences on causal relationships in all individual cross section units while it sometimes exists in only some of the individual cross sections. This may as well be true on the other way round, rejecting the existence of causality for the whole group of cross section individuals while actually there exists some causal relationships in some of the individual cross sections in the panel.

However, it is also good to note that the outcome of the Granger test is sensitive to the number of lags introduced in the regression model. This is because too few or too many lags are problematic, too few lags means some important variables are omitted hence specification error that leads to biasness in the retained regression coefficients, leading to erroneous conclusions. Likewise too many lags leads to specification error indicating wasteful observations, hence increasing the standard errors of the estimated coefficients leading to false conclusions (Konya 2006).The results in the table 38 are based on the lag of 2, however whatever lag that could be chosen between 1 to 10 gives the same results in terms of significance and the nature of causality.

The short-run causality tests by using Granger reveal that there exists a high statistical significant uni-directional short run causal relationship between trade openness and GDP per capita growth. The direction of causality runs from economic growth to trade openness indicating that economic growth induces trade flows in Africa. This implies that African countries could boost their trade openness ratios by enhancing their economic development. The results supports growth led hypothesis for the African countries.

Table 29: Short run causality test by Granger

Dependent variables	Source of Causation (independent variables)	
	Trade openness	*GDP per capita growth*
	F – Statistic (p- value)	
Trade openness	-	8.21*** (0.00)
GDP per capita growth	0.03 (0.97)	-

Note: the values in the parenthesis are the probability of rejecting the null of non-causality. * Rejects the null of non-causality at the 10% significance level; and, ** Rejects the null of non-causality at the 5% significance level.

The results above do not give the detailed Granger causality for the variables for each individual African country. It is inevitable to have a look on the detailed individual African countries considering the fact that most of these countries significantly differ from one another, so they could have different economic growth experiences and hence the causality directions between trade openness and economic growth. Economies of these African countries as discussed in chapter two differs due to factors such as civil wars in some of these countries, different extent of foreign aid they receive, the differences in climatic conditions, and differences in natural resources endowments.

However for this to be done requires a cross section data analysis rather than the previously used panel dataset. The sample size is altered as four countries (Djibouti, Libya, Somalia and Eritrea) were removed from the sample due to many gaps in the data as a result of which the Granger causality test could not workout. The sample period for this cross sectional data is 2012. It is expected that testing for Granger causality for each country in the sample will also help to explain the differences between countries. Table 39 below shows mixed results for the different African countries.

In fact the dominant hypothesis for the 34.8 per cent of the African countries in the sample is the export led growth hypothesis. This group is a composition of 16 countries (Burkina Faso, Cameroon, Chad, and Cot d'Ivoire, Egypt, Eritrea, Ethiopia, Gabon, Guinea Bissau, Morocco,

Namibia, Niger, Nigeria, Tanzania, Uganda and Zambia). Several studies have recommended this hypothesis than any other particularly for the developing countries like most of the African countries. This is based on the fact that with the export promotion hypothesis African countries can expand their limited domestic markets by making use of the international markets through exports of their products (Chow, 1987). However the export led hypothesis would be much more advantageous for the African countries if it would not only result into increased in real incomes but also if it would result into economic structural transformation of these economies.

This is important because in order for these countries to achieve sustained economic growths, promotion of trade openness presupposes a well-established set of institutions and investment strategies. The importance of having well established domestic institutions and investments strategies lies on the fact that the world has been facing several international economic problems. One of which is the increasing protectionism especially for developed countries which has effects on the developing countries trying to open up their economies. Studies show that the collapse of the world trade (by US$43 billion) during the 2008 crisis was as a result of increased tariffs on major imported products in Russia, China, Argentina and Turkey. It was also due to higher antidumping duties in the United States and the EU (Kee et al., 2013).

Most of these economies impose restrictions on the free flow of trade on the grounds of national welfare, while they are advocated by and greatly for the benefit of small minority of producers in the economy at the expense of mostly silent majority of consumers (Salvatore, 1998). It is even more challenging with the tendency of the world to break up in three major blocks, a North American block (i.e. US, Canada and Mexico), a European trading block and Asian trading block. With these tendency towards protectionism by developed economies and the creation of blocks, poor African economies are left hanging, even in their efforts to adopt openness strategies so as to boost their economies proves futile.

There is also an excessive volatility of exchange rates as a challenge facing international economics. The pattern of international trade and specialisation is greatly affected by large fluctuations of national currencies as well as persistent exchange rates disequilibrium. Besides it causes the instability in global international financial conditions. For unstable economies with feeble domestic financial and institutional system like the African economies, opening up to the world market may be disastrous leading a country into experiencing disadvantages of openness.

The results in table 30 also indicate that 13.0 per cent of the African economies in the sample show preference of growth led hypothesis. Countries in this group include Angola, Ghana, Guinea, Kenya, Seychelles and Tunisia; whereas only 8.7 per cent indicates a bi directional causality between trade openness and economic growth.

Table 30: Granger causality Wald tests for individual African countries (Lags 5)

Null Hypothesis	F-statistic	Probability
Algeria's lagged values of trade openness does not Granger cause GDP per capita growth	0.8011	0.5641
Algeria's lagged values of GDP per capita growth does not Granger cause trade openness	1.6771	0.1940
Angola's lagged values of trade openness does not Granger cause GDP per capita growth	2.5879	0.0944
Angola's lagged values of GDP per capita growth does not Granger cause trade openness	***4.9693***	***0.0149***
Benin's lagged values of trade openness does not Granger cause GDP per capita growth	2.0173	0.1276
Benin's lagged values of GDP per capita growth does not Granger cause trade openness	1.5083	0.2393
Botswana's lagged values of trade openness does not Granger cause GDP per capita growth	***2.8533***	***0.0493***
Botswana's lagged values of GDP per capita growth does not Granger cause trade openness	***3.4521***	***0.0256***
Burkina Faso's lagged values of trade openness does not Granger cause GDP per capita growth	***2.877***	***0.0480***
Burkina Faso's lagged values of GDP per capita growth does not Granger cause trade openness	0.33131	0.8538
Burundi's lagged values of trade openness does not Granger cause GDP per capita growth	1.1316	0.3794
Burundi's lagged values of GDP per capita growth does not Granger cause trade openness	0.10774	0.9892
Cameroon's lagged values of trade openness does not Granger cause GDP per capita growth	***3.3337***	***0.0264***
Cameroon's lagged values of GDP per capita growth does not Granger cause trade openness	0.62039	0.6861
Central Africa Republic's lagged values of trade openness does not Granger cause GDP per capita growth	1.6074	0.2095
Central Africa Republic's lagged values of GDP per capita growth does not Granger cause trade openness	2.3836	0.0840
Chad's lagged values of trade openness does not Granger cause GDP per capita growth	***4.4836***	***0.0079***
Chad's lagged values of GDP per capita growth does not Granger cause trade openness	0.15731	0.9750
Congo's lagged values of trade openness does not Granger cause GDP per capita growth	2.4155	0.0765
Congo's lagged values of GDP per capita growth does not Granger cause trade openness	0.83672	0.5408
Cote d'Ivoire's lagged values of trade openness does not Granger cause GDP per capita growth	***8.2656***	***0.0003***
Cote d'Ivoire's lagged values of GDP per capita growth does not Granger cause trade openness	0.47718	0.7885

Null Hypothesis	F-statistic	Probability
D.R.C's lagged values of trade openness does not Granger cause GDP per capita growth	0.56938	0.7225
D.R.C's lagged values of GDP per capita growth does not Granger cause trade openness	0.32143	0.8935
Djibouti's lagged values of trade openness does not Granger cause GDP per capita growth	2.9518	0.0693
Djibouti's lagged values of GDP per capita growth does not Granger cause trade openness	0.53504	0.5917
Egypt's lagged values of trade openness does not Granger cause GDP per capita growth	***3.429***	***0.0237***
Egypt's lagged values of GDP per capita growth not Granger cause trade openness	0.5152	0.7614
Equatorial Guinea's lagged values of trade openness does not Granger cause GDP per capita growth	***8.0177***	***0.0004***
Equatorial Guinea's lagged values of GDP per capita growth does not Granger cause trade openness	***4.3112***	***0.0094***
Eritrea's lagged values of trade openness does not Granger cause GDP per capita growth	***7.083***	***0.0008***
Eritrea's lagged values of GDP per capita growth does not Granger cause trade openness	0.61825	0.6876
Ethiopia's lagged values of trade openness does not Granger cause GDP per capita growth	***5.8085***	***0.0023***
Ethiopia's lagged values of GDP per capita growth does not Granger cause trade openness	0.89956	0.5025
Gabon's lagged values of trade openness does not Granger cause GDP per capita growth	***8.8078***	***0.0011***
Gabon's lagged values of GDP per capita growth does not Granger cause trade openness	0.58228	0.5655
Gambia's lagged values of trade openness does not Granger cause GDP per capita growth	1.7701	0.1699
Gambia's lagged values of GDP per capita growth does not Granger cause trade openness	0.45545	0.8039
Ghana's lagged values of trade openness does not Granger cause GDP per capita growth	0.71634	0.4976
Ghana's lagged values of GDP per capita growth does not Granger cause trade openness	***3.7343***	***0.0370***
Guinea's lagged values of trade openness does not Granger cause GDP per capita growth	1.5138	0.2349
Guinea's lagged values of GDP per capita growth does not Granger cause trade openness	***3.4525***	***0.0231***
Guinea Bissau's lagged values of trade openness does not Granger cause GDP per capita growth	***3.2331***	***0.0551***
Guinea Bissau's lagged values of GDP per capita growth does not Granger cause trade openness	0.28378	0.7552
Kenya's lagged values of trade openness does not Granger cause GDP per capita growth	0.53149	0.7497
Kenya's lagged values of GDP per capita growth does not Granger cause trade openness	***2.9601***	***0.0402***
Lesotho's lagged values of trade openness does not Granger cause GDP per capita growth	1.3394	0.2927
Lesotho's lagged values of GDP per capita growth does not Granger cause trade openness	0.92489	0.4877
Liberia's lagged values of trade openness does not Granger cause GDP per capita growth	0.51435	0.7620
Liberia's lagged values of GDP per capita growth does not Granger cause trade openness	0.20799	0.9548
Libya's lagged values of trade openness does not Granger cause GDP per capita growth	2.8313	0.0765
Libya's lagged values of GDP per capita growth does not Granger cause trade openness	0.23857	0.7894
Madagascar's lagged values of trade openness does not Granger cause GDP per capita growth	0.62897	0.6800
Madagascar's lagged values of GDP per capita growth does not Granger cause trade openness	0.6291	0.6799
Malawi's lagged values of trade openness does not Granger cause GDP per capita growth	2.5274	0.0986
Malawi's lagged values of GDP per capita growth does not Granger cause trade openness	3.0928	0.0617
Mauritania's lagged values of trade openness does not Granger cause GDP per capita growth	1.294	0.3099
Mauritania's lagged values of GDP per capita growth does not Granger cause trade openness	1.4456	0.2560
Mauritius's lagged values of trade openness does not Granger cause GDP per capita growth	2.5067	0.0686
Mauritius's lagged values of GDP per capita growth does not Granger cause trade openness	2.275	0.0907
Morocco's lagged values of trade openness does not Granger cause GDP per capita growth	***3.7011***	***0.0380***
Morocco's lagged values of GDP per capita growth does not Granger cause trade openness	0.55158	0.5824
Mozambique's lagged values of trade openness does not Granger cause GDP per capita growth	0.96555	0.4646
Mozambique's lagged values of GDP per capita growth does not Granger cause trade openness	0.5234	0.7555
Namibia's lagged values of trade openness does not Granger cause GDP per capita growth	***6.4002***	***0.0053***
Namibia's lagged values of GDP per capita growth does not Granger cause trade openness	0.69089	0.5098
Niger's lagged values of trade openness does not Granger cause GDP per capita growth	***4.4979***	***0.0078***
Niger's lagged values of GDP per capita growth does not Granger cause trade openness	2.5816	0.0627

Null Hypothesis	F-statistic	Probability
Nigeria's lagged values of trade openness does not Granger cause GDP per capita growth	***4.1374***	***0.0112***
Nigeria's lagged values of GDP per capita growth does not Granger cause trade openness	0.10042	0.9908
Rwanda's lagged values of trade openness does not Granger cause GDP per capita growth	***3.2247***	***0.0298***
Rwanda's lagged values of GDP per capita growth not Granger cause trade openness	***6.0261***	***0.0019***
Senegal's lagged values of trade openness does not Granger cause GDP per capita growth	2.3085	0.0871
Senegal's lagged values of GDP per capita growth does not Granger cause trade openness	1.6112	0.2077
Seychelles' s lagged values of trade openness does not Granger cause GDP per capita growth	1.2395	0.3318
Seychelles' lagged values of GDP per capita growth does not Granger cause trade openness	***7.5168***	***0.0006***
Sierra Leone's lagged values of trade openness does not Granger cause GDP per capita growth	2.3715	0.0807
Sierra Leone's lagged values of GDP per capita growth does not Granger cause trade openness	0.95221	0.4721
Sudan's lagged values of trade openness does not Granger cause GDP per capita growth	1.0108	0.4399
Sudan's lagged values of GDP per capita growth does not Granger cause trade openness	1.0854	0.4016
Tanzania's lagged values of trade openness does not Granger cause GDP per capita growth	***3.939***	***0.0137***
Tanzania's lagged values of GDP per capita growth does not Granger cause trade openness	1.0992	0.3949
Togo's lagged values of trade openness does not Granger cause GDP per capita growth	0.80132	0.4591
Togo's lagged values of GDP per capita growth does not Granger cause trade openness	0.45999	0.6361
Tunisia's lagged values of trade openness does not Granger cause GDP per capita growth	1.4625	0.2506
Tunisia's lagged values of GDP per capita growth does not Granger cause trade openness	***5.0319***	***0.0047***
Uganda's lagged values of trade openness does not Granger cause GDP per capita growth	***5.1588***	***0.0047***
Uganda's lagged values of GDP per capita growth does not Granger cause trade openness	0.94342	0.4584
Zambia's lagged values of trade openness does not Granger cause GDP per capita growth	***3.9071***	***0.0323***
Zambia's lagged values of GDP per capita growth does not Granger cause trade openness	0.04414	0.9569
Zimbabwe's lagged values of trade openness does not Granger cause GDP per capita growth	***5.7073***	***0.0025***
Zimbabwe's lagged values of GDP per capita growth does not Granger cause trade openness	***4.8202***	***0.0057***

For these countries the implication is that trade openness and economic growth are mutually beneficial and reinforce each other (Chow, 1987; Klasra, 2011). The results also indicate a large number of countries with no conclusive implication for causality direction. For these countries which represent 43.5 percent of the sample, the implication could be that the adoption of other strategies other than export led or growth led hypothesis might result into economic growth (Sarkar, 2008).

5.7 Conclusion

Chapter five has examined the effects of trade openness on economic growth for the African countries, it has also examined the short-run and the long-run dynamics of the relationship between trade openness and GDP per capita annual growth as a proxy for economic growth for a sample of African countries. The test for stationary, which is done by the IPS and Fisher type

tests, indicates that the data are stationary at level, which confirms that the two variables have stationary linear combination (are cointegrated) indicating that the economic growth for the African countries portrays a long run relationship with their levels of trade openness.

These relationships are confirmed by Granger causality test to be uni-directional, running from economic growth to trade openness. However this is for the African countries as a whole because individual countries granger causality tests indicates mixed results. The policy implications of these results to policy makers is that comparatively permanent economic growth shocks induce larger long-run trade openness level responses, than the effect of permanent trade openness shocks on long-run economic growth. Therefore concentrating on enhancing policies that induce permanent economic growth may bring about the large positive long run trade openness changes for the African countries. In a way these conclusions supports the growth-driven export hypothesis discussed earlier in this chapter.

However as some of the individual countries Granger causality Wald tests indicates, there are also cases where the causality runs from trade openness to economic growth. The implication of which is that economies should seek for adoption of outward oriented policies for them to achieve economic growth. However this has not been straight forward for many African countries. Deriving positive impacts from the integrating in the world economy, policy makers in African countries need to understand the effects of globalisation having in mind the set-up of their own countries. This is because globalisation has proved to oppose the notion of '*one size fits all'*. African countries need to know how to manage the openness strategies they adopt so as to maximize the benefits of outward oriented strategies in the same time minimising the risks. This is in line with the argument by Rodrick (1999) who argues that openness has potential benefits, but for these benefits to be realised the beneficiaries need to have quality and well established complementary policies and institutions. Proper institutions and policies

can protect these growing economies from external shocks and any possibility of domestic quarrels and political turmoil that could be produced. Thus, despite the economic development anxiousness that African countries might have, an emphasis of adopting openness through encouraging exports and direct foreign investments (alone) without strengthening their institutions and domestic policies could be hazardous. The end result in most cases has not been what was intended but rather ending up with economies that are doomed to disappointment and failure. Policy makers need to know that openness is a mixed blessing and it need to be nurtured well to have guaranteed positive results to the economy.

CHAPTER SIX

DETERMINANTS OF AFRICAN BILATERAL TRADE FLOWS

6.1 Introduction

Studies on the analysis of bilateral trade flows between a pair of countries have considered either developing countries alone or a pair of developing and developed country (Baldwin and Taglioni, 2011; Zannou, 2010; De Castro, 2012). For most of the studies developing countries have been considered as a dummy variable with an argument that, including developing and developed countries in the same sample for regression analysis results into biased results hence a heterogeneity problem (Fontagné and Freudenberg, 2002). It is also argued that the economic difference between these economies being so huge make income likely to be a substitute for differences in degree of development instead of the ability of income growth to stimulate trade (Tansey and Touray, 2010). Nevertheless, the literature also asserts that differences in economic size among countries will encourage more trade (Islam et al., 2014) this contention is worthy examining by having a sample that contain economies that differs in size.

This chapter examines the determinants of intra African bilateral trade flows on one hand, and it also examines the determinants of both the trade flows of African countries with the OECD and that of African countries with the emerging trading partners to Africa, namely Brazil, Russia, India and China (the BRIC[20]). These countries are part of the five largest emerging economies (the other being South Africa) that accounts for about 20 per cent of the world output and 27 per cent of the global trade flows (De Grauwe et al., 2012). Their shares in the world merchandise exports in 2011 were 11 percent (China), 3 per cent (Russia), 2 per cent (India) and 1 per cent (Brazil). The inclusion of the OECD and the emerging countries is based

[20] Other countries which are potentially considered for membership include Israel, Nigeria, Mexico, Indonesia, Iran and Egypt (Chen and Lambaerde, 2013)

on the fact that they together account for 91.7 per cent of the total African trade (OECD, 2011). Moreover they are included for comparative purpose as well as examining the external openness on the African countries.

Table 31: African trade by trading partner

(Figures as a percentage of total African merchandise trade)

	1992	**2000**	**2005**	**2009**
OECD	81.8	73.6	68.5	60.6
Intra Africa	3.4	9.8	9.5	9.2
Brazil	1.0	1.6	2.3	2.5
China and Hong Kong	1.7	4.2	7.6	13.5
India	1.3	2.1	2.1	4.9
Russia	…	0.5	0.7	1.0
Total	**89.2**	**91.8**	**90.7**	**91.7**
Non OECD Total	18.2	26.4	31.5	39.4

S**ource:** OECD Report, 2011

While for some decades now the OECD accounted for the largest share of African trade, as it can be seen from the table above the trend is now changing, the share of non-OECD countries in Africa's trade has risen from 26.4 per cent in 2000 to 39.4 per cent in 2009. China (taken as a single country) may soon take a lead considering the rate of growth with which it trades with African countries. For instance, China's share in the Africa's trade has risen from less than 1 per cent (1980's) to 13.5 per cent (Africa's imports) and 11 per cent (Africa's exports) in 2009; besides China accounts for more than any individual European country in Africa's trade (De Grauwe et al., 2012). In 2011, as Africa's largest trading partner, China's trade deals totalled $160 billion. The focus of this chapter is to examine factors that affect bilateral trade between African countries (intra African trade) as well as between African countries and the OECD on one hand and the BRIC son the other hand. It also examines how these trade flows compare to each other. The purpose being, to examine whether factors that determine bilateral trade between African countries and the OECD countries are significantly different from those that

determine trade between African countries trade with the BRICs countries (China, Brazil India and Russia). The analysis also helps to examine determinants for intra-African bilateral trade.

Though bilateral trade has been widely examined, this chapter brings some novelty in that it considers the bilateral trade flows between African countries to OECD countries and major emerging economies. Besides, so far there is a gap in the literature in that no study has done a research concerning African countries trade flows with the largest emerging economies where this study takes on and considers four of the BRICS economies (see table 40).The chapter also includes some new variables such as credit to private sectors operation in the economy, arable land as a percentage of total land mass as well as mobile cellular subscriptions. Furthermore, the study is different from many other gravity model studies in terms of the empirical analysis that is applied. The chapter make use of panel data, different from those other studies that probably avoid this because of the fear to deal with large datasets of bilateral trade (Aitken, 1973; Frankel et al., 1995a; Bergstrand, 1985). An advantage of using gravity model in a panel dataset is that it is possible to explicitly test the changes in trade patterns over time and examine how these changes differ across different regions in question. This is more thoroughly done than just clumsily examining trade patterns changes in a particular one year as can be expected in cross section studies.

The examination is conducted by use of the renowned gravity model technique, which has proved to be powerful in explaining different scenarios in international trade issues, particularly bilateral trade. The study estimates a gravity model to examine the determining factors behind the intra-African bilateral trade flows and the bilateral trade flows between Africa and the BRIC and OECD countries. It employs the Instrumental Variable (IV) estimation techniques the System Generalised Methods of Moments (System GMM) and that developed by Hausman and Taylor in 1981 in order to take care of the endogeneity and biasness resulting from

omission of variables. As expected the main findings indicates that the African bilateral trade flow within, and with the BRIC and OECD countries is explained greatly by the traditional gravity variables. In addition to those variables the study examines three new variables examined by this chapter were also found to affect bilateral trade positively, especially for the intra African bilateral trade. These are domestic credit to private sector, arable land as a percentage of the total land and the mobile cellular subscriptions.

The intra-African bilateral trade is also determined by the fact that countries in pair belong to the same regional trade agreement. This together with the sharing of the same border and the use of common official language accounts for proximity between the trading partners and therefore reducing the transaction risk and costs. Yet an account of bilateral trade in African countries cannot leave aside the trade deterring factors such as landlocked and the distance. The regression results indicates that trade within Africa as well as with countries outside Africa (e.g. OECD and the BRIC) is expected to be negatively affected by these factors. This is based on the fact that infrastructure is not efficient in these countries, hence the transportation costs becomes high. Population as a variable has its contribution as it can act as a possible attractive indication for potential market. Finally the level of development which in this study is measured by GDP per capita has a considerable contribution to the volumes of bilateral trade between African countries. South Africa and Nigeria which represent the two largest economies in the continent account for a large portion of intra Africa bilateral trade as well as of Africa's trade with the countries abroad.

The rest of the chapter will proceed as follows; following will be the review of salient literature on the dynamics of bilateral trade in the African countries, thereafter the general model is specified together with a description of data for the study. Section three provides the estimation

technique, followed by empirical results and discussion. Finally, a conclusion and policy implications is presented.

6.2 The dynamics of bilateral trade in Africa

6.2.1 Trends in African trade and gravity equation variables

According to World Bank (2013), from 1960–2011 Africa's exports grew at a mean rate of 2.6 percent per annum. The mean annual growth rate of imports was faster than that of the exports, at 4.1 percent. While for Sub-Saharan Africa alone the export mean growth rate was almost similar to imports rate that is, 1.8 for exports and 2.1 for imports. Likewise, the total trade as a percentage of GDP for Africa as a whole had a mean value of 55.7 percent with a mean growth rate of 0.24 per cent per annum. It is therefore obvious that for over the past five decades exports grew at a lower rate than the imports did. Besides, the growth of total trade as a percentage of GDP has been very small (less than 0.5 per annum) over the past 52 years. Contrary to the BRIC countries which for the same period experienced the growth of their exports at a mean rate of 9.05 per cent while imports grew at a rate of 5.7 per cent. As for the OECD countries, exports grew at a mean rate of 7.4 per cent, while imports at a mean rate of 5.6 per cent.

Taking Sub Sahara African alone (excluding South Africa and Nigeria), the data shows an even a worse picture. For the same period (from1960 to 2011), the exports grew at a mean annual rate of 0.1 percent, while imports at 2.2 per cent. The mean value for the total trade as a ratio of GDP for the whole period was 55.9 per cent and had been declining at a mean rate of 0.01 annually. The volume of trade as a ratio of GDP has been declining despite the fact that Africa's GDP rate of annual growth has been 3.8 per cent on average for the whole period from 1960 to 2011 (WorldBank, 2013). This confirms the claim by (Coe and Hoffmaister, 1999)that despite the fact that Africa's GDP has been growing more slowly than other regions since 1970's, it

has risen more rapidly than trade. Compared to Asia and Latin America countries during the same period; to these regions trade has risen more rapidly than their respective GDP. Thus what is observed in Africa is contrary to the predictions of the gravity model, which predicts that the trade volumes between countries increase as their respective GDP increases.

Specifically, the standard gravity model predicts the trade intensity between countries by using their respective economic size and the distance between them. However, Coulibaly and Fontagne (2006) argue that the existence of untapped trade potentials in the Sub Sahara African countries trade proves that the limited intra-sub Saharan African trade is not justified by the economic size of the exporting and the importing economies. On the contrary, they argue that geography, the fact that Africa has a large percentage of landlocked countries coupled with poverty which creates trading costs. Generally landlocked countries are disadvantaged in terms of trade, however comparatively African countries that are landlocked are more disadvantaged than the developed landlocked countries. This is because they trade less than their counterparts. On average, the export ratio for SSA land locked countries is less than 30 percent while the developed countries' landlocked country is 50 percent. However, the total trade as a ratio of GDP data reveals that for the period from 1990 to 2012 average trade ratio mean value for the non-landlocked African countries is 71.68 per cent while for landlocked African countries was 65.81 per cent while that of developed countries was 139.91percent (WorldBank, 2013).

Table 32 below provides a more detailed mean values; Swaziland and Lesotho are outliers probably because they are countries surrounded by South Africa which has been the strongest economy in Africa for so long before Nigeria took the top position (BBC News Business, 2014). It can therefore be argued that the geographical and infrastructural characteristics poses a sizable obstructions on bilateral trade in the SSA countries(Coulibaly and Fontagné, 2006); a 10 percent increase in the paved roads that joins a pair of two trading countries is believed to

induce a 17 to 30 per cent in trade between the two countries. This only means that transport costs are higher for African land locked countries than it is with the developed land locked countries.

Table 32: Mean values of trade volume as a ratio of GDP for the period from 1990 to 2012

Developing landlocked countries - African Countries				**Developed landlocked Countries - OECD**	
	%		***%***		***%***
Botswana	89.9	Mali	59.2	Czech Republic	113.8
Burkina Faso	34.7	Niger	44.3	Hungary	115.9
Burundi	33.8	Rwanda	35.2	Luxemburg	256.2
Central Africa Republic	36.2	Swaziland	143.8	Slovak Republic	132.6
Chad	65.5	Uganda	36.9	Switzerland	80.88
Ethiopia	32.6	Zambia	69.3		
Lesotho	166.3	Zimbabwe	75.9		
Malawi	63.6				
Average mean for all landlocked countries			***65.81***	***139.91***	
Average mean for non-landlocked countries			***71.68***	***73.27***	

Source: Author's calculations on the World Bank development indicators (2013) data.

A more related to geography is the distance variable; the distance variable is one of the trade impeding features in the gravity model studies. The standard gravity model predicts that bilateral trade between any two countries is negatively related to the distance between the two trading countries. While it has been argued that the distance variable works in favour of economies that are in the same continent or region (Tansey and Touray, 2010), there has also been a considerable discussions about the death of distance due to technological advancement(Kolko, 2000; Capling and Nossal, 2001; Cairncross, 2001).

There are arguments that the global increase in trade can be attributable to a decrease in the distance between countries which is reflected by a fall in transportation costs in terms of ocean freight rates, air freight rates and overland transport costs. There are studies that have made an attempt to link trade growths to changes in transport costs (as measured by IMF c.i.f. /f.o.b. ratios) among other factors (Rose, 1991; Krugman, 1995; Baier and Bergstrand, 1997). The technological advancement in communications, the post second world war (WW II)

development of jet aircraft engines and the use of containerisation in the ocean shipping has led to lower shipping costs, as well as other transportation costs that has been linked to an increase in international trade (Hummels, 2007a).

6.2.2 African trade: Exports and imports composition

Merchandise exports in Africa are dominated by primary commodities (mainly minerals and fuels products) and these are mainly exported outside the continent[21]. In 2011, intra-African trade was about 12 per cent of the continent's total trade with the remaining 88 per cent being trade with the rest of the world. For the past decade, on average the level of intra-African exports trade has been maintained to 15 per cent. Whereas imports has slightly increased in the same period that is, from 10.6 per cent in 2000 and 11.7 per cent in 2010 (UNESCO, 2013).

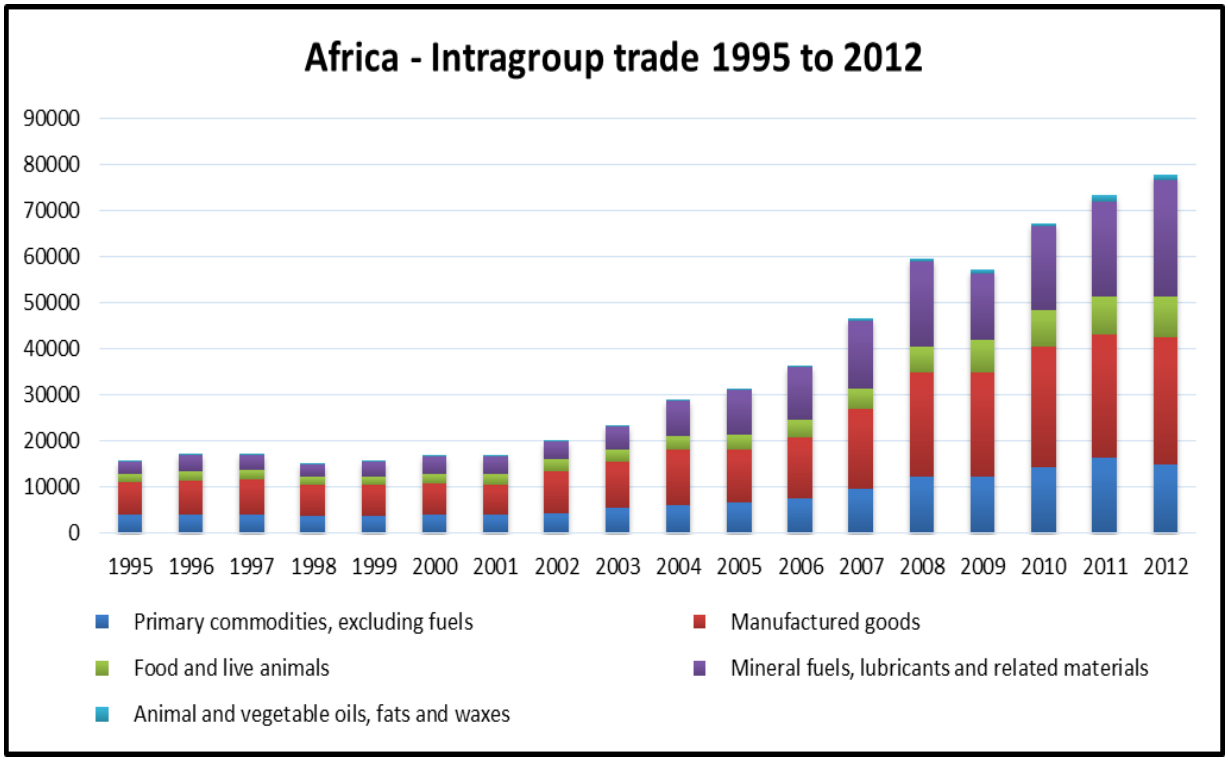
Nevertheless, there are good stories in the intra-African trade, the fact that the goods that dominate the intra African trade are manufacturing goods. Data reveals that the share of manufactured goods in intra-African trade is higher than its share of manufacturing goods in the African trade with countries outside the continent. This is true for the past two decades irrespective of the fact that this sector is not yet fully exploited relative to other sectors in the continent (UNCTAD, 2013). The main manufactured goods being traded between partner countries includes cotton fabrics, machinery parts, gold in semi manufactured forms, plywood, aluminium alloy plate, tea in packages, portland cements, cigarettes containing tobacco, medicaments, vegetables fresh and chilled, cashew nuts fresh and dried etc.

The figure 14, below compares the volume of trade by sectors and it reveals that the intra African trade is mainly dominated by manufacturing sector for the whole of the two decades. Trade in minerals fuels, lubricants and related materials is second to manufacturing sector,

[21]Please refer to chapter two for more details.

leaving behind the agricultural sector (i.e. food and live animals, animal and vegetable oils, fats and waxes), which is the backbone for many of the African countries' population income wise as well as for provision of employment.

Figure 14: Intra African total trade (merchandise and service) composition (1995-2012)



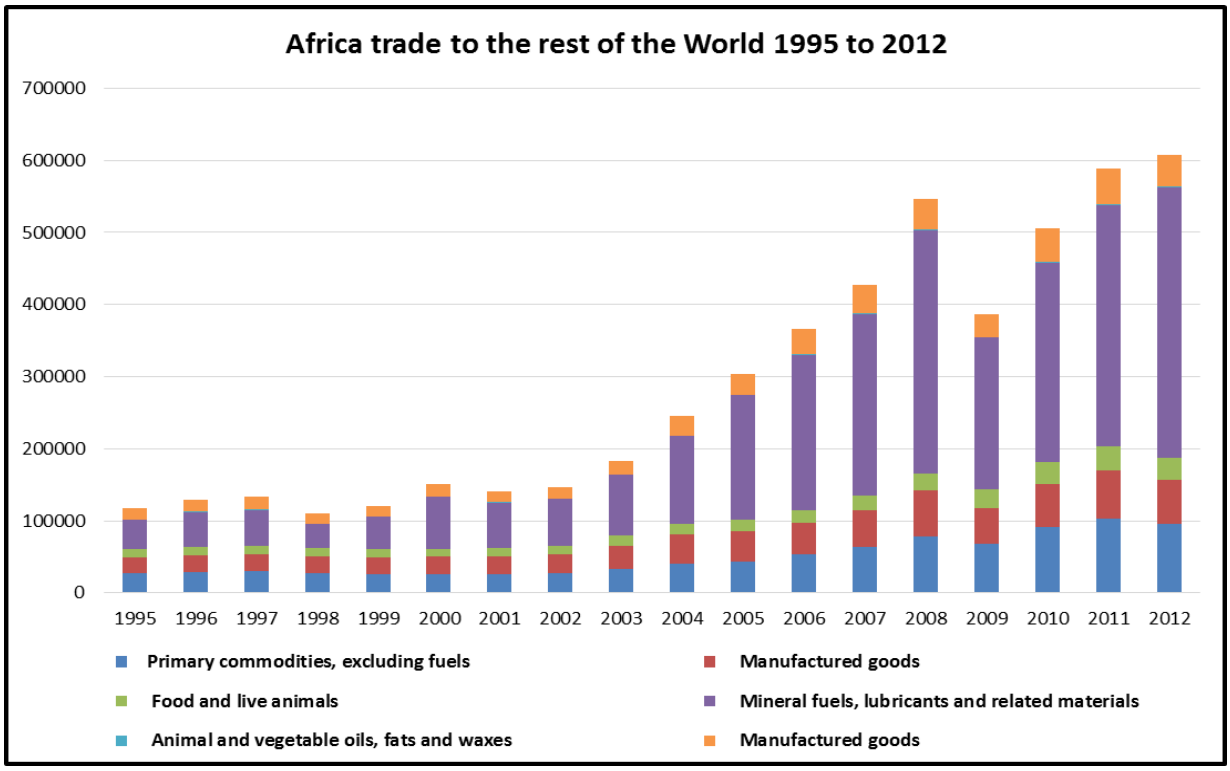
Source: Author's manipulation on the UNCTADstat (2013) data

A different picture is seen on the part of African trade with the rest of the world (figure 15). A large percentage of external exports and especially from year 2000 has been mainly in mineral fuels, lubricants and related materials. A large part of Africa's natural resources feeds Asian and European countries' industries. Primary commodities (excluding fuels) are second to minerals and fuel sector, and provides a hint on the same idea of African external trade being dominated by primary commodities.

However, the intra-regional trade ratio in Africa is remarkably low compared to industrialised countries although it doubled from 6 per cent (in 1990) to 12 per cent (in 2011). Whereas if compared to the Asian countries, the intra-Asian trade rose from 48 percent in (1990) to 52 per

cent (in 2012). And the intra-North American trade rose from 41 per cent (in 1990) to 48 percent (in 2011). As for Europe's intra-regional trade share in exports fell from35 per cent to 29 per cent between 1990 and 2011with intra-EU trade excluded. Reasons could be because most countries in the African continent have their production and export structures such that the focus is on primary commodities like fuel, minerals and agricultural products. And since most countries have similar structures (Shinyekwa and Othieno, 2013), they cannot satisfy their mutual import needs therefore leaving them with an option of satisfying the external market.

Figure 15: African trade (merchandise and service) to the rest of the world (1995-2012)



Source: Author's manipulation on the UNCTADstat (2013) data

Consequently, the direction of the African's trade with the rest of the world follows the same traditional links (chiefly to Europe). Therefore, the reason why the intra-regional trade ratios remain persistently low is that more than 80 per cent of the continents exports are destined for external markets. Likewise for imports; large part of imports comes from markets outside the continent (UNESCO, 2013).Besides, as pointed out earlier in this chapter, inadequate and

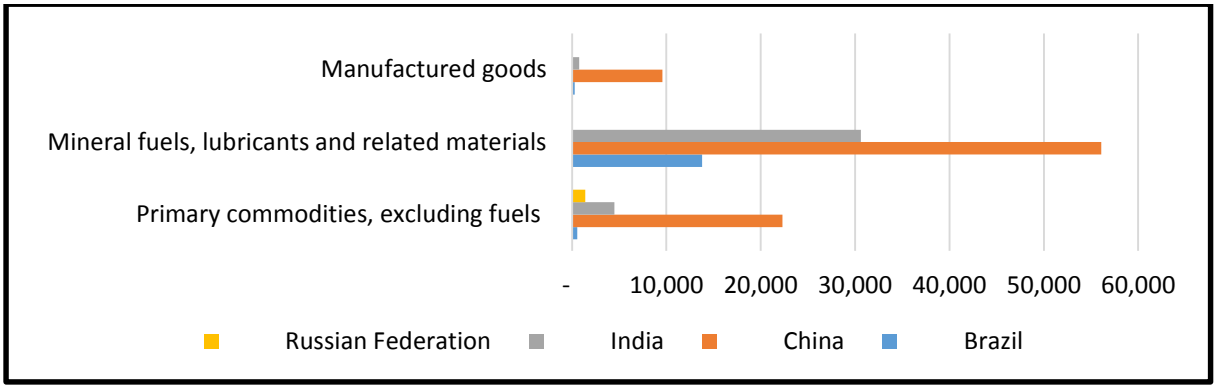
unreliable infrastructure cannot be neglected as another major reason for lower intra-regional trade.

As a way to boosting the intra African trade African leaders makes efforts to establish various regional economic communities (RECs) in the region. These are geared towards deeper integration through free trade, developing customs unions and a common market. If these efforts turn out to be successfully, will help to re-establish new production and export structures as well as diversification of the export markets. With the recent trend of intra-African trade being dominated by the manufacturing sector, however small it is, it provides a substantial basis of future growth. Besides, there is an initiative for the Tripartite Free Trade Area (TFA) adopted by Heads of state and government of COMESA, EAC and SADC, which is expected to work as a handy model for a new approach to regional integration (OECD, 2013). The agreement includes a total of 26 African countries which are members to the three regional economic groups. Among other things, the agreement will create a market of combined population of 600 million people with an approximately GDP of US$1 trillion.

Principally, this will cover more than half of the member states of the African Union and is intended to escalate investment, stimulate the development of cross-regional infrastructure as a result enhancing intra–regional trade (OECD, 2013). All these efforts aim at strengthening the intra African trade flows hence being in a position to tackle the challenge of handling stiff competition in international markets and enhancing its bargaining power in international trade negotiations. Despite the fact that currently the Europe Union (EU) and the USA remains the Africa's main trading partners, the continent has enormously increased its share of exports to its emerging trading partners, the BRIC countries (i.e. China, India, Brazil and Russia). Yet, for the time being Europe and the United States continue to be Africa's main trading partners.

Over the past decade, the share of Africa's traditional export markets has been maintained whereas the continent's share of exports of emerging economies import markets has increased significantly. After the recent financial crisis, the growth in exports to these emerging countries is to a large extent explained by the rising in commodity prices. In 2009, the value of African exports fell by 31 per cent and grew by 25 per cent in 2010, and the volume of imports fell by 11 per cent and consequently mended by 9 per cent in the respective years. Which means price effects described virtually two thirds of the growth in trade values (UNESCO, 2013).

Figure 16: Africa Merchandise trade with the BRIC countries (product groups, exports in millions of dollars, annual, for 2012)



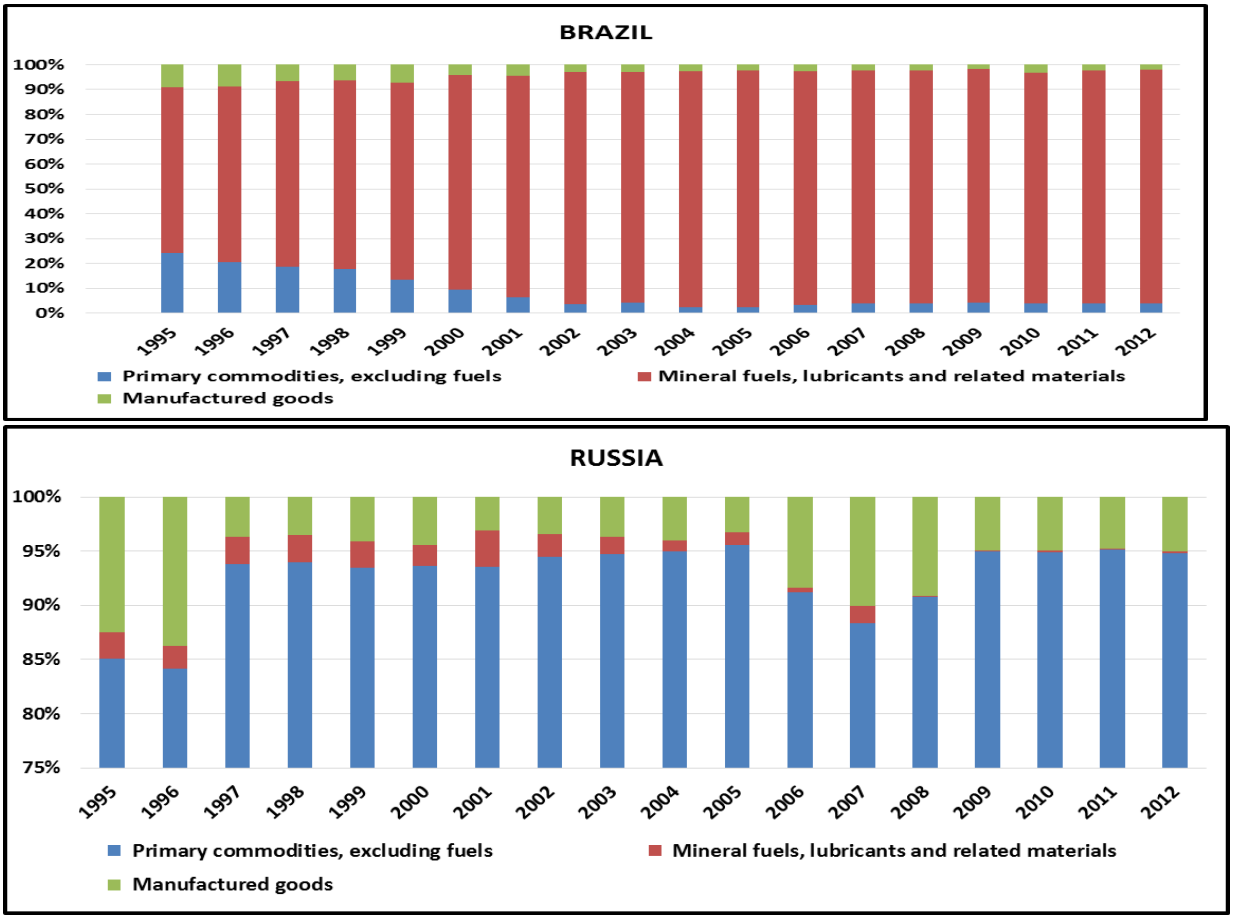
Source: Author's manipulation on the UNCTADstat (2013) data

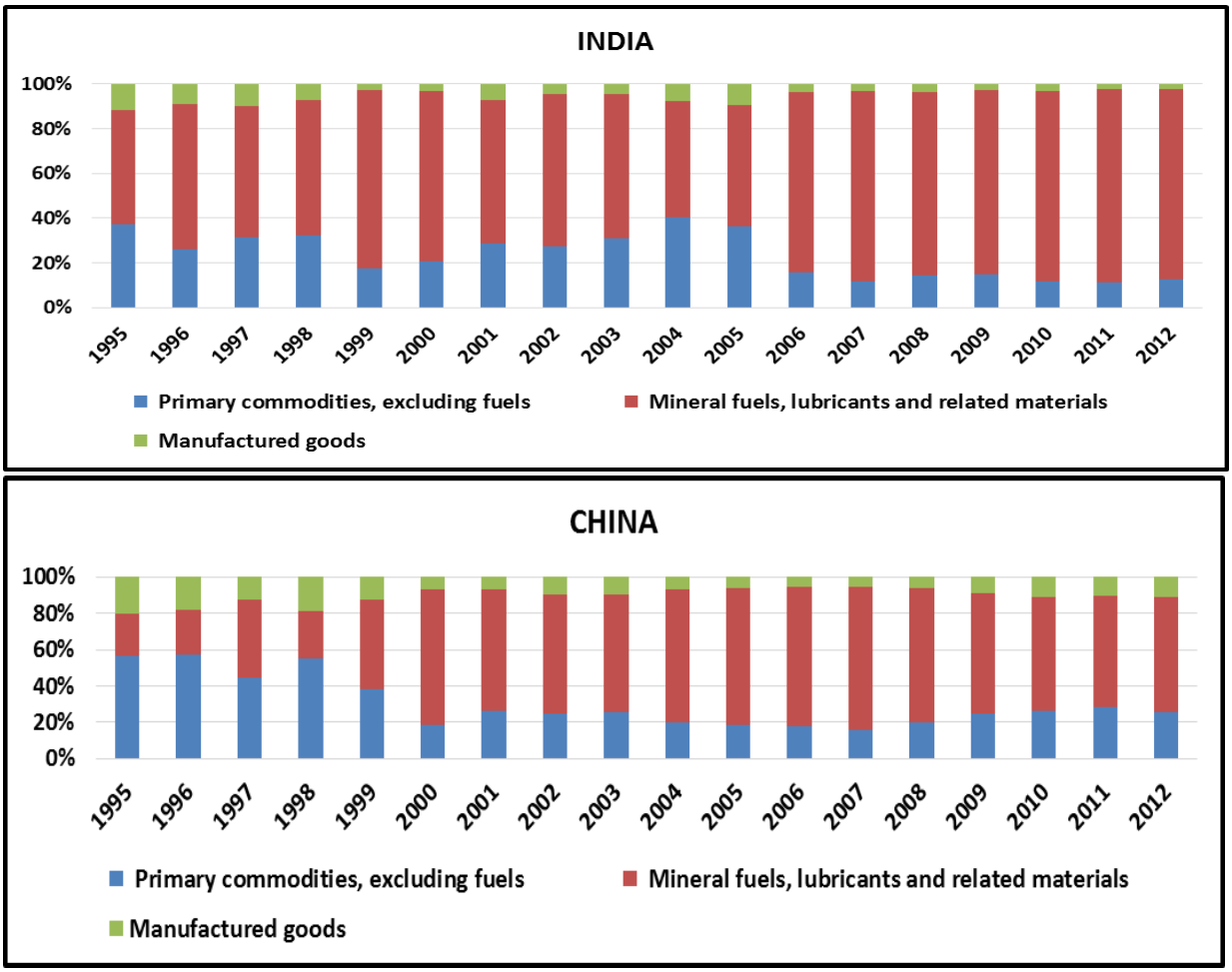
This trend of Africa diversifying its exports market towards emerging partners has seen China's export and import figures gradually progressing from one of the least among the top ten trading partners to Africa to the largest ones over the last decade, becoming the second after USA in 2010 (IMF, 2012). In 2010 alone, 12.5 per cent and 4 percent of Africa exports went to China and India respectively, which represented 5 per cent and 8 per cent of these countries' imports respectively. As depicted in figure 15 and 16 above, African exports to these emerging countries is characterised by concentration of minerals and fuels.

Figure 17 shows the concentration trend of the products dominating the exports from Africa to each of the BRIC countries. It can be argued that the driving force behind BRIC –African trade

boom is natural resources available in the African countries. This is because exports to Brazil, China and India represent a significant part of mineral oils being exported from African countries to the BRIC. For this matter therefore there is a concentration of this booming trade to certain African countries with major sources of natural resources. According to World Bank data, the top in the list of trading partners includes Angola, Sudan, Nigeria, Republic of Congo, Libya and Algeria. All these countries have mineral fuels as the main product for their exports (Drummond and Lie, 2013).

Figure 17: The trend of African merchandise trade with the BRIC countries (exports in thousands of dollars) from 1995 to 2012





Source: Author's manipulation on the UNCTADstat (2013) data

For instance, considering China alone, its engagement with Africa portrays an increasing trend with African share in the Chinese mineral fuels import market increasing from less than 5 per cent in 1995 to 25 per cent in 2011(UNESCO, 2013). The other countries in the list include South Africa, Benin, Morocco and Egypt. The latter have a diversified economy so they export agricultural products and manufactured products. From figure 17 above, Russia is a leading importer of these products among the BRIC, followed by China and India.

6.3 Model specification: the gravity model

This chapter uses gravity model to estimate the determinants of bilateral trade flows of Africa. The application of the model to analyse international trade flows traces back to Tinbergen (1962) and Poyhonen (1963). Since then the gravity model has gained great interest of the

researchers due to its powerfulness in explaining different scenarios in international trade issues; such as testing the effect of a common currency, or membership in regional integrations agreements on bilateral trade (Guttmann and Richards, 2006).

In the context of international trade flows, the theory asserts that the volume of trade flows between two trading partners is defined by the supply conditions at the country of origin, demand conditions at the country of destination and stimulating or restraining factors that are related to the trade flows between the two trading partners (Serlenga and Shin, 2004). It is a model that gives clear and robust economic empirical findings on international trade issues (Haveman and Hummels, 2004).

According to Baier and Bergstrand (1999) and (Zannou, 2010), in the earlier days of its usage, the gravity model was lacking a formal theoretical foundation, only to be provided by the empirical investigations by (Krugman, 1979; Helpman and Krugman, 1985; Deardorff, 1998a; Feenstra et al., 2001; Evenett and Keller, 1998; Anderson, 1979). They represent the gravity model to be a reduced form that is derived theoretically from a general equilibrium model of international trade in final goods. Two countries GDPs are taken to be the production and absorption capacities of the two exporting and importing countries respectively; whereas the geographical distance represents the transportation costs, more distance meaning greater costs (Baier and Bergstrand, 2001). More discussion about gravity model is explained in chapter three, for now the concentration goes to the specification of the model that will be used in this study.

The starting point for any specification of the gravity model must be a consideration of the flow of goods (X_{ij}) between two countries *i* and *j*; whereas, the flow of goods between the two, would depend on the characteristics of the country of origin (A_i) and those of the destination country

(B_j) as well as the measure of resistances and motivational factors to bilateral trade that exists between the two countries *(R_{ij})*. Hence, the multiplicative form of the gravity equation;

$$X_{ij} = G*A_i*B_j*R_{ij} \quad (6.1)$$

To put it in the typical terms of the gravity model tradition, X_{ij} represent the monetary value of exports from country *i* to *j*; the *G* denotes some variables that do not depend on either of the two countries, also known as gravitational constant (e.g. globalisation level). A_i stands for factors that are specific to an exporting country (e.g. exporter's GDP); B_j comprises of all the importer specific factors that make up the total importer's demand (e.g. importer's GDP).R_{ij} signifies the ease with which the exporter country can access the importer's market *j*, in some other studies (Drysdale and Garnaut, 1982) R_{ij} stands for resistances to trade between *i* and *j*. The R_{ij} is more defined in Deardodorff (1998), who presents it as a measure of distance between the two countries, the combined effect of the two factors (size and distance) is known as the gravity term and it is normally expressed as the product of the output of the two trading partners divided by the distance between them (Musila and Sigué, 2010), the result of which is the model below:

$$T_{ij} = G*[(Y_{it}*Y_{jt})/D_{ij}] \quad (6.2)$$

Where; T_{ij} represents the value of exports from country *i* to country *j*; Y_i and Y_j are their respective national incomes; and D_{ij} represents a measure of distance between them; and *G* is a gravitational constant. The national incomes shows the economic size of the exporting country and hence determines the quantity of goods that it can produce and export, while the economic size of the importing country determines the capacity of its market to purchase the imported goods. On the other hand, the distance variable represents the transportation costs that will determine the volume of goods that will be traded. The distance variable is considered

as a resistance/motivating factor as it can either promote or hinder trade flows between countries (Sichei et al., 2011). This reflects that transport costs in international trade flows increases with distance.

Gradually, new explanatory variables were added to the model in order to capture more country specific characteristics. The literature reckons the augmentation of such variables as population (Linnemann, 1966b), income per capita and contiguity (Sanso et al., 1993; Frankel and Wei, 1998; Frankel et al., 1995b; Eichengreen and Irwin, 1998). Moreover, variables that captures geographic features, economic development and policy institutions, were included in the model as explanatory variables resulting in an augmented gravity model which is in use in most of the most current literature like that of Gutmann and Richards (2006), Zannou (2010) and (Vicard, 2011b). The augmented gravity model came to be presented as;

$$T_{ijt} = \beta_0 Y_{it}^{\beta 1} Y_{jt}^{\beta 2} P_{it}^{\beta 3} P_{jt}^{\beta 4} D_{ij}^{\beta 5} M_{ij}^{\beta 6} \eta_{ijt} \qquad (6.3)$$

Where; β_0 is the constant of proportionality; Y_{it} (Y_{jt}) is the GDP of the country *i* and *(j);* $\boldsymbol{P_{it}}(P_{jt})$ are populations of country *i* and *(j);* D_{ij} represents a measure of distance between the two countries; M_{ij} represents any dummy variables that can be included in the model; η_{ijt} is the error term and βs are the parameters of the model.

From the original standard gravity model in a multiplicative form, the standard procedure for estimating the model is by making the application of natural logarithms of all variables so as to obtain a log linear equation that can easily be estimated by the Ordinary Least Squares (OLS) regressions as well as other estimation methods(Tripathi and Leitão, 2013). In estimating a gravity model, the inclusion of all the surveyed variables can be done; but the issue is whether all countries and most especially the less developed countries have their data included in the dataset of the samples previously used(Baltagi et al., 2003). Hence, though the number of

variables may vary depending on the nature of estimations required, the log linear form of the model can be presented follows;

$$logT_{ijt} = \beta_0 + \beta_1 logY_{it} + \beta_2 log\ Y_{jt} + \beta_3 logP_{it} + \beta_4 logP_{jt} + \beta_5 logD_{ij} + \beta_6 M_{ij} + \eta_{ijt} \quad (6.4)$$

The classical gravity models were basically used in a cross section studies so as to estimate trade effects or trade relationships for a particular time period (Baltagi et al., 2003). One of the first studies that applied gravity model in the panel data studies to account for country pair effects instead of exporter and importer effects was the study by(Hummels and Levinsohn, 1995). And it is now the most adopted approach by majority of the current studies on the determinants of trade volumes. The advantage for this is that the fixed country-pair effects controls for the impact of any time-invariant factors such as bilateral distance, common language, historical relations, membership to regional trading groups and contiguity.

Besides, the use of country–pair effects removes any possibility for biasness resulting from error of omission due to the omission of any such variable(Baltagi et al., 2003). The Panel data approach allows for more variation in the data and hence assuring more efficiency in data handling, and reduction in the degree of multicollinearity in the variables (Baltagi and Kao, 2001). This chapter will therefore make use of panel data for the sample of countries that are examined. Below is the description of the variables that will be included in this study.

6.4 Description to variables, Sample and Data sources

The data for this chapter were obtained from different databases and compiled to fit the analysis as indicated in the table below. The main databases include the World Bank development indicators, Centre d'EtudesProspectivesetd' InformationsInternationales (CEPII) gravity dataset, WTO database and the IMF direction of trade statistics database.

Table 33: Description of variables, data sources and expected relationship

Variable	Description	Source	Expected sign
Exports[22]	Measures the total exports from one trading partner to another in the country pair. The exports variable accounts for both flows from country A to B as well as country B to A.	IMF Direction of Trade Statistics	This is the dependent variable.
GDP per capita	Measures of the level of economic development of an economy. The GDP per capita data are in constant 2005 US dollars.	World Bank Development Indicatiors (2013)	The sign for coefficients is expected to be positive as in Zannou(2010)
Geographical Distance	Measure of the geographical distance between the capital cities of pair of countries.	CEPII gravitydataset	The level of trade between a pair of countries is a negative function of the distance between trading pair countries (Rose and Van Wincoop, 2001)
Population size	Measure of the total population of a country	World Bank Development Indicatiors (2013)	Studies finds a different relationship depending on if a country is an importing and exporting country (Kimino et al., 2007; Zannou, 2010). The expected sign is positive.
Landlocked	Measures the number of countries without access to the sea/ocean in each country pair (i.e. *0* if not one country in a pair is landlocked, *1* if one country in a pair is landlocked or *2* if both are)	CEPII gravity dataset	The expected sign is negative.
Contiguity	Measure of whether countries in a pair share common border. The common border or adjacent dummy variable takes the value of *1* for neighbouring countries and *0* for countries that do not share a border.	CEPII gravity dataset	The argument is that similarity in countries encourages bilateral trade and therefore sharing border or contiguity has a positive effect on trade (Balassa, 1966; Frankel and Rose, 2002)
Common language official	Measure of whether countries in a pair share official common language. The variable takes the value of *1* for countries using common language and *0* for countries that do not.	CEPII gravity dataset	Similarity in countries encourages bilateral trade and therefore similarity in language has a positive effect on trade (Balassa, 1966; Frankel and Rose, 2002)
Membership into same regional trading agreement (RTA)	Measure of whether countries in a pair belong to the same RTA or not (i.e. *0* if two countries in a pair do not belong to one RTA, *1* if a pair belong to the same RTA).	World Bank Development Indicatiors (2013) and WTO database, 2013	It is therefore expected that the coefficients will be positive.
Membership to WTO	A measure of whether countries in a pair are member to WTO (i.e. *0* if not one country in a pair is a member, *1* if one country in a pair is a member or *2* if both are).	WTO database, 2013	It is expected that the coefficients will be positive.
Mobile cellular subscription:	Measures the subscriptions to public mobile telephone services using cellular technology that provides access to the public switched telephone network. It represents a percentage of the total subscriptions to public telephone network.	World Bank Development Indicatiors (2013)	Mobile cellular subscription is considered as a factor that positively influences the trade flows between African countries and outside the continent, hence positive coefficients. This is based on the fact that not only it simplifies communication, but also enables the users to use mobile banking facility (for settling transaction bills).thus reducing transaction costs in bilateral trade.
Arable land as a percentage of total land	A measure of the total size of arable land as a proportion of the total land in each country in a pair.	World Bank Development Indicatiors (2013)	Arable land is more closely related to a country's productive capacity than the total land (Baxter and Kouparitsas, 2006). The expected sign is positive

[22]It is often the case that data on exports between pair of countries have inconsistencies between exports to a partner and the partner's recorded imports from a particular country, i.e. the exports from Country A to B do not always equal the imports of Country B from A. This is due to the different ways countries report their trade, i.e. differences in classification concepts and detail, time of recording, valuation, and coverage, as well as processing errors.

			coefficients reflecting a positive impact to the bilateral trade flows.
Domestic credit to private sector	Measures all the financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment (WorldBank, 2013).	World Bank Development Indicatiors (2013)	The role played by private sector is paramount in the trade flows between economies. The expected sign for the coefficients of this variable is positive.
Bilateral exchange rate	Refers to the exchange rate determined by national authorities from which a bilateral exchange rate (cross rate) is computed by the researcher.	World Bank Development Indicatiors (2013)	Generally changes in exchange rate index has a significant *negative impact* on the volume of exports because for risk averse market participants, exchange rate uncertainty causes them to reduce their activities, change prices, or shift sources of demand and supply in order to minimize their exposure to the effects of exchange rate volatility(Chowdhury, 1993).

The sample period is 32 years (from 1980 to 2012 all inclusive). The reason for this sample period is because most of African countries have at least complete dataset from 1980's, so to avoid a large number of gaps in the dataset 1980 to 2012 was appropriate. The chapter considers three sets of datasets. First is the bilateral trade between Africa and OECD with a total of 75 countries (41 African countries and 34 OECD countries). Second bilateral trade flows between African countries and the BRICs countries (41 African countries and 4 BRIC countries); the third dataset is the bilateral trade between African countries (intra African trade). What is typical for the bilateral trade dataset used is that there are a lot of missing data; the handling of these missing data is discussed later in the chapter.

To get the overall picture of the features of the data for the variables above, the descriptive statistics of the variables data in log form are presented in table 34. There after (table 35) the correlation coefficients of the explanatory variables are also presented to show the extent of correlation between the explanatory variables. They all provide a feel of the data in a sample used by this chapter. Observing the standard deviations in table 34, it can be seen that standard deviations are moderate, hence indicating less deviations of data within the variable.

Table 35 presents pair wise correlation coefficients between all the variables used in the study. To most of the coefficient correlation magnitude of the correlation is not higher than 50 per

cent. Except for the correlation between GDP per capita and the credit to private sector in both exporting and importing country, this could possibly be because the extents of credits given to private sector depend on the economic size of the respective economy.

Table 34: A summary of descriptive Statistics for the variables.

Variable		Mean	Std. Dev.	Min	Max
Log Merchandise exports (valued free on board in million US$)	Overall Between Within	15.118	3.250 2.412 2.499	0	24.297
Log Distance between capital cities	Overall Between Within	8.759	0.529 0.396 0	6.002	9.845
Log GDP per capita (exporting country *i*)	Overall Between Within	7.519	1.702 0.964 1.499	3.998	10.938
Log GDP per capita (importing country *j*)	Overall Between Within	8.369	1.716 0.837 1.559	3.998	10.938
Log Population, total (exporting country, *i*)	Overall Between Within	16.028	1.719 1.367 1.211	11.073	21.024
Log Population, total (importing country, *j*)	Overall Between Within	16.195	1.710 1.164 1.287	11.073	21.024
Log Credit to Private Sector (exporting country, *i*)	Overall Between Within	3.307	1.029 0.609 0.892	0.432	5.458
Log Credit to Private Sector (importing country *j*)	Overall Between Within	3.686	1.028 0.527 0.919	0.432	5.767
Log Mobile cellular Subscription (exporting country *i*)	Overall Between Within	1.586	2.815 0.568 2.761	-4.605	5.189
Log Mobile cellular Subscription (importing country *j*)	Overall Between Within	1.985	2.702 0.541 2.661	-4.605	5.189
Log Arable land (exporting country *i*)	Overall Between Within	2.165	1.348 1.056 0.884	-3.219	4.131
Log Arable land (exporting country *j*)	Overall Between Within	2.385	1.234 0.836 0.961	-3.219	7.989
Log Bilateral exchange rate (cross rate)	Overall Between Within	5.947	3.688 2.674 2.707	-9.210	16.013
Landlocked	Overall Between Within	0.373	0.543 0.403 0.375	0	2
Common Official Language	Overall Between Within	0.161	0.368 0.289 0.253	0	1
WTO membership	Overall Between Within	1.821	0.383 0.287 0.262	1	2
Contiguity	Overall Between Within	0.084	0.277 0.278 0	0	1
Regional Trading Agreement membership	Overall Between Within	0.293	0.455 0.455 0	0	1

Table 35: Correlations (Covariance) of the variables

	lnDISTij	lnGDPpp*i*	lnGDPpp*j*	lnPOPN*i*	lnPOPN*j*	lnCRDPR*i*	lnCRDPR*j*
lnDISTij	1.00						
lnGDPpp*i*	-0.04	1.00					
lnGDPpp*j*	-0.04	-0.64	1.00				
lnPOPN*i*	-0.04	0.03	-0.24	1.00			
lnPOPN*j*	0.05	-0.21	0.03	-0.08	1.00		
lnCRDPR*i*	-0.02	0.74	-0.53	0.19	-0.18	1.00	
lnCRDPR*j*	-0.01	-0.54	0.79	-0.19	0.20	-0.45	1.00
lnMOBIL*i*	0.04	0.33	-0.14	-0.06	-0.01	0.36	-0.09
lnMOBIL*j*	0.03	-0.12	0.32	0.01	-0.06	-0.11	0.37
lnARBL*i*	-0.01	0.12	-0.28	0.32	-0.09	0.18	-0.23
lnARBL*j*	-0.13	-0.28	0.13	-0.07	0.38	-0.22	0.17
lnEXCHij	0.03	-0.06	-0.09	-0.07	-0.05	-0.09	-0.09
landlocked	0.01	-0.11	-0.03	-0.06	-0.11	-0.11	-0.02
Language	0.08	0.04	0.07	-0.02	-0.02	0.04	0.07
WTO	0.14	0.04	-0.07	0.02	0.09	0.05	0.03
Contiguity	-0.59	-0.03	-0.03	0.11	0.06	0.06	-0.05
Same RTA	-0.46	-0.09	-0.06	-0.08	-0.05	0.05	-0.08

	lnMOBIL*i*	lnMOBIL*j*	lnARBL*i*	lnARBL*j*	lnEXCH*ij*	landlocked	Language	WTO	Contiguity
lnMOBIL*i*	1.00								
lnMOBIL*j*	0.25	1.00							
lnARBL*i*	0.05	-0.04	1.00						
lnARBL*j*	-0.09	-0.01	-0.13	1.00					
lnEXCHij	0.08	0.08	0.05	0.04	1.00				
landlocked	0.04	0.02	0.09	0.06	0.11	1.00			
Language	0.01	0.01	0.05	-0.01	-0.16	0.07	1.00		
WTO	-0.01	-0.02	0.13	0.03	-0.03	0.12	0.04	1.00	
Contiguity	0.04	0.01	0.02	-0.03	0.04	0.05	0.12	0.02	1.00
Same RTA	0.06	0.03	0.06	-0.02	0.02	0.08	0.06	0.05	0.28

The correlation coefficient between distance between capital cities and the contiguity is also higher than 50 per cent, possibly because economies sharing borders are expected to be less distant than those that do not share border. Stronger correlation coefficients imply a multicollinearity problem which has an effect of the parameter estimates resulting from those variables. However since the data is very large in size this should not be a problem, as despite the presence of multicollinearity obtaining more data produces more precise parameter estimates. Besides, the estimation techniques used in this study takes a good care of the endogeneity between variables.

6.5 Dealing with zero-valued and missing trade flows

The study uses logarithmic transformation in most of the variables discussed in the previous section, this will make it possible for the estimation of the log linear equation(Coe and Hoffmaister, 1999). However the data that is used is a bilateral trade flow data in most cases has either missing values or many zero trade flow observations. And for the case of African trade flows some observations are even missing. The zero data values normally would imply absence of any trade at all(Bikker, 1987), however this would be the case for a carefully prepared datasets. Otherwise, they could be caused by non-reporting of the trade flows between pair of countries. It could also reflect errors or omission during the preparation of the datasets(Martin and Herath, 2008).

Even if there are zero values still the study would want to examine the trade flows because if two countries have zero flows it imply that they are small or they are distant countries or both, thus the gravity model predictions would be either very low bilateral flows or non-existent (Frankel et al., 1997; Coe and Hoffmaister, 1999). The logarithmic transformation cannot be possible with zero observations because the log of zero is undefined (or minus infinity). Thus doing such transformation prior to dealing with the available zero observations would result into biased and inconsistent estimation results. Likewise if the zero flows are disregarded by omitting them in the dataset, the information to explain why there is very low trade cannot be obtained. Same kind of problems occurs in case there are missing values in the dataset, hence these calls for a solution.

There are many solutions to this problem as suggested by the literature (confer, e.g. Frankel, 1997; Linders and DeGroot, 2006; Foroutan and Pritchett, 1993). The most resorted solution is to ensure that the sample is selected such that is does not contain observations with zero or missing values. However sometimes this is difficult especially when the aspiration is to have

as broader sample size as possible. This approach has been adopted by such authors as Frankel et al (1997) and Bikker (1987). Another solution/approach would be to arbitrarily substitute small number values for all observations with zero and missing values. This would enable the logarithmic transformation process be correctly done. Example of literature following this includes(Raballand, 2003; Wang and Winters, 1992; Linnemann, 1966a).This approach has also been challenged for being an ad hoc process and does not guarantee the underlying expected value.

This study has adopted approaches one and two together so that they can complement each other, first the sample selection is based on the countries with less gaps, but the sample period also took into consideration the period when most of the countries, especially African countries has number values in their observations leaving aside those years with missing values. In this way there were very few gaps which were taken care of by the second approach.

Otherwise some other literature resorted to some other approaches such as the use of the original multiplicative gravity equation, hence nonlinear estimation technique (see for example Coe and Hoffmaister, 1999). In this way, there was no need for log transformation process where observation with zero values would be problematic. Some other studies adopting linear estimation techniques have used Tobit estimation technique(Linders and De Groot, 2006).

6.6 Empirical model

The estimation is done in three sets, i.e. estimating the bilateral trade between African countries (intra African trade flows); estimating the bilateral trade on African countries with the BRICs; and African countries with the OECD countries. An examination of bilateral trade between African countries and the BRICs and the OECD each forms two ways trade flows. This makes a total of five sets of estimation results.

To be consistent with what is being measured; same model with same set of variables is used so as to obtain coherent test results. Below two models are presented, one is for the variables at level, and the second includes product variables (i.e. a product of variable data for importing country and exporting country). However it will not be possible for one variable that is whether pair of countries belongs to the same regional trade agreement *(RTA)*. This variable is only relevant for intra African trade flows, since it is not possible for an African country to belong in the same RTA with a country in the BRICs or OECD. The study also includes a dummy variable for time fixed effects, thus a two way fixed effects (observing variations of time and panels).

Estimation model using variables at level: Exports, population, GDP per capita, bilateral exchange rate, domestic credit to private sector and distance variables are in natural logarithm. The rest of the variables are either presented as ratios or they are dummies, hence there was no necessity of converting them into natural logs. Mobile cellular subscriptions represents a percentage of the total subscriptions to public mobile telephone network services, arable land is a percentage of total land mass of a particular country.

Dummy variables include the rest of the variables, i.e. whether the pair of countries belong to the same regional trade agreement or not, whether they are members of the World Trade Organisation or not (0 if none of the pair countries is, 1 if one country in a pair is a member, 2 if both are members), landlocked measures whether countries belong to a landlocked countries (0 if none is, 1 if one in the pair is, and 2 if both are), contiguous indicate whether the two countries in a pair share the same border, language indicates whether both countries have common official language or not. The model is presented as follows;

$$logEXP_{ijt} = \beta_0 + \beta_1 log(POPN_{it}) + \beta_2 log\ (POPN_{jt}) + \beta_3 log(GDPpp_{it}) + \beta_4 log\ (GDPpp_{jt}) + \beta_5 log(EXCH_{ijt}) + + \beta_6 log(DIST_{ij}) + \beta_7 log(CRDPR_{it}) + \beta_8 log(CRDPR_{jt}) + \beta_9 MOBIL_{it} + \beta_{10} MOBIL_{jt} + \beta_{11} ARBL_i + \beta_{12} ARBL_j + \beta_{13} SRTA_{ij} + \beta_{14} WTO_{ij} + \beta_{15} LANDL_{ij} + \beta_{16} CONTIG_{ij} + \beta_{17} LANG_{ij} + \partial D + \eta_{ijt} \quad (6.5)$$

Where;

β = represents the coefficients of the variables

$logEXP_{ijt}$= natural logarithm for Exports from country *i* to *j*

$logPOPN_{it}$= natural logarithm for Population of importing country

$logPOPN_{jt}$= natural logarithm for Population of exporting country

$logGDPpp_{it}$= natural logarithm for GDP per capita of importing country

$logGDPpp_{jt}$ = natural logarithm for GDP per capita of exporting country

$logEXCH_{ijt}$ = natural logarithm for bilateral exchange rate

$logDIST_{ij}$ =Distance between exporting (*i*) and importing (*j*) country

$logCRPR_{it}$ =Credit to private sector for importing country

$logCRPR_{jt}$= Credit to private sector for exporting country

MOB_{it} =Mobile cellular subscriptions for importing country

MOB_{jt} =Mobile cellular subscription for exporting country

$ARBL_i$ =Arable Land for importing country

$ARBL_j$ =Arable Land for exporting country

$SRTA_{ij}$ =Two countries belonging to the same Regional Trade Agreement

WTO_{ij} = WTO membership

$LANDL_{ij}$ =Landlocked (1 if one of the country in a pair is land locked, 2 if both are land locked)

$CONTIG_{ij}$=Contiguous countries (1 if two countries are neighbouring or share common border)

$LANG_{ij}$=Common official language (1 if both countries use same official language)

∂D = is a vector of year dummies for the year 1982 through 2012 (the year dummy for the year 1981 is dropped)

η_{ijt} = is the error term

Estimation model including product variables: This model uses the same variables as above, only that it includes some variables representing a product of two variables for importing and exporting country. The aim is to examine how simultaneously the two variables can influence

the bilateral trade flows between the two parties. The variables in a product form include mobile cellular subscription, arable land, and credit to private sectors, population and GDP per capita.

$$logEXP_{ijt}=\beta_0+\beta_1 log(POPN_{ijt})+\beta_2 log(GDP_{ijt})+\beta_3 log(EXCH_{ijt})+\beta_4 log(DIST_{ij})+\beta_5 log(CRDPR_{ijt})+\beta_6 log(MOBIL_{ijt})+\beta_7 log(ARBL_{ij})+\beta_8 SRTA_{ij}+\beta_9 WTO_{ij}+\beta_{10} LANDL_{ij}+\beta_{11} CONTIG_{ij}+\beta_{12} LANG_{ij}+\partial D+\eta_{ijt} \quad (6.6)$$

Where;

$logPOPN_{ijt}$= natural log for a product of population of importing and exporting country
$logGDPpp_{ijt}$= natural log for a product of GDP per capita of importing and exporting country
$logCRPR_{ijt}$ = natural log for a product of credit to private sector for importing and exporting country
$logMOB_{ijt}$ = anatural log for product of mobile cellular subscriptions for importing and exporting country
$logARBL_{ij}$ = natural log for a product of credit to arable land private sector for importing and exporting country
The rest of the variables are defined as above (*model 6.5*).

Since the panel data analysis is used in this study to examine the determinants of bilateral trade flows, whereas the sample contains several countries and a number of periods, there is a need also to test whether time fixed effects have a role on bilateral trade flows as well. Therefore a full set of (T-1) time dummies, one for each period but the first, is introduced. If these dummies are not included it may lead to omitted variable bias in the results. These dummies, are shift variables that take the value of one for all states in the reference years and zero in all the others. Moreover, after estimation regressions are obtained, a joint test is conducted to see if these dummies are jointly equal to zero or not. This is not included in any of the models above because it is a post estimation process by using a *'test varlist'* command. If the year dummies are zero then time fixed effects have no influence on the bilateral trade flows. Thus it will be

testing the null hypothesis: *all years' coefficients are jointly equal to zero.* Failing to reject the null hypothesis will mean that no time fixed effects are needed.

6.7 Estimation techniques

The study uses a panel based approach following the criticisms over using cross section estimation, which is misspecification, because it cannot deal with bilateral heterogeneity present in the bilateral trade flows. With panel data approach heterogeneity issues are modelled by including country-pair individual effects (Serlenga and Shin, 2004).The essence of using panel data is to control for these individual specific effects that are possibly unobservable but may be correlated with other explanatory variables in the econometric model(Hausman and Taylor, 1981).

There are a number of panel estimation techniques; the traditional and commonly used estimation technique for the gravity model studies has been the Ordinary Least Squares (OLS) technique. However the use of OLS has been challenged because its implementation assumptions are not in line with the underlying theoretical models. It ignores the fact that there can be a correlation between explanatory variables and individual effects which are unobservable, hence resulting to coefficient estimates that are severely biased (Serlenga and Shin, 2004). It also fails to account for endogeneity and biasness resulting from omission of variables. The presence of these correlations excludes both OLS and GLS from being used as estimation methods in the estimation of parameters of this study as may yield biased and inconsistent estimates (Hausman and Taylor, 1981).

In such a situation, traditionally the option has been to go for an instrumental variable (IV) estimation technique. Thus in order to overcome this, the within estimator from analysis of covariance or fixed effects estimation technique has been used (Cornwell and Rupert, 1988).

The estimator is designed particularly for analysing the impact of variables that vary over time, as it assumes that the time invariant variables are unique to the individual country hence not correlated with other individual country characteristics. Therefore, under this method all the individual effects in the sample are eliminated by transforming the data into deviations from individual means.

As a result of this procedure, the within-groups estimator also suffers from two imperative defects; *one,* during data transformation process, all the time invariant variables are eliminated hence their coefficients are not estimated, *two,* the within group estimator ignores variation across the individuals or countries included in the sample hence it is not fully efficient. Comparatively, the first defect seem to be more serious especially when the primary interest in the application of the estimator is attached to the unknown coefficient of time invariant variables such as the influence of country's historical past events, membership to regional trading groups or countries using the same official language in the gravity modelling. Leaving these variables un-estimated renders the study meaningless.

The time invariant variables are well estimated by the GLS Random effects model (partial pooling model). This is because under this technique the assumption is that variations across countries are assumed random and uncorrelated with the independent variable used in the model. Therefore while under the fixed effect model , the time invariant variables are absorbed by the intercept, this technique include time invariant variables as explanatory variables in the model because for this model the error term is assumed to be uncorrelated with explanatory variables. Thus for a perfect estimation, inclusion of all individual country characteristics is required which is normally not possible hence leading to the omitted variable bias in the specified model.

In their ground-breaking paper of 1981, Jery Hausman and William Taylor developed an alternative method that has been used with panel data to treat the problem of correlation between explanatory variables and the concealed individual specific effect. It is an IV estimator with neither of the two defects mentioned above as it employs several dimensions of panel data to overcome the correlation without any variables from outside the model (Egger, 2002). The HT makes use of time varying variables in two ways – to estimate their own coefficients as well as serving as instruments for endogenous time invariant variables, hence giving room for identification and efficient estimation of both time varying and time invariant coefficients.

It is therefore better than the within groups estimation technique as it is more efficient and it also produces coefficient estimates for time invariant variables. The possibility of the existence of a potential correlation between the unobservable individual specific effect and a subset of the exogenous variables cannot be denied (Serlenga and Shin, 2004; Rault et al., 2009).Since the presence unobservable individual effects and time invariant variables is unquestionable even in the estimation of the bilateral trade flows in the African countries, this chapter uses the Hausman Taylor estimator.

Consider the following equation;

$$Y_{it} = X_{it}\beta + Z_i\gamma + \alpha_i + \eta_{it} \qquad (i = 1, \ldots, N;\ t = 1, \ldots, T) \qquad (6.7)$$

Where, β and γ are k and g vector coefficients associated with time varying (for this case GDPpp, POPN,EXCH, CRDPR and MOBIL) and time invariant observable variables (for this case DIST and ARBL) respectively. The disturbance η_{it} is assumed uncorrelated with the columns of (X, Z, α). The individual specific effects α_i (for this case LANDL, CONTIG, LANG, WTO and SRTA) are assumed to be time invariant random variable and in this study is potentially correlated with columns of *X* and *Z*.

The HT estimation model does not assume a specification of the unobservable individual specific effects α_i and it is less sensitive to whether they are known or unknown by the researcher (Hausman and Taylor, 1981). In this way handles the risk of falling into biased results due to omission of variables. It rather works under an assumption that some variables among *X* and *Z* are uncorrelated with individual specific effects α_i. And that the X_{it} which are uncorrelated with α_i serves two functions because of their variation across both individuals and time; *first*, using deviations from individual means, they produce unbiased estimates of the coefficients, and *secondly* using the individual means, they produce valid instruments for the time invariant variables (Z_i) that are correlated with the individual specific effects α_i (Hausman and Taylor, 1981).Therefore it helps to avoid the difficulty of extracting instrument variables external to the specified model by using some variables within the model as instruments.

However for comparison purposes as well as for checking the robustness of the results, HT estimation techniques will be used together with some other panel data estimation techniques including the FE and RE as well as with other IV panel estimation methods. Another IV estimation technique that does not require extracting instruments variables external to the specified models is the Systems GMM. The system GMM (Arellano-Bover (1995)/Blundell-Bond (1998) combines the *T-2* equations in differences with the *T-2* equations in levels into a single system, making use of the lagged levels of dependent and independent variables as instruments for the difference equation and lagged differences of dependent and independent variables as instruments of the level equation (Yasar et al., 2006; Arellano and Bover, 1995; Blundell and Bond, 1998).

The use of System GMM enables a good examination of cross country relationship between the volume of bilateral trade and its determinants since the fixed effects are just controlled by lagged differences of the dependent and independent variables as instruments, with an

assumption that levels are correlated with country specific effects while the differences are not correlated with country specific effect. The study also makes use of the random effect generalised least square regression and the fixed effect (within) regression techniques.

6.8 Trade entropy indicators: Africa versus BRIC and the OECD countries.

Before embarking to the gravity model empirical results, it is worthwhile looking at the descriptive statistics, especially some trade indicators so that one can have a priori overview of the level and changes in the African trade pattern or the direction of bilateral trade flows with its trading partners in question. These trade indicators aid in giving a clear understanding of the important export destinations for Africa, as well as, measuring the geographical concentration or diversification of the continent's exports profile (Shinyekwa and Othieno, 2013). Since the concern for this chapter is bilateral trade flows between African continent with the OECD and the BRIC countries, the trade indicators to be discussed here will also focus on those trading partners to Africa.

There is a historical fact that African trade has been more integrated with the OECD countries, specifically with the EU countries and the United States (OECD, 2011). The literature provides that over the last ten years there has been a rise of the BRIC countries in the African trade flows, hence there have been much flows of trade and investment projects between these countries to and from Africa. This part will also assess the quality of trade integration between Africa and these countries through trade entropy indicators. While there are several bilateral trade indicators, this part will focus on trade intensity and bilateral concentration indices.

Bilateral Concentration index; this trade indicator is a measure of the degree of market concentration; in this case it measures the degree of spatial concentration of African trade relations. This index can be calculated for all trading partners, though it can also be broken down by specific trading partners so as to enable a more detailed analysis. In this case the index

it broken down to include the countries of interest as shown in table 36. The index has been normalised to obtain values ranking from 0 to 1, maximum concentration indicated by 1. And the following formula has been used to derive the indices in table 36;

$$H_{jk} = \frac{\sqrt{\sum_{i=1}^{n}(\frac{x_{ijk}}{X_{jk}})^2 - \sqrt{\frac{1}{n}}}}{1-\sqrt{\frac{1}{n}}} \quad (6.8)$$

With; $X_{jk} = \sum_{i=1}^{n} x_{ijk}$ (6.9)

Where;

H_{jk}= concentration index of country or country group *j* exports to/imports to partner country *k*/country group *k*

x_{ijk} = exports or imports of product *i* for reporter country *j* and trading partner *k*

X_{ik} = total value of exports/imports for country *j* to/from country *k* and product *i*

n = number of product

According to the literature, a country that is trading with several other countries is considered to be more integrated into other trading blocs than that country which is trading with only few partner countries (Laaser and Schrader, 2006). For the case of this study therefore if the BRIC or OECD countries for example, has a low concentration index it means that Africa is less integrated into them, while a higher concentration index in these trading partners to Africa will imply more integrated with Africa.

Table 36 presents the concentration indices of major trading partners to Africa. With respect to exports, higher concentration index can be seen for the United States, but on average for the period from 2002 to 2012, the BRIC countries shows higher concentration index than the USA. This depicts the upsurge of the interest of the BRIC countries to integrate with Africa. Imports shows a different picture higher concentration indices are seen for the BRIC countries, hence

more integration of Africa into these countries. It is noted that indices are slowly decreasing over years for United States while for all other countries they increase, especially for the BRIC countries.

Table 36: Bilateral concentration indices of merchandise exports and imports for Africa

Trading Partner	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Exports											
Brazil	0.75	0.74	0.83	0.81	0.81	0.79	0.77	0.76	0.59	0.62	0.63
China	0.47	0.54	0.65	0.68	0.70	0.69	0.73	0.65	0.62	0.55	0.57
India	0.40	0.41	0.33	0.32	0.57	0.58	0.55	0.62	0.62	0.64	0.66
Russian Federation	0.39	0.37	0.34	0.32	0.32	0.30	0.30	0.33	0.32	0.28	0.29
United States	0.59	0.63	0.69	0.73	0.76	0.77	0.77	0.73	0.72	0.72	0.68
European Union	0.27	0.28	0.30	0.37	0.37	0.36	0.44	0.36	0.37	0.38	0.47
Imports											
Brazil	0.26	0.20	0.19	0.18	0.21	0.17	0.18	0.21	0.28	0.32	0.28
China	0.07	0.08	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.07
India	0.12	0.10	0.10	0.10	0.15	0.18	0.21	0.19	0.22	0.21	0.19
Russian Federation	0.22	0.25	0.28	0.30	0.26	0.33	0.27	0.26	0.28	0.35	0.37
United States	0.14	0.12	0.11	0.11	0.13	0.12	0.10	0.09	0.08	0.12	0.10
European Union	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.06	0.08	0.08	0.09

Source: UNCTADstat, 2014

Trade Intensity index; This index measures country's trade performance in terms of the share of one country's trade with another country as a proportion of world trade (Hill, 1985). It examines the importance of one country in other's trade. For Africa's (*i*) exports to any of the trading partners (*j*), the intensity index (I_{ij}) is defined as the share of Africa's (*i*) exports to the trading partners (*j*) in its total exports (X_{ij}/X_i) relative to the share of the trading partner's (*j*) imports in the world imports, net of Africa's imports (M_w-M_i).

Because no country can export to itself, that is why M_i is subtracted to M_w, implying that the only share of the world imports it might possibly have is all imports from other countries other than its own. Thus the indices were computed using the formula below;

$$I_{ij} = (X_{ij}/Xi)/ (M_j/ M_w\text{-}M_i) \quad (6.10)$$

Where;

X_{ij}= the exports of country *i* to country *j*

X_i= Total exports of country *i*

M_j =Total imports of country *j*

M_w = the total world imports

M_i = total imports of country *i*

(X_{ij}/Xi) = denotes the proportion of exports sent to trading partner relative to total exports.

$(M_j/M_w\text{-}M_i)$= represents the foreign country's total imports as a proportion of total world imports less the import of the domestic country.

Whereas the I_{ij} takes a value between *0* and $+\infty$, values exceeding a unity signify a presence of relatively intense trading relationship because the relative importance of partner country (*j*) in African trade (*i*) is greater than partner country's trade share of world trade. Thus higher values of *I* are expected to countries which import at relatively higher levels from the same country to which they export most of their products. On the other hand, countries will have lower *I* if they import from diverse markets such that they do not rely on only one country where they send most of their exports.

The indices in table 36 show Africa being important in EU trade as it reflects higher indices over the last decade. However it is evident that the trend decreases as time goes on, different from what appears to be with China which is the second following the EU. The results show strengthening intensity indices that are, strengthening trade flows between Africa and China and India.

The two countries proportionately import goods from Africa to which they also send most of their exports, hence intense trading relationships. A decreasing trend is also seen for trade

flows between Africa and Brazil as well as Russia and USA, meaning that Africa is losing its importance in these countries.

Table 37: Trade intensity indices between Africa and BRIC countries, EU and USA

Trading Partner	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Africa	5.08	4.73	4.17	3.85	3.76	3.54	3.89	3.75	3.48	3.86
Brazil	1.10	1.26	1.26	1.17	1.17	1.16	0.86	1.00	1.07	0.99
China	2.39	2.83	3.18	3.74	3.85	3.08	3.22	4.15	3.95	4.27
India	1.28	0.49	0.56	1.26	1.56	1.55	1.66	2.39	2.00	2.11
Russia Federation	0.12	0.11	0.13	0.10	0.10	0.09	0.10	0.11	0.09	0.09
United States	1.86	2.16	2.73	2.77	2.80	2.71	2.12	2.20	2.02	1.35
European Union	20.72	19.50	17.30	15.56	13.47	12.64	11.37	11.02	11.10	11.22

Source: UNCTADstat, 2014

6.9 Gravity Model Estimation Results

The estimation is done for model *6.5*, and 6.*6* and, for each model regressions are conducted for the six parts; the estimate results for the full sample *(1)*. The bilateral trade between African countries i.e. intra African bilateral trade flows *(2)*,trade flows from African countries to the BRICs *(3)*, from the BRICs to African countries *(4)*,from African countries to the OECD countries *(5)* and lastly from the OECD countries to African countries *(6)*. Moreover, for each part (*1* to *6*) estimation is done in two steps, in the first step variables are considered at level, while in the second step the model includes some variables as a product of the values of the two trading partners. Both models are estimated using the HT, estimation technique as well other three panel data estimators. The random effect GLS regression, the fixed effects regression and the System GMM are used for comparative purposes but also to test for robustness of the primary results. Results are presented in table 38 to 45. Table 38 and 39 presents results for the full sample. Tables 40 and 41 present results for Intra African bilateral trade flows. Tables 42 and 43 present results for the bilateral trade between African and BRIC

countries. Tables 44 and 45 present results for the bilateral trade flow between Africa and OECD countries. The discussion of results follows the same pattern.

6.9.1 Full Sample estimation results

The results of the HT, GLS and FE for the full sample are shown in 38 for the variables in level and table 39 for the model that include product variables. In both tables, the first column lists the variables. The second, third and fourth columns show the coefficients and standard errors in parenthesis for each of the above estimation techniques respectively. The regression results reveal that in most cases the results are robust with few exceptions of changes in significance levels and the magnitude of the coefficients.

The results in table 38 portray a good picture since, with exception of the mobile cellular subscriptions for the importing country and the WTO membership, all of the variables are significant and the coefficients take the expected sign in both estimated models for all estimation techniques. Results in table 39 which incorporates some product variables also shows good results as only two variables, though significant; arable land and WTO membership have coefficients which do not take the expected sign. This is also observed in the coefficients under fixed effect technique for the credit to private sector variable, it is negative though is statistically significant. Otherwise the rest of the variables are significant and their coefficients take the expected signs. Noteworthy is that, it was expected that if the variables in the model are measured in a product form (model 6.6) would yield improved results; this has not been the case as can be seen in table 39 below. There has not been significant improvement on the estimation results by including some multiplied variables.

The GLS random effect and fixed effect estimation techniques proves that the equations fit the data relatively well, explaining over 50 per cent of the variations in the bilateral trade linkages. The probability of Prob>chi 2 and Prob>F obtained from the test for the relevance of time

Table 38: Empirical results, full sample (variables at level)

Modelling technique:	**Hausman Taylor**	**GLS (RE)**	**Fixed Effect (FE)**
lnExchange rate	0.01	0.01	-0.01
	(0.00)	(0.00)	(0.00)
lnCredit to Private sectors $_i$	0.37***	0.30***	0.28***
	(0.02)	(0.02)	(0.02)
lnCredit to Private sectors $_j$	0.25***	0.24***	0.24***
	(0.01)	(0.02)	(0.02)
Mobile cellular subscriptions$_i$	0.01***	0.05***	0.05***
	(0.00)	(0.01)	(0.01)
Mobile cellular subscriptions$_j$	-0.01***	0.16***	0.16***
	(0.00)	(0.01)	(0.01)
Arable land $_i$	0.01***	0.09***	-
	(0.00)	(0.01)	
Arable land $_j$	0.01***	0.10***	-
	(0.00)	(0.01)	
lnGDPpp$_i$	0.99***	0.99***	1.02***
	(0.01)	(0.12)	(0.02)
lnGDPpp$_j$	0.77***	0.51***	0.51***
	(0.01)	(0.02)	(0.02)
lnPopulation$_i$	1.18***	1.19***	1.24***
	(0.01)	(0.01)	(0.01)
lnPopulation$_j$	0.94***	0.98***	0.99***
	(0.01)	(0.01)	(0.01)
lnDistance$_{ij}$	-0.96***	-0.83***	-
	(0.02)	(0.03)	
Landlocked	-0.59***	-0.74***	-
	(0.02)	(0.03)	
Common language official	0.85***	0.97***	-
	(0.03)	(0.03)	
WTO membership	-0.00*	-0.31***	-
	(0.00)	(0.04)	
Year dummy	32.68***	497.47***	19.81***
	(0.01)	(0.00)	(0.00)
R-Square	-	0.67	0.53
No. of observations	37,475	37,475	37,475
No. of country pairs	1,387	1,358	1,358

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

fixed effects reveals that all the coefficients of the year dummies in the full sample are jointly not equal to zero. The test rejects the null hypothesis that all years' coefficients are jointly equal to zero hence reflecting that in the examination of the bilateral trade flows, time fixed effects are needed in the estimations as they have significant explanatory power on the dependent variable.

The population variables have higher coefficients and are both positive and significant. The results explain the positive and significant impact of the population growth of the trading partner countries on the bilateral trade flows between them. A closer look at the results reveals that the volume of bilateral trade has different reactions to population growth depending on whether the population increase is of an exporting or importing country. More proportionate increase in seen for the exporting country and less for the importing country. Model 6.5 reveals that with a 10 per cent increase in the population size in the exporting country, exports volumes may increase by 12 per cent, while for the importing country may increase by 9 per cent to 10 per cent. Considering the combined size of population (table 39), an increase of 10 per cent in the population of the pair of countries would lead to an increase of around 7 to 11 per cent of their bilateral trade flows.

For both models, the GDP per capita of both pair of countries has positive and significant coefficients. Though the variable at level (table 38), has higher coefficients values than in the combined or product variable (table 39). These results suggest that the economic development between the trading partners strengthens the bilateral trade flows. The results show that an increase of the GDP per capita of a country gives rise to an increase in the volume of exports in the bilateral trade. For a 10 per cent increase in GDP per capita results into approximately 9 to 10 per cent in exports, whereas 5 to 7 per cent of the volume of the imported goods.

Considering a product variable of the two country pair, the effect shows less impact on export volumes, around 1.3 per cent.

Table 39: Empirical results, full sample (include product variables)

Modelling technique:	**Hausman Taylor**	**GLS (RE)**	**Fixed Effects (FE)**
ln (Mobile cellular*i*j*)	0.01	0.01*	0.01**
	(0.00)	(0.00)	(0.00)
ln (Arable land*i*j)*	-0.02*	-0.02**	-
	(0.01)	(0.00)	
ln(Credit to Privatesector*i*j)*	0.21***	0.21***	-0.01***
	(0.01)	(0.01)	(0.00)
lnExchange rate	0.01***	0.01***	0.06***
	(0.00)	(0.00)	(0.00)
ln (Population*i*j)*	0.07***	0.06***	0.11***
	(0.00)	(0.00)	(0.00)
ln(GDPppi**j)*	0.13***	0.12***	-
	(0.00)	(0.00)	
lnDistance	-1.76***	-0.89***	-
	(0.03)	(0.03)	
Landlocked	-0.62***	-0.64***	-
	(0.03)	(0.03)	
Common language official	0.91***	0.91***	-
	(0.04)	(0.03)	
WTO membership	-0.01***	-0.00***	-
	(0.00)	(0.00)	
Years dummy	41.18***	765.15***	30.10***
	(0.00)	(0.00)	(0.00)
R-square	-	0.52	0.47
No. of observations	32,440	32,440	32,440
No. of panel groups	1,365	1,365	1,365

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

Negative and significant coefficients for the distance variable indicate the volume of bilateral trade flows decreases as distance between trading partners increases. Any increase of 10 per cent in the distance between two countries reduces trade from 9 to 10 per cent. However table 39 indicates even higher than that, around 9 to 18 per cent. As expected a land locked variable has a negative and significant coefficients in both models and in all estimation techniques. All together indicates that landlocked countries trade by around 60 to 70 per cent less as compared to countries that are not locked.

The coefficients for the variable common official language are positive and statistically significant in both models, and indicate that countries that use the same official language tend to trade at 85 to 97 per cent more than countries that do not share their official language. This reflects the positive effects of belonging to the same language sphere and the role it plays in reducing the transaction costs.

Surprisingly the dummy variable for membership to WTO gives negative and significant coefficients, while the expectation was that if both countries are members of the WTO, trade volume between them would increase.

The variable arable land has positive and significant coefficients in model 6.5 (table 38 results). However, the magnitude of the influence on the volume of exports is very small compared to the rest of the variables with exception of the bilateral exchange rate which also have lower coefficients and is not significant as well. The variable exchange rate, here referred to as bilateral exchange rate and indicates the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages. From the data the bilateral exchange rate was computed by calculating the cross rate between the real rates applicable in each trading partner (bilateral exchange rate) because all the official exchange rates used are against the U.S. dollar. The

bilateral exchange rate in table 39, the coefficients are becoming significant though remains to be positive. But for the arable land variable, the coefficients turn out to be negative though they remain significant.

Likewise mobile cellular subscription variable has lower coefficients particularly in the Hausman Taylor estimation technique for the variables at level (table 38), as well as when estimated as a product (table 39). However the coefficients reflect that the variable has a positive and significant effect on export volumes. The mobile cellular subscription variable measures the subscriptions to public mobile telephone services using cellular technology that provides access to the public switched telephone network. It includes both post-paid and pre-paid subscriptions.

The inclusion of the variable is particularly motivated by the fact that there has been exorbitant growth of mobile phones usage in the African countries in the recent years. Africa is considered to be the world's fastest growing mobile market with the number of mobile cellular subscribers increasing on an average of 17 per cent between 2010 and 2011. This has been attributed to an increasing use of smart phones and falling internet costs. Besides, through innovations in money transfer systems, mobile phones have revolutionized the continent's financial transactions (MDG Report, 2013). This has increased the number of people using internet services as this is readily available for all smart phones. Today businessmen and women can even transfer their money from their mobile phones to their bank accounts and vice versa. They can pay for transactions and bills through their mobile phones wherever they are because mobile banking has been made possible.

Consequently, under this chapter mobile cellular subscription is considered as a factor that positively influences the trade flows between African countries and outside the continent, hence positive coefficients. Empirical results in both cases confirms this as the coefficients for

the variable are positive and significant, with more significance level (at 1 per cent) when variables are considered at level. This may imply that the expansion of mobile phone usage enhances communication and reduced trade costs between pair of countries. This confirms the fact that mobile phones provides new possibilities for the economies particularly African economies as it enhances financial development, mobility in the face of African poor infrastructure, and generally economic growth(Asongu, 2013; Aker and Mbiti, 2010; Smith et al., 2011; Baumüller, 2012; Dermish et al., 2011)

The variable domestic credits to private sector have been included considering the fact that the role played by private sector is paramount in the trade flows of both developing and developed countries. It refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. The variable credit to private sector to both countries in a pair, that is exporting and importing country, has positive and significant coefficients. However the effect seem to be more for the exporting country than for the importing country, meaning that the influence is more on export volumes than on imports. Specifically, when the credit to private sector goes up by 10 per cent, exports increase by 3 to 4 per cent, while imports increase by approximately 2 to 3 per cent. When considered as a product variable in model 6.6 (results in table 39), the variable increases export volumes by 2 per cent when raised by 10 per cent.

6.9.2 Intra-African bilateral trade flows

The regression estimates shows that the intra-African bilateral trade flows are explained more by the effect of the trans-border trade. The variables that accounts for higher effect on the dependent variable (exports volume) are linked to either sharing borders or being distant from each other. *First* in the list contiguity as per the Hausman Taylor estimates has the highest significant coefficient and is taking the positive sign. Which imply that relative to countries

that do not share borders, *ceteris peribus*, two contiguous African countries have a higher volume of trade. The dummy variable contiguity has been used in this study for intra African trade flows only, because neither BRIC countries nor OECD countries borders with any of the African countries.

Table 40: Empirical results, intra Africa bilateral trade flows (variables at level)

Modelling technique:	**Hausman Taylor**	**System GMM**	**GLS (RE)**	**Fixed Effect (FE)**
$lnPopulation_i$	0.95***	0.28*	0.93***	0.25
	(0.19)	(0.16)	(0.06)	(0.27)
$lnPopulation_j$	1.23***	0.81***	0.74***	2.08***
	(0.20)	(0.17)	(0.06)	(0.28)
$lnDistance_{ij}$	2.32	-2.54***	-1.51***	-
	(1.82)	(0.62)	(0.19)	
$lnGDPpercapita_i$	0.88***	0.73**	0.78***	0.89***
	(0.14)	(0.24)	(0.09)	(0.16)
$lnGDP\ per\ capita_j$	0.65***	1.09***	0.71***	0.67***
	(0.11)	(0.21)	(0.08)	(0.12)
$lnCredit\ to\ Private\ Sector_i$	0.29***	0.17*	0.20***	0.28***
	(0.05)	(0.09)	(0.06)	(0.06)
$lnCredit\ to\ Private\ Sector_j$	0.22***	-0.06	0.32***	0.27***
	(0.06)	(0.11)	(0.05)	(0.05)
$lnBilateral\ Exchange\ Rate_{ij}$	0.06***	-0.15**	0.07***	0.07***
	(0.01)	(0.06)	(0.15)	(0.01)
$Mobile\ Cellular_i$	0.01***	0.01	-0.01**	-0.01**
	(0.00)	(0.00)	(0.00)	(0.00)
$Mobile\ Cellular_j$	-0.01*	0.01	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
$Arable\ land_i$	-0.01	0.08***	0.01	-
	(0.00)	(0.02)	(0.01)	
$Arable\ land_j$	0.03***	0.02	0.02***	-
	(0.00)	(0.01)	(0.00)	
Landlocked	-1.36***	0.15	-0.89***	-
	(0.39)	(0.52)	(0.17)	
Contiguity	5.16**	-0.30	1.15***	-
	(2.23)	(1.10)	(0.38)	
Common language official	2.36***	1.06*	1.13***	-
	(0.52)	(0.55)	(0.19)	
WTO membership	1.54*	-0.46	0.25	-
	(0.82)	(0.55)	(0.21)	
Regional Trade Agreement	3.48***	0.30	0.78***	-
	(1.15)	(0.70)	(0.24)	

Lag of Exports$_{ij}$	-	0.27***	-	-
		(0.02)		
Years dummy	27.74**	63.12***	29.49***	1.42*
	(0.04)	(0.00)	(0.03)	(0.11)
R-square	-	-	0.44	0.18
No. of observations	6,737	5,744	6,737	6,737
No. of panel groups	529	478	529	529

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

The results indicate a positive and significant effect as the coefficient for the variable takes the expected sign and it is significant. This might imply that proximity have positive impact to trade, there tend to be more bilateral trade flows for countries sharing border than for those countries that do not share. In table 41, however, the coefficients for the variable contiguity is not significant though takes a positive sign, implying here that sharing common land border tend to affect trade positively though not significantly. The Random effect GLS gives out the same positive and significant results for both models, confirming what has been found in the HT estimator. Coe and Hoffmaister (1999) include regional fixed effects in their regressions and they find that proximity is an important factor for bilateral trade, for example they conclude that Africa overtrades with Europe than it does with North America because of the proximity. Furthermore even the trade expansion in the intra African trade can be explained by the effect of trans- border trade (Zannou, 2010).

Secondly, most African regional trade agreements are based on neighbourhood, with countries that either share borders or are in the same regional block[23]. The coefficient for the variable regional trade agreement has also high coefficients (magnitude) which are taking the expected positive sign and statistically significant. Thus membership to same regional trade groups is a factor also that explains the trend of bilateral trade flows in the African countries. The variable,

[23]Refer to African regional blocks discussed in chapter two.

though tested for intra African trade only is positive and significant in all estimation techniques with exception of the system GMM in model 6.5 and though significant have negative coefficients in model 6.6.

The implication is that African countries need to promote more regional integrations to enhance their intra trade levels. Formation of regional trade agreements have been proved to increase trade, as it can be seen in a research by Islam, et al., (2014). They ascertained that the formation of SAFTA (i.e. South Asia Free Trade Agreement) had increased trade particularly the exports of SAFTA members to the rest of the world. Therefore even if the African intra-regional trade agreements are not as promising as they are expected to be (as it is in other regions like Asia, Europe and America), still the formation of the regional trade agreements will help to boost the continent's trade volumes as well as to move towards integration into global economy. Worthy to note is also that when countries goes into deeper integration to having a common currency, it can be expected that their bilateral trade flows increases even more (Glick and Rose, 2002; Yeyati, 2003; Afio, 2010; Tansey and Touray, 2010).

Thirdly, the role of using common official language in promoting bilateral trade flows in the African language is vividly revealed by the empirical results both when estimated with variables at level and with the inclusion of product variables. The coefficients of the variable are statistically significant and are positive. As it has been discussed in chapter two, that there is much disparity in the continent which also translates on how the bilateral trade are structured[24]. To link this disparity to the aspect of language, consideration of historical facts and African regional blocs is inevitable. Most of the countries in the eastern and southern Africa use English as an official language (except for Angola and Mozambique who use Portuguese language). Large part of the countries in the central and western bloc of the continent use

[24] Of course this is also based on regional economic grouping (RECs)

French an official language, whereas the northern part uses Arabic as an official language. A closer analysis of the intra-regional trade flows are based on this division because it is easier for them to communicate and also reduces the transaction costs during the trading activities. These three variables accounts for a large part of the explanation of the intra African bilateral trade flows according to the empirical results in table 40 and 41.

The continent accounts for a large number of landlocked countries compared to the other six continents; this together with the relatively lower economic development justifies the regression results in table 40 and 41. Landlocked has negative and statistically significant coefficients in both models that have been estimated. This imply that landlocked-ness of a country reduces the volume of trade between countries in Africa. As expected distance variable also reduces the export volume of the intra African trade. Regression results in table 40 indicate that on average an increase in distance by 10 per cent tend to reduce bilateral trade by around 15 and 25 per cent; whereas 11 to 14 per cent in table 41. However the Hausman Taylor gives strange results for the where the coefficient is positive and not significant.

Despite this trivial variation between estimation techniques, still distance continues to be a major determining factor for the bilateral trade between the African countries. The literature (Limao and Venables, 2001; Longo and Sekkat, 2004; Longo and Sekkat, 2001)provides that the lower levels of intra-regional trade in Africa is to a great extent attributed to transportation costs considering the limited infrastructural setup in the continent.

WTO membership variable has positive and significant coefficients in both models. With exception of the system GMM, which indicates a negative coefficient in table 40, all other estimation techniques support the fact that there tend to be more bilateral trade flows for countries that are both members of the WTO. However as will be argued later in this chapter,

Table 41: Empirical Results, Intra-Africa bilateral trade flows (include product variables)

Modelling technique:	**Hausman Taylor**	**System GMM**	**GLS (RE)**	**Fixed Effect (FE)**
ln (Mobile cellular*i*j)*	0.06***	0.20***	0.07***	0.06***
	(0.01)	(0.02)	(0.01)	(0.01)
ln (Arable land*i*j)*	0.16	0.05***	0.19***	-
	(0.10)	(0.01)	(0.06)	
ln(Credit to Privatesector*i*j))*	-0.06	-0.01	0.04	-0.09
	(0.05)	(0.02)	(0.05)	(0.06)
lnExchange rate	-0.11*	0.01	-0.11**	-0.21**
	(0.06)	(0.08)	(0.06)	(0.07)
ln (Population*i*j)*	0.07***	-0.22***	0.05***	0.07***
	(0.01)	(0.08)	(0.00)	(0.01)
ln(GDPppi**j)*	0.16***	0.05***	0.11***	0.17***
	(0.02)	(0.01)	(0.01)	(0.02)
lnDistance	-1.18	0.07***	-1.44***	-
	(1.26)	(0.03)	(0.21)	
Landlocked	-0.97***	-0.76***	-1.04***	-
	(0.34)	(0.66)	(0.21)	
Contiguity	0.79	1.70***	0.97***	-
	(1.67)	(0.52)	(0.42)	
Same Regional Trade Agreement	1.58**	-2.53**	1.06***	-
	(0.71)	(1.21)	(0.67)	
Common language official	1.54***	2.29***	1.09***	-
	(0.37)	(0.88)	(0.22)	
WTO membership	0.80	0.27	0.67***	-
	(0.59)	(0.59)	(0.24)	
Lag of Exports*ij*	-	0.23	-	-
		(0.59)		
Years	43.37***	68.51***	43.17***	2.06***
	(0.00)	(0.00)	(0.00)	(0.00)
R-squared	-	-	0.42	0.13
No. of observations	4,802	4,293	4,802	4,816
No. of panel groups	491	449	491	491

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

the negative coefficients being significant reflect the fact that the membership impact depend on what the country does with its membership.

The GDP per capita variable has positive and highly significant coefficients (at significance level 1%) in all estimation model implying that the bilateral trade flows between African

countries are influenced by the level of economic development of the parties involved in trade. This is evidenced by the fact that both the GDP per capita of the exporting and the importing country are highly significant and positive for both model estimation results.

The literature (Rose and Van Wincoop, 2001; Tripathi and Leitão, 2013) also has all along predicted that the level of economic development of a particular country determines the volume of bilateral trade between countries, Zannou (2010) finds that an increase in income per capita of a country has positive effects on the ECOWAS intra community tradeThe variable credit to private sector has positive and significant coefficients in most of the bilateral trade flows with high significant positive sign for intra Africa bilateral trade flows. It has positive and statistically significant coefficients in both pair of countries, which is for the importer and exporting country. It implies that private sector involvement in the bilateral trade is enormous and it is significantly affecting the bilateral trade within Africa positively. Results indicate that on average credit to private sectors explain 25 per cent of the variations in the bilateral exports, and this is significant at 1 per cent level in all regression technique with exception of system GMM. Though the results in table 41 for this variable are not promising, the importance of private sector on the African economies cannot be undermined.

Trade policy reforms in many of the African countries in the 1980s meant to facilitate the involvement of the private sector organisations in the economic activities. For many African countries it is private sector organisations (either acting solely or in partnership with the public sector) that are the exporting and importing goods and services in their respective economies. It is logical therefore to argue that enhancing private sector organisations with accessibility to credit facilities directly improve the trading volume of African economies. These results confirms with the findings by Beck (2002). While exploring the link between financial development and trade in manufactures using a 30-year panel for 65 countries, he used credit

to private sector as share of GDP as a proxy for financial development. The coefficients for the variable were positive and statistically significant which implied that the impact of credit to private sector on exports is positive. Moreover he found the impact of credit on private sector on the manufactured trade to have more of a long-run than the short-run impacts. The conclusion was higher levels of financial development as measured by credit to private sectors are associated with higher shares of manufactured exports in GDP and in total merchandise exports as well as higher trade balance in manufactured goods (Beck, 2002). Hence, credit to private sector plays a significant role in the bilateral trade flows as proved by the empirical results.

Again the population variable has positive and significant coefficients implying that the population increase tend to increase the level of bilateral trade between countries in Africa. However for the intra-African bilateral trade, the empirical results shows that the effects are more proportionately higher for the importing country that for the exporting countries. Thus the increase in population tend to increase the volume of imports than the exports. This could explain the fact that the effect of the population variable on the trade volume is on the market side, implying that the volume of imports tend to be higher for a highly populated country than for a less populated countries. It could also be explained by the fact that food stuff commodities accounts for a significant share of the composition of African imports.

Though the coefficients for the mobile cellular subscriptions seem to be weak, they are significantly positive in most of the cases indicating that mobile cellular subscriptions not only accelerates communications in the trading process but also facilitates instant money transfer for business firms through mobile banking (Dermish et al., 2011). Mobile phones have become so important in Africa because they have improved the communication infrastructure in the region hence reducing transaction costs. Data shows that the rate of mobile cellular usage in

Africa was 6.2% in 2005. Reunion and Seychelles were leading by penetration rates of 74.7% and 68.4% respectively while Mauritius (37.9%) and South Africa (36.4%)(Sridhar and Sridhar, 2007).

These rates of penetrations are helping the continent to reduce to a significant rate the transaction cost and transportation cost which are among the main stumbling block for trading activities in Africa evident from the inefficient infrastructure. The influx and a wide range use of mobile phones reduce the costs in the telecommunication market because of the available competition. The literature asserts that reducing importer's calling price by half leads to a 42.5 per cent increase in aggregate bilateral trade (Fink et al., 2005). The literature also asserts that mobile cellular usage in the continent has also improved access to information hence reduced search costs, improved coordination among market agents and increased market efficiency. Business firm's productive efficiency has also improved to the extent of being able to manage well their supply chain (Aker and Mbiti, 2010). Business firms being major players in the bilateral trade are now in a better position to learn about prices in different regions prior to trading activities.

Another determinant for the intra African bilateral trade is the bilateral exchange rate. The effects of exchange rate on bilateral trade arises where there are uncertainties on the appreciation and depreciation in value of any of the trading partner's currency. This exchange rate volatility has a tendency of affecting the profitability of foreign exchange trades. The coefficients for the variable are positive and significant. Though the system GMM give coefficient with negative sign and significant, which signify that in times when the bilateral exchange rate index drops, the exporter currency depreciates with respect to the trading partner's currency, which improves the exports competitiveness (Islam, et al., 2014; Rault et

al., 2009). The same mixed results appear in table 41, this time system GMM and Hausman Taylor changes signs.

For this variable at level, System GMM provides coefficients that confirm that bilateral exchange rate changes adversely affect the bilateral trade flows between countries. Hausman Taylor and GLS random effect estimators do the same in table 41. Abbott (2004) confirms the negative effect that exchange rate uncertainty has on export volumes, in his study exchange rate uncertainty is found to have negative and significant influence on the UK exports to the EU countries. The argument is, despite the fact that with short run fluctuations hedging can be used to insure the risk, it becomes more challenging to cover against long-term exchange rate fluctuations.

These results are also supported by Iqbal and Islam (2014) who asserts that the bilateral real exchange rates are inversely related to the bilateral trade flow between Bangladesh and the European Union. Besides, the negative coefficients conforms to the results by Chowdhury (1993) whose error-correction results indicate that exchange rate volatility has a significant negative impact on the volume of exports in each of the G-7 countries. Moreover, Rault et al. (2009) modelling trade flows between CEEC and OECD countries get the same results implying that when exchange rate index slumps the exporter currency depreciates relative to the currency of the importer, hence improving export competitiveness.

However for the positive coefficients it may also explain the claim that in some cases market participants can benefit from exchange rate volatility if trade is considered as an option held by enterprises. So like any other option that is held by enterprises, (e.g. stocks) the value of trade can rise with any changes in exchange rate indexes (Sercu and Vanhulle, 1992; De Vita and Abbott, 2004). In the study by De Vita and Abbott, with an increase in exchange rate volatility, Japanese buyers imported more so as to build up their stock as a way to avoid being

affected by any sharp rise in price. They find that the import volume grew by 147 per cent during the sample period covered. Likewise on the part of exports, if producers are risk averse any increase in exchange rate risk will raise their expected marginal utility of export revenue and hence will encourage them to escalate their export activities.

Another reason for the positive coefficient could be because of dollarization in the African countries economies. In most of these economies, with higher rates of inflation, the preferred currency for transactions and particularly in the exports and imports is the U.S dollar. To some countries like Zimbabwe, this can even go as far as being used in daily transactions, where it is used alongside the local currency. This being the case the negative effects of exchange rate can never be expected to affect the bilateral trade flows, on contrary market participants can take advantage of the changes in exchange rates by doing speculation in the foreign exchange market.

The Arable land variable has positive and significant coefficients for the exporting countries in the intra African trade flows under system GMM in table 40. And this is logical as it may indicate that the level of exports for most of the African countries is influenced by the size of the arable land available in the country. The random effects GLS results (in table 41) also confirms this, where the coefficient is positive and significant, with the implication that an increase in one percent of the arable land to the total land increases bilateral trade by 19 per cent. As pointed out earlier that the decision to include arable land rather than land in general is because of the feeling that arable land is more closely related to a country's productive capacity (Baxter and Kouparitsas, 2006) considering the fact that Africa accounts for about 27 per cent of the world's arable land.

As noted earlier, in order to control for temporal variations in the exports which are not adequately captured by the other explanatory variables, the time dummies included indicates

that there was a need for their inclusion. Coefficients for a full set of (T-1) time dummies one for each period but one, are jointly highly significant. The results therefore confirm the crucial role of time variations on explaining bilateral trade flows in the African countries. An examination of the lag of exports variable at level under the system GMM also provides coefficients that are positive and highly significant explaining about 27 per cent of the export volume of the intra-African bilateral trade flows. Though positive, the variable is not significant under the results in table 41.

6.9.3 Bilateral trade flows between Africa and the BRIC countries

From the results in table 42 three major factors that influence the bilateral trade between Africa and the BRIC countries include the use of common official language, the GDP per capita and population. The variables are statistically significant and economically reasonable. Results in table 43 reveals that, arable land and bilateral exchange rate are also important in explaining the bilateral trade flows between these trading partners. And in both equations the time dummies are jointly highly significant. Under the system GMM technique, the lag of exports also are positive and highly significant and explains the export volume between African countries and the BRIC countries by around 30 to 33 per cent.

The variable common official language has higher coefficients than the rest of the variables more so in table 42. The coefficients are positive and statistically significant implying that the bilateral trade between African countries and the BRIC is explained by use of common official language. However in actual sense there is no African country that uses Chinese or any of the Russian language as an official language. But the fact that English is adopted by many countries as a medium of business language it has become possible for trade with China as well.

GDP per capita variables has positive and statistically significant coefficients in most cases at one per cent level. Except for the fixed effects estimations on the variables at level in table 42, the coefficients are not significant in both cases. This is applicable for both the exporting and the importing country which indicates that the level of economic development tends to positively influence the exports and imports in the bilateral trade between Africa and the BRIC countries. As explained earlier in this study, the BRIC-Africa trade is characterised by the exports of primary commodities from African countries and importation of food and consumables from BRIC countries, but mainly from China. This is a vivid complementarity, whereas African exports feeds the growing industries in the BRICs African countries also imports manufactured goods from these countries, particularly from China. The imported manufactured goods are not only for household consumption but also for feeding the growing manufacturing sector in the African countries (Broadman and Isik, 2007)

It is also worth noting that African countries where most of this bilateral trade with BRIC is concentrated includes those countries which are rich in natural resources, and in most cases they are the same with higher GDP per capita among the African countries. Thus, an automatic connection with the role of the level of economic development with the bilateral trade.

These results are similar to the claim by Markusen that the intra-country distribution of income measured by GDP per capita matters for inter-country trade (Markusen, 2013). Besides Deardorff (1998) confirms that economies with higher per capita income are expected to have high capital labour ratios which results into producing more of capital intensive goods and will tend to trade more because they produce more and consume larger proportions of capital-intensive goods. Recent literature concludes that there is robust empirical evidence that economies with lower per capita income will tend to have smaller volumes of bilateral trade even after controlling for aggregate income (Tarasov, 2012). Likewise he asserts that not only

Table 42: Empirical Results, Africa -BRIC bilateral trade flows (variables at level)

	From Africa to the BRIC				From the BRIC to Africa			
Modelling technique	**HT**	**SGMM**	**RE**	**FE**	**HT**	**SGMM**	**RE**	**FE**
lnPopulation$_i$	0.88	-0.17	1.46***	1.59***	3.59***	1.16***	2.55***	3.86***
	(0.56)	(0.25)	(0.14)	(0.63)	(0.27)	(0.19)	(0.12)	(0.38)
lnPopulation$_j$	3.32***	2.33***	2.27***	1.42	1.90***	0.62***	1.19***	1.81***
	0.83	(0.58)	(0.32)	(0.95)	(0.21)	(0.11)	(0.06)	(0.26)
lnDistance$_{ij}$	-3.89	1.48	1.04	-	4.77**	-0.62	-0.32	-
	(6.19)	(1.62)	(0.78)		(2.21)	(0.40)	(0.29)	
lnGDP per capita$_i$	1.96***	1.56***	1.57***	2.07***	0.71***	0.76***	1.14***	0.73***
	(0.23)	(0.30)	(0.17)	(0.24)	(0.07)	(0.08)	(0.05)	(0.07)
lnGDP per capita$_j$	1.28***	1.52***	1.39***	1.46***	0.87***	0.77***	0.76***	0.73***
	(0.19)	(0.27)	(0.14)	(0.19)	(0.07)	(0.11)	(0.06)	(0.08)
lnCredit to Private	-0.12	0.21	-0.41*	-0.24	-0.28***	-0.27***	0.01	0.01
Sector$_i$	(0.11)	(0.16)	(0.22)	(0.23)	(0.06)	(0.07)	(0.03)	(0.04)
lnCredit to Private	-0.39*	0.05	-0.02	-0.03	-0.01	-0.09	-0.29***	-0.19***
Sector$_j$	(0.21)	(0.32)	(0.11)	(0.11)	(0.03)	(0.06)	(0.07)	(0.07)
lnBilateral	-0.02	-0.13*	-0.02	-0.02	-0.04***	-0.01	-0.03***	-0.05***
Exchange Rate$_{ij}$	(0.03)	(0.07)	(0.03)	(0.04)	(0.00)	(0.01)	(0.00)	(0.01)
Mobile Cellular$_i$	0.01*	-0.00	-0.00	-0.01	0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00	(0.00)	(0.00)	(0.00)
Mobile Cellular$_j$	0.01	0.01	0.01***	0.01***	0.01***	0.01**	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00	(0.00)	(0.00)	(0.00)
Arable land $_i$	0.03	0.02	0.00	-	-0.12***	-0.03**	0.01	-
	(0.01)	(0.22)	(0.01)		(0.01)	(0.01)	(0.01)	
Arable land $_j$	-0.25***	0.02	0.01	-	-0.01	-0.03***	-0.03***	-
	(0.04)	(0.02)	(0.01)		(0.00)	(0.01)	(0.01)	
Landlocked	-0.41	-0.60	-0.63	-	-1.26*	-1.95***	-1.57***	-
	(2.77)	(0.67)	(0.52)		(0.76)	(0.32)	(0.22)	
Common language	7.05*	2.91**	0.39	-	2.67***	1.79***	1.33***	-
official	(3.80)	(1.21)	(0.71)		(1.10)	(0.56)	(0.33)	
WTO membership	0.68	-1.88***	-0.03	-	-0.54	0.28	-0.19	-
	(2.85)	(0.68)	(0.55)		(0.93)	(0.39)	(0.26)	
Lag of Exports$_{ij}$	-	0.28***	-	-	-	0.38***	-	-
		(0.03)				(0.02)		
Year dummy	83.46***	143.72***	85.84***	3.63***	41.14***	25.37*	46.19***	1.63**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.12)	(0.00)	(0.05)
R-square	-	-	0.45	0.34	-	-	0.66	0.46
No. of observations	2,321	2,091	2,321	2,321	3,778	3,587	3,778	3,778
No of country pairs	148	146	148	148	164	163	164	164

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

trade volume will be lower but also less number of trading partners can be expected for such economies. That is why the intra African bilateral trade has a relatively lower average

coefficient for the variable than African trade with OECD and BRIC as these empirical results shows.

In their seminal paper examining the North – South trade, Coe and Hoffmaister (1999) assert that income has a positive impact of bilateral trade such that a 1 percent increase in income of the trading partners, will lead to an increase in the bilateral trade between the two groups by 2 per cent. These results are somehow similar to what this chapter presents in table 42 as well as table 43.

Population variable has positive and significant coefficients especially in the bilateral trade from BRIC countries to Africa. This imply that an increase in population tend to result into a proportionate increase in trade between trading partners. For the trade flow from Africa to BRIC, the coefficient does not support that the increase in population leads to an increase in exports but more in imports. However the literature assert that there has been an increase in the food exports from Africa to Asian countries particularly China and India, and this has been as a result of an increasing populations and income levels in these countries (Broadman and Isik, 2007). This fact is confirmed by the results in table 43 when population is used as a product variable, the coefficient turn to be positive and significant.

Moreover, the flow of manufactured goods from BRIC countries to African countries are for the search of market, and data shows that Nigeria, which is the most populous country in the continent records higher imports from China (World Bank, 2014). The African exports concentration is also based on the same pattern, for the period between 2000 to 2004 more than 80 percent of value added exports from Africa originated from Nigeria (refined petroleum), South Africa (refined petroleum products, pharmaceuticals, electronics, machinery and transportation equipment's) and Swaziland (pharmaceuticals) (Broadman and Isik, 2007).

Table 43: Empirical Results, Africa-BRIC bilateral trade flows (include product variables)

	From Africa to the BRIC				From the BRIC to Africa			
Modelling technique:	**HT**	**SGMM**	**RE**	**FE**	**HT**	**SGMM**	**RE**	**FE**
ln (Mobilecellular$_i$ x_j)	-0.01 (0.02)	-0.01 (0.02)	0.02 (0.01)	0.03 (0.02)	0.05*** (0.00)	0.07*** (0.01)	0.07*** (0.01)	-0.01 (0.01)
ln (Arable land$_i$ x_j)	0.11 (0.22)	0.55** (0.24)	0.24* (0.14)	-	0.65*** (0.14)	0.10*** (0.02)	0.05*** (0.01)	-
ln(Credit to Privat. $_i$ x_j)	-0.05 (0.10)	0.25* (0.14)	0.02 (0.10)	0.04 (0.01)	-0.05 (0.08)	-0.33* (0.18)	0.14 (0.13)	0.20 (0.14)
lnExchange rate	-0.34*** (0.07)	-0.02 (0.09)	-0.30*** (0.07)	-0.36*** (0.07)	-0.07*** (0.01)	0.02 (0.02)	-0.07*** (0.02)	-0.04 (0.02)
ln (Population$_i$$x_j$)	0.08*** (0.01)	0.03*** (0.01)	0.09*** (0.01)	0.11*** (0.03)	0.09*** (0.00)	0.04*** (0.00)	0.08*** (0.00)	0.18*** (0.02)
ln(GDPppi x_j)	0.29*** (0.02)	0.22*** (0.03)	0.22*** (0.02)	0.31*** (0.03)	0.19*** (0.01)	0.06*** (0.02)	0.12*** (0.01)	0.19*** (0.02)
lnDistance	11.47*** (4.74)	2.43* (1.41)	2.12*** (0.69)	-	1.12 (2.28)	-0.13 (0.61)	-0.42 (0.39)	-
Landlocked	-0.82 (0.90)	-3.84*** (1.03)	-0.99* (0.56)	-	-1.09*** (0.45)	-2.21*** (0.45)	-1.31*** (0.29)	-
Common Official Language	3.59*** (1.36)	4.64*** (1.76)	1.63*** (0.72)	-	-0.26 (0.69)	4.32*** (0.77)	0.43 (0.41)	-
WTO membership	0.39 (1.01)	-2.21*** (0.71)	-0.49 (0.58)	-	-0.07 (0.61)	1.26*** (0.43)	-0.36 (0.37)	-
Years	95.74*** (0.00)	175.84*** (0.00)	117.85*** (0.00)	5.43*** (0.00)	36.18*** (0.00)	26.83* (0.08)	33.19** (0.02)	1.94*** (0.01)
Lag Exports	-	0.28*** (0.02)	-	-	-	0.32*** (0.02)	-	-
R-square			0.41	0.23			0.62	0.54
No. of observations	1,818	1,694	1,818	1,818	2,454	1,627	1,654	1,654
No. of country pairs	148	146	148	148	164	128	128	128

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

Bilateral exchange rate has negative coefficients though not significant in all estimation techniques for the variables at level. But it is negative and significant in all except under system GMM in the table 43 results. Partly this could be explained with the same arguments discussed under intra African bilateral trade in the previous section. The coefficients for the distance variable also do not appear to have consistent sign and significance in all the estimation techniques.

However, the traditional gravity model studies and many recent empirical studies find that the level of trade between a pair of countries is a negative function of the distance between trading

pair countries (Tripathi and Leitão, 2013; Rose and Van Wincoop, 2001). Hence the inconsistence in these results could possibly be insinuating the aspect of the death of distance due to technological advancement in the transportation and communication sectors as discussed earlier in this chapter (see part 6.2.1).

A country in a trading pair being a member to WTO or not has also been examined, in the estimation results under the Hausman Taylor, coefficients are positive but not significant in both cases. However looking of the rest of the estimation techniques, they give mixed results. This could be in line with what is discussed in the literature, while Rose (2002) suggest that membership to WTO does not have any positive effects on trade, Subramanian and Wei have provided evidence that though little but there is an impact of WTO membership on bilateral trade. They find that bilateral trade is greater when both partners had liberalized their trade policy than when only one partner did and the other did not. Besides, as it is in theory, the WTO membership impact would depend on *what the country does* with its membership, *with whom* it negotiates, and *which products* the negotiation covers. This disagreement might explain the mixed regression results in this study (Subramanian and Wei, 2007).

The variable arable land does not give out the expected results. When the variable is estimated at level it almost gives negative coefficients, but the coefficients becomes positive when tested as a product variable. The coefficients takes a positive sign with high statistical significance for the trade flow from BRIC to Africa; and it indicate that the size arable land tend to statistically explain 65 per cent of the variations on exports for the bilateral trade flow from the BRIC to African countries. The coefficients for the variable land locked are negative but not significant in all the estimation techniques, however it implies that the variable has a good explanatory power on the bilateral trade between the Africa and the BRIC countries.

The coefficient for the variable credit to private sector does not indicate the expected results. The coefficients are negative and in most cases not significant, hence reflecting that the variable does not explain the bilateral trade flows between African countries and the BRIC countries. This could be resulting from the nature of the African private sector and enterprises which are characterised with low level of innovation capabilities and competitiveness (UNCTAD, 2013a). They thus do not have significant contribution to the competitiveness of the products to the market external to Africa.

Looking at the results in table 42 and 43, the coefficients for the mobile cellular variable seem to indicate that the variable affect the trade from BRIC to Africa positively. The coefficients are positive and significant. However the magnitude of the effects on trade is so minimal around 0.1 to 0.7 per cent for any 10 percent increase in mobile cellular subscriptions. All the same this shows that the mobile phone usages do have an impact in enhancing the linkage between trading partners.

6.9.4 Bilateral trade flows between Africa and OECD countries

Under this category of bilateral trade flows, the most important determinants are GDP per capita for both importing and exporting country, distance, population variable particularly for the importing country and membership to WTO. Even for these empirical results, the coefficients for the year dummy are positive and significant like in all the previous results. The lag of exports also is positive and highly significant and explains the export volume between African countries and the OECD by around 25 per cent.

The first assertion of these results is the traditional gravity model fact that trade between a pair of countries is an increasing function of their incomes and a decreasing function of their distance between them (Frankel and Rose, 2002: De Groot and Linders, 2004). The distance variable has negative and significant coefficients in all estimation technique for the variables

at level. These results imply that distance has negative effects on bilateral trade. Results show that, on average distance explains around 24 per cent of the variations in the bilateral trade between Africa and the OECD. In the study like this Zannou (2010) asserts that an increase of 10 per cent in the distance between the two trading partner countries reduced trade from 8 to 13 per cent.

The coefficients for population variable are also taking the expected positive sign and highly significant especially in both models. This imply that the populous economies tend to trade more that less populated countries, and this applies for both, the importing and exporting country. Besides the same results are provided by the random effect GLS, the within estimator and the system GMM estimation technique. These results corroborates with the previous results in this chapter that bilateral trade increases more proportionately to population growth for the exporting country and importing country likewise.

The variable credit to private sector shows mixed results. For the trade from Africa to OECD, the HT estimation technique provides coefficient estimates that are significantly positive for the importer and exporter when the variable is considered at level. The implications of these results are that, credits to private sector tend to increase exports by 1.2 percent with the 10 per cent increase in the credits to private sector. More proportionate increase is on the imports, as the same increase would lead to an increase in imports by 11.7 per cent. However when the variable is estimated as a product, the coefficients turns out to be negative.

Coefficients of the bilateral exchange rate in table 45 are positive and significant in all estimation techniques, while for the variables at level in only some few cases coefficients are positive, especially for the trade flows from OECD to Africa. This implies that the bilateral exchange rate affects the exports and imports positively. However for the variables at level estimation results, coefficients for the bilateral exchange rate are negative and significant. This

would only mean that for the trade flows from Africa to the OECD countries, bilateral exchange rate affect trade negatively. This mixed results renders the same explanation as in the previous sections.

Table 44: Empirical Results, Africa -OECD bilateral trade flows (variables at level)

	From Africa to the OECD				From the OECD to Africa			
Modelling technique:	**HT**	**SGMM**	**RE**	**FE**	**HT**	**SGMM**	**RE**	**FE**
lnPopulation$_i$	0.12	0.07	0.83***	0.02	2.24***	0.26***	1.15***	2.81***
	(0.13)	(0.13)	(0.04)	(0.14)	(0.09)	(0.07)	(0.02)	(0.13)
lnPopulation$_j$	2.09***	0.63***	1.22***	2.38***	0.65***	0.51***	0.93***	0.42***
	(0.11)	(0.14)	(0.04)	(0.15)	(0.07)	(0.06)	(0.02)	(0.08)
lnDistance$_{ij}$	-1.92***	-1.38***	-1.45***	-	-2.87***	-0.42*	-1.38***	-
	(0.42)	(0.44)	(0.12)		(0.37)	(0.24)	(0.07)	
lnGDP per capita$_i$	0.88***	0.36***	0.84***	0.92***	1.09***	0.60***	1.15***	1.22***
	(0.08)	(0.13)	(0.06)	(0.08)	(0.05)	(0.09)	(0.04)	(0.06)
lnGDP per capita$_j$	1.71***	0.90***	1.27***	1.93***	0.76***	0.19***	0.60***	0.79***
	(0.10)	(0.18)	(0.07)	(0.13)	(0.03)	(0.07)	(0.03)	(0.03)
lnCredit to Private Sector$_i$	0.12***	0.04	-0.07	-0.17***	-0.11***	0.11**	0.19***	0.15***
	(0.13)	(0.05)	(0.05)	(0.05)	(0.03)	(0.05)	(0.03)	(0.02)
lnCredit to Private Sector$_j$	1.17***	-0.22**	0.15***	0.13***	0.15	-0.01	0.05*	-0.12***
	(0.05)	(0.01)	(0.03)	(0.03)	(0.01)	(0.03)	(0.03)	(0.03)
lnBilateral Exch.Rate$_{ij}$	-0.01**	-0.01	-0.01	-0.01***	0.01***	-0.06***	0.01**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Mobile Cellular$_i$	0.01***	0.01***	-0.01***	-0.01***	-0.01***	0.01***	0.01***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mobile Cellular$_j$	-0.01***	0.01*	0.01***	0.01***	0.01**	0.01***	-0.01***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Arable land $_i$	-0.02***	-0.01	0.01*	-	-0.04***	0.01	-0.01	-
	(0.00)	(0.01)	(0.00)		(0.00)	(0.00)	(0.00)	
Arable land $_j$	-0.01	0.03***	-0.01*	-	-0.00	0.02***	-0.00	-
	(0.00)	(0.01)	(0.00)		(0.00)	(0.00)	(0.00)	
Landlocked	0.29	-0.49	-0.37***	-	0.10	-0.72***	-0.58***	-
	(0.28)	(0.54)	(0.12)		(0.22)	(0.21)	(0.07)	
Common language official	0.22	-0.08	0.92***	-	0.11	-1.20***	0.67***	-
	(0.42)	(0.61)	(0.18)		(0.33)	(0.33)	(0.10)	
WTO membership	0.58	-0.31	0.29*	-	1.12***	-0.01***	-0.00**	-
	(0.40)	(0.54)	(0.16)		(4.50)	(0.00)	(0.00)	
Lag of Exports$_{ij}$	-	0.26***	-	-	-	0.23***	-	-
		(0.01)				(0.01)		
Years	94.91***	105.93**	103.97***	3.28***	378.86***	223.18**	405.04***	15.58***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
R-square	-	-	0.45	0.25	-	-	0.65	0.40
No. of observations	17740	15970	17740	17740	25,056	23,062	25,056	25,056
No. of country pair	1102	1043	1102	1102	1,365	1,296	1,365	1,365

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the

difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

Table 45: Empirical Results, Africa- OECD bilateral trade flows (include product variables)

	From Africa to OECD				From OECD to Africa			
Modelling technique:	**HT**	**SGMM**	**RE**	**FE**	**HT**	**SGMM**	**RE**	**FE**
ln (Mobilecellular$_i$ x_j)	-0.04*** (0.00)	-0.00 (0.01)	-0.02*** (0.01)	-0.06*** (0.01)	0.02*** (0.00)	0.03*** (0.01)	0.03*** (0.00)	0.01 (0.00)
ln (Arable land$_i$ x_j)	-0.27*** (0.08)	0.35** (0.16)	0.17*** (0.04)	-	-0.46*** (0.04)	-0.03 (0.06)	-0.09*** (0.02)	-
ln(Credit to Privatesector ($_i$ x_j)	-0.34*** (0.09)	-0.02 (0.14)	-0.13 (0.09)	-0.36*** (0.10)	0.12*** (0.02)	0.19*** (0.03)	0.19*** (0.02)	0.11*** (0.02)
lnExchange rate	-0.01*** (0.00)	-0.02 (0.01)	-0.01* (0.00)	-0.02*** (0.01)	0.01 (0.01)	-0.12*** (0.02)	-0.01 (0.01)	0.01 (0.01)
ln (Population$_i$ x_j)	0.10*** (0.00)	0.04*** (0.01)	0.07*** (0.00)	0.12*** (0.01)	0.10*** (0.00)	0.04*** (0.00)	0.07*** (0.00)	0.14*** (0.01)
ln(GDPppi x_j)	0.16*** (0.01)	0.12*** (0.02)	0.15*** (0.01)	0.19*** (0.02)	0.11*** (0.01)	0.07*** (0.01)	0.09*** (0.00)	0.09*** (0.00)
lnDistance	-2.33*** (0.44)	-0.28 0.38	-1.05*** (0.13)	-	-2.47*** (0.35)	-0.56*** (0.21)	-1.18*** (0.08)	-
Landlocked	-0.10 (0.02)	-1.47*** (0.70)	-0.43*** (0.14)	-	-0.27 (0.20)	0.95*** (0.25)	-0.64*** (0.08)	-
Common Official Language	0.88** (0.41)	1.63** (0.77)	0.95*** (0.20)	-	0.75*** (0.28)	-2.43*** (0.41)	0.74*** (0.12)	-
WTO membership	0.0 5 (0.39)	1.13* (0.59)	0.11 (0.18)	-	-6.45*** (0.86)	-0.00*** (0.00)	-0.00*** (0.00)	-
Lag Exports	-	0.24*** (0.01)	-	-	-	0.27*** (0.01)	-	-
Years	88.63*** (0.00)	3.05*** (0.00)	102.61*** (0.00)	116.15*** (0.00)	386.50*** (0.00)	250.18*** (0.00)	370.10*** (0.00)	16.36*** (0.00)
R-Square			0.47	0.37			0.66	0.56
No. of observations	10,148	9,351	10,148	10,148	14,018	13,385	14,018	14,018
No. of country pair	1,002	953	1002	1002	1,244	1214	1244	1244

Note: The dependent variable for these regression results exports from country *i* to *j*. ***, **, * denotes significance level at 1%, 5% and 10% respectively. Standard errors are in parentheses. *i denotes* exporting country, while *j* denotes importing county. Under the Hausman -Taylor modelling technique all the time varying variables are used as instruments for endogenous time invariant variables. Under the system GMM lagged levels of dependent and independent variables are instruments for the difference equation whereas lagged differences of dependent and independent variables are used as instruments of the level equation.

As discussed in the previous sections, the variable landlocked as used in several researches that use gravity model, has a negative effect on bilateral trade. Coe and Hoffmaister (1999) conclude that other things being equal trade by land locked countries is 70 per cent less than the country with an access to the sea. In both regression results of the two models, the coefficients for the landlocked for the trade flow between Africa and OECD are not significant.

By coefficients not being negative and significant, might give an implication of the discussion under table 44, that landlocked countries in the developed countries trade more than their counter parts in the less developed countries. This is quite interesting as it questions the notion that being landlocked is always associated with lower trade volumes as compared to non-landlocked countries.

On the other hand, results in table 45, coefficients for land locked takes the expected sign and is significant confirming that bilateral trade flows between countries tend to be reduced by landlocked-ness of their trading partners. In a way it contradicts the proposition made in the previous paragraph, though it can be argued basing on the fact that the countries in consideration here includes developed and less developed countries. Therefore while the positive coefficients under the HT technique in table 44 could be representing the developed countries (OECD) as argued above, the negative coefficients under HT in table 45 could be explaining the African countries where landlocked reduces the trade volumes.

Results also confirms that countries that uses common official language tend to trade more because linguistic and cultural bonds between trading partners has a tendency of boosting up bilateral trade. The argument is that similarity in countries encourages bilateral trade and therefore has a positive effect on trade (Balassa, 1966; Frankel and Rose, 2002). The variable takes the positive sign and it is statistically significant except for the African bilateral trade flows with OECD countries, the coefficients are not significant though positive. The only anomaly on the common language in model 6.5 (results table 44), where variables at level provides mixed picture. However, generally the literature (e.g. Glick and Rose, 2001; Coe and Hoffmaister, 1999 and Zannou, 2010), confirms that sharing common language encourage trade. When trading partners share common official language, they trade as twice much than two countries that belong to two different linguistic circle. The positive effect for African

countries bilateral trade flows with the OECD may be explained by the fact that they either speak English, French or Portuguese language based on colonial ties. Studies shows that the bilateral trade between French speaking countries is the highest than others.

The coefficients for the arable land variable in both cases portray a contrary picture to what is taking place in reality. This is because the trade composition of the African exports to these countries (especially African exports) is largely composed of the primary products based on agricultural produce. The coefficients for the mobile phone usage variable, though significant but provides mixed sign effects on the bilateral export volumes. Besides, even the magnitude of the coefficients is very trivial.

An overall assessment based on the R-squared, of the modelling techniques used in this chapter indicates the Generalised least square (GLS) technique to have a higher R-squared statistic compared to the rest of the techniques. It can therefore be said to be the best modelling technique in this study as this fact is true for all trading groupings examined in this chapter.

6.10 Conclusion

In order to examine the determinants for the bilateral trade flows of intra African trade flows, bilateral trade flow between Africa and BRIC and the OECD countries, the chapter has made use of the gravity model on some economic, demographic, cultural and political ties data of the African countries and their trading partners. The study has also incorporated some new variables in the gravity model considering their pivotal role particularly in the Africa trading activities. And this is perhaps the most significant contribution of this study on the bilateral trade research using gravity model. Considering the role of private sector in the bilateral trade, credit to private sector was also included in modelling African bilateral trade flows. Besides the fact that the continent account for a significant portion of the world arable land (27%), arable land was also included to consider the role of productivity on bilateral trade. In the recent

decade, mobile phones has become widely used particularly in the African countries, measured by a number of subscriptions for each country, mobile phone usage has also been included to examine its role in the augmentation of bilateral trade flows.

All of these variables have indicated that they account for the bilateral trade in the African countries to a considerable extent, especially credit to private sector. Mobile phones usage also has a great potential to enhance the bilateral trade volumes of the African countries as well considering the limited infrastructural setup in the continent. But the sustainability and efficiency of this to happen will largely depend on the institutional climate and regulatory system in these economies to support these initiatives.

Empirical results are estimated by use of the Hausman Taylor (1981) technique in order to take advantage of mending the limitations of the panel data estimation techniques like the Generalised Least Square (Random Effect Method) and the within estimator (Fixed Effect method) techniques. The limitations raised by use of these estimation methods calls for an instrumental variable based technique. The use of Hausman Taylor was resorted for it does not involve the inclusion of the instruments from outside the specified model, which can be erroneously done and jeopardise the consistency of the coefficient estimates. Two models were estimated one with variables at level and the second one included variables in product form to try to see if there could be any improvement in the results, which is not the case for many of the variables. However, in order to test for the robustness of the estimations results and or comparative purposes, the study has concurrently estimated the variables using three other more estimation techniques that are popular with panel data analysis. The random effect generalised least square, the fixed effect and the system generalised method of moments (system GMM). What is of important is that the results with these three estimators revealed that the estimated results were robust. This is because with very few exceptions, almost all the

variables showed the same level of statistical significance and with the same positive or negative sign.

Traditional gravity model variables (GDP per capita and distance) took the expected sign in most of the coefficients confirming the wide spread literature on bilateral trade flows. Moreover, dummy variables which have also been tested in most of the literature in this area (like landlocked, contiguity, membership to same RTA and WTO) have also showed good results. Once again this confirm the earlier researches done in this area. Based on the empirical results of the landlocked variables, the study has confirmed that developing land locked countries trade less than their counter part developed land locked countries. Efficiency transportation and telecommunication systems in these countries makes landlocked-ness and distance to be less of a stumbling block to bilateral trade than it is for developing landlocked countries in Africa. Otherwise regional trading agreement has indicated a positive and significant impact on the intra African trade flows. It is up to policy makers in the African countries to ensure that these agreements are more integrated so as to enhance the trading level within Africa and to the rest of the world.

The chapter also highlights some important implications on the up surging trade links of Africa with emerging economies (BRIC). Data shows that the commodity composition of this bilateral trade is much concentrated on the primary products, and most especially on minerals and fuel products. Raising doubt on whether the growing bilateral trade with these countries is for the interest of either trading partners or it is for their benefit in order to feed their growing industrialising economies and leaving Africa a looser. Even looking at the main African countries that are leading for exportations in the BRIC countries, it is mainly the countries with large deposits of fuel and minerals like Angola, Algeria, South Africa and Nigeria to mention few, that has more trade volumes. The intensity index (as can be seen in table 37), which

indicate among the trading partners to Africa which is the most important to the continent, shows that the EU is having a high index. Therefore despite the fact that the concentration index (as can be seen in table 36) indicates the BRIC countries to have much higher concentration than the EU, the EU is still important to Africa. This means although at a decreasing rate, the EU's rate of imports from Africa is almost equivalent to its exports to Africa. Policy makers in the African countries should beware of the investment contracts and negotiations with these emerging countries so that the continent does not end loosing.

Lastly, it is good to note some important variables in the bilateral trade flows for the African countries. For intra African bilateral trade the most important determinants for increasing the volume of trade are the proximity variables to include pair of country belonging in the same regional trade agreement, the contiguity as well as the common official language. Empirical results have also shown that domestic credit to private sector is an important enhancement of bilateral trade flows in the intra African bilateral trade flow. On the other hand landlocked and the distance variables are the strongest factors that reduces the bilateral trade flows within the region.

The bilateral trade flow between African countries and the BRIC countries is determined mainly by the GDP per capita, common official language and population. The empirical results from System GMM estimation shows that even the size of arable land matters for this trade relationship. Still landlocked and distance poses a sizable negative influence on the volume of bilateral trade flow even between the African countries and the BRICs. As for the bilateral trade flow between the African countries and the OECD countries, the main determinants are GDP per capita, population and common language, while distance remains to be the most significant hindrance to higher bilateral trade volumes.

Furthermore, it is anticipated that future research work examine the statistical determinants of African regional blocks and the RECs bilateral trade with the BRIC and the OECD. This is vital considering the regional diversity of Africa as discussed in chapter one.

CHAPTER SEVEN

CONCLUSION AND POLICY IMPLICATIONS

7.1 General Conclusions and Policy Implications

As a response to the research objectives and therefore the research questions that sparked this research, the study has examined the determining factors for trade openness, the effects trade openness has to the African economy, and eventually the examination of factors behind bilateral trade flows in Africa. The latter has examined the intra African bilateral trade, and bilateral trade between Africa and the BRIC and the OECD countries. However before this the theoretical background of international trade has been revisited to envisage how they explain international trade in the current global trade pattern. It has been shown that the H-O model can explain the north-south trade relationships, while the new trade theories has been shown to explain the trade pattern among developed countries (north-north trade). While in the former countries' differences in factor endowments gives existence of trade between countries, the latter is characterised with trade in differentiated products and takes advantage of increasing return and economies of scale. Diversity in consumer's preferences accounts for much of the trade in differentiated products.

Trade between developed countries and less developed countries including most of African countries have been better explained by the H-O model, whereas the composition of African exports is characterised by products from natural resources that is primary commodities. Therefore as it has been shown in chapter three large African exporters to developed countries are those that host rich deposits of natural resources like minerals, fuels and gas. Likewise, agricultural products for exports which are mainly destined outside the continent are mostly from countries in the eastern part of Africa where there are favourable climatic conditions. The resultant of this has been the fact that most African countries has export trade structures which

are similar from one country to another hence failing to complement one another by satisfying their demands. It has been argued in this research that this is one of the reasons why more than 80 per cent of the African exports are destined to countries outside Africa, same goes for imports.

A review of the empirical data on African economies show that African countries have experienced an increasing trend of economic growth from 2000's.The economic growth rates for many countries are higher than any other region in the world, nearly half of the economies, saw the average growth rates of at least 5 per cent since 2000's. The intra-regional trade and investment continues to grow and becomes more diversified, though only few economies hosts the giant dynamic companies are active actors, these include South Africa, Nigeria, Kenya and Morocco.

However these growth rates triggers some policy implications for the sustainability of the growth of African economies. As it has been pointed out in this research, the recent growth rates has been a resultant of the increasing prices in the world market for primary commodities and the increasing demand of natural resources as a resultant of the growing industrial economies particularly in the BRIC countries. Considering the export structure of African economies being dominated by primary commodities, any improvement in the commodity prices in the world market would mean a growth in the incomes of African economies. A call for diversification in the exports for the African economies is inevitable for Africa to be able to avoid the fate of crisis such as the 2000's fall in copper price in the world market which resulted into economic stagnation for some African economies like Zambia which is one of the world's largest producers of copper which accounts for 80 percent of the country's foreign earnings.

To be able to sustain the notable economic growth experienced in the last decade, lot of efforts need to be done to avoid setbacks from the commodity price volatility. African countries need to embark on more diversification in their exports composition as commodity price volatility is external to these countries and it is actually beyond the scope of their domestic policies as they are just price takers. To attract more trade and investment as well as industrialization which are very pertinent, structural transformation and improvement in infrastructure are inevitable. Also African economies need to fight against weak institutions and governance structures which results into undesirable discretional behaviours and corruption.

As much as diversification of economic structures for these countries is important, it has been concluded from this research project that trade openness is vital for enhancing African economic growth. It therefore goes without saying that the destination for African exports need also to be diversified. It is a good thing that of recent years this has been happening as these countries has opened up to the BRIC countries as their export destination and source of their imports.

Trade openness for the African countries presents an avenue for gaining new knowledge, ideas and capital. These are amongst vital elements for innovation and enhanced productivity. To boost trade openness, an examination of the determinants of trade openness in the African countries has been done. The most important factors to boost trade openness in the African countries have been found to be the population size, the income per capita and economic location. The inclusion of factors like mining, value added (as a proportion of GDP) and agriculture, value added (as a proportion of GDP), was also fruitful as the variables are significant though not as the fore mentioned factors.

However the empirical results in chapter four show also that the economic location of any of the African country matters in the analysis of the rate with which economies trade

internationally. One of the explanations given is the inefficient infrastructure in these countries which makes distance to potential trading partners a major stumbling block. The chapter has also examined the LPI index with its components, regression results has clearly indicated that logistics performance is important in explaining trade openness in the African countries. The variables shows a positive relationship to trade openness. Improvement in the competitiveness of the index for the countries in Africa could render desirable results on boosting their trade volume as well as their economic growth levels.

Opening up of African economies to the global economy through trade openness has been proved empirically in this research that it boosts economic growth in Africa. Chapter five examines this relationship and finds that African economies present a typical case for export led growth hypothesis. An examination of individual African countries through Granger causality tests reveal that in most of the countries in the sample there exists a high statistical significant uni-directional causal relationship running from GDP per capita growth to trade openness. And the channels through which this could be achieved include attracting more FDI. Of recent years the continent has witnessed one of the significant FDI inflows particularly in the mining sector. This influx boosts exports volume for these countries, improve their knowledge base through knowledge spill over, and enhance their capital formation, increase employment rates as well as income per capita as well.

Chapter six examines the determining factors for the intra African bilateral trade flows, and the bilateral trade flows between African countries and the BRICS and the OECD countries. It has been argued that the intra African trade flows has been lower compared to some other intra-regional trade, an examination of the determinant reveals that the coefficients and the significance level for factors such as landlockness and distance are very high for intra African

trade flows. These variables also remain to be significant even in the bilateral trade with African trading partners.

The findings shows that the intra African bilateral trade is mostly explained by proximity factors. The regional trade agreement factor as well as the contiguity shows higher significant coefficients, which suggest the necessity to enhance regional trade agreement as well as maintaining harmonious neighbourhood among African countries. Findings also suggest that the use of common official language has appealing effects on the bilateral trade between African countries. It is therefore logical to conclude that African countries that share the same official language have an advantage over those that do not. Empirical results have also shown that domestic credit to private sector is an important enhancement of bilateral trade flows in the intra African bilateral trade. These results shows the necessity of African economies to support private sector initiatives because their activities has a multiplier effect on the economy particularly on trade volumes.

The bilateral trade between African countries and the BRIC countries is determined by major factors as GDP per capita, common official language, population and the size of arable land. As for the bilateral trade flow between the African countries and the OECD countries, the main determinants are GDP per capita, population and common language. Comparatively it may be argued therefore that factors that determine bilateral trade flows between African countries and the BRIC and OECD countries are nearly the same. The level of economic development, demographic factors and similarity in official language. Broadman and Isik (2007) argues that population growth and economic development growth in the Asian countries, especially India and China, have resulted into an increase of importation of food products from African countries.

Policy implications from the study

First: **On domestic policies and institutions.** While it has been empirically proved by this research that trade openness in the African economies is important for economic growth of these countries, yet the degree to which these economies are open to the global market is still minimal. African economies are struggling to ensure that they liberalise their economies to reap the globalisation benefits as well as increasing their global trade share. There are countless economic reforms in African countries since 1990s to provide attractive and conducive environment for investors, both domestic and foreigners so as to boost investment rates. Strategies like providing tax holidays, favourable tax rates and establishment of economic processing zones (EPZ) have been adopted by African economies in the recent decades to attract more foreign direct investments. To many of the countries these efforts have proved fruitful.

However as discussed in this research, all these efforts to increase the degree of openness as well as improving the levels of bilateral trade will be rewarding to the African economies if they are coupled with establishment of effective domestic policies and institutions. They could include political institutions which are participatory, free labour unions, free corrupt bureaucracies, independent judiciaries and civil and political liberties. It is beyond doubt that sizable openness to the global economy is associated with external shocks as the market becomes less segmented. It is therefore true that, if African economies concentrate on establishing economic growth strategies that relies solely on encouraging FDI and boosting exports without enhancing complementary policies and institutions, the only expectation that can be awaiting for these economies is crisis and failure. Having well established institutions may reduce the compromising and corruption based investment contracts that jeopardise the economic growth efforts by most of the African economies today. Rodrick concludes that

openness is a mixed blessing and that for it to have positive economic effects; it has to be well nurtured. In addition to its positive effects, openness can increase the vulnerability of an economy to external shocks; can bring about domestic conflicts and political upheavals (Rodrick, 1999). Many of the African countries today experiences internal conflicts and political upheavals, a closer analysis to these experiences revels the lack of effective domestic institutions and investments policies as many of these upheavals are experienced in countries rich in natural resources. The problem arises from the management of investment in these rich natural resources. Good examples are what are happening to countries such as Democratic Republic of Congo (DRC), Sudan, Nigeria and previously Angola. These countries are rich in mineral and fuel deposits, and conflicts arouse due to among others, lack of proper institutions to mediate distributional conflicts.

Moreover, African governments and policymakers need to understand that global integration is not an end in itself, but rather the liberalization efforts should be coupled with domestic policies that are favourable for the growth of investments, macroeconomic stability so as to ensure sustainable and long term economic growth. With the increased interest of the BRIC countries in the continent, there is an increasing rate of investment contracts that are being signed by African governments with investors from countries like China, for these to be effective and to bring desirable long run impact to the respective economies, presupposes proper investment strategies in place and impartiality in the whole process. There have been new discoveries in natural gas and fuels deposits in many of the countries in the eastern part of Africa, and this has attracted more foreign investors in the region. The normal expectation is a future increase in exports and economic growth. However, whether or not these resources will bring about long run economic development to these countries will solely depend on impartiality of the respective governments, institutions and policy advisors.

Second: **On the need for infrastructure development strategies.** An examination of the determinants of bilateral trade flows in the intra African trade as well as African countries and the BRIC and the OECD countries reveal that the most challenging issue is the trade costs. Trade costs are mostly as a result of high transport costs which are resultant of the relatively poor infrastructure and fact that Africa is a home to large number of land locked countries compared to any other region in the world. Efficient infrastructure has proved to reduce the impact of a country being a land locked and distance in the OECD countries like Switzerland and Austria (confer chapter six), but for the intra African bilateral trade landlockness and distance is still very relevant due to poor infrastructure.

Looking at the global competitive index for 2013-2014, though Sub-Sahara Africa has in the recent years showed some impressive growth rate in the competitive global index, still SSA remains at the bottom in the world in terms of competitiveness. This has been as a result of among other things its profound deficit in infrastructure. Therefore despite the registered promising economic growth in the recent decade, the sustainability of these growth rates are hampered by the underdeveloped infrastructure with poor roads, ports and an unreliable electricity supply.

Given this bearing and the remoteness from the global market centres for most of African economies, governments in African countries should give a priority to infrastructure in their efforts to integrate their economies to the global economy. This could be done by imbedding it in the investment strategy through making sure that any investment contract signed has an element of boosting up the infrastructure in the respective country. This will not only create favourable investment environments, but also will boost up intra-regional and inter regional trade. Besides even the agricultural sector which is the dominant sector in most of the Sub Sahara African countries, is affected by higher marketing costs which results from inefficient

infrastructure. Efforts to boost Agricultural sector that are currently adopted by countries such as Tanzania (through Kilimo Kwanza) require efficient infrastructure. The increasingly foreign direct investment flows in the continent also requires efficient infrastructure if African countries expect growth oriented impacts from FDI.

Third: **On diversification of export markets and export commodity composition.** A discussion in chapter two and in chapter six reveals that Africa has another challenge that needs an attention of policy makers in the African economies. Reliance on the implication of the classical trade models of specializing and exporting small number of products that countries have a comparative advantage has not been ideal for African countries. Instead these countries have increased their degree of vulnerability to external shocks and stagnating economic growths. It is time now that policymakers realise that diversification is a better policy option than specialization. However for the African countries diversification should not only focus on the composition of products being exported but also where they are being exported and where do these countries import from.

However, as discussed in the chapters of this research, there has been promising efforts towards diversification in the African economies. The export composition of the intra African trade is increasingly becoming manufactured oriented, and the export destinations are becoming more diversified with the coming of the BRIC countries in the picture. But more of these efforts are needed to be able to achieve a complete diversified Africa economy. This is based on the fact that so far there are only few key players with diversified exports in the intra-regional trade, such as South Africa, Nigeria and Kenya. Increasing the number of key players in the region requires deliberate efforts to enhance the private sector participation in the economic development initiatives. This research has examined the role of private sector on bilateral trade

flows; it has concluded that provision of credits to enterprises in the private sector has a positive impact on the intra African bilateral trade flows.

This research work calls for African policy makers to work and design structural adjustment on their respective economies' trade structure as well as diversification strategies to continue reducing the existing high export concentration and dependence on primary commodity exports. However a realization that diversification is not an end in itself is also very important for policymakers, diversification will have positive impact only if it will enable a country to reduce the risk to vulnerability, enhance growth and reduce poverty. This is only possible if the diversification efforts are accompanied with the efforts to increase the manufacturing value added (Osakwe, 2007). However the best way to make these efforts fruitful, governments and policy makers in Africa need to make good management of the natural resources available these countries. This coupled with the efficient strategies to develop infrastructure in the region would ensure positive effects from the diversification efforts.

Fourth: **On enhancing African regional integration.** The empirical results in chapter six concludes that the most important variable for intra African trade is the fact that countries are in the same regional trade agreement, as well as when countries share the same borders. While this is a reality, it is inevitable for governments and policy makers in Africa to realise that strong regional economic arrangements are useful to fight the marginalisation of Africa in the global economy as well as enhancing the bargaining power and the economic survival of the African economies. For this to be realised, Africa's perception, approach and pace of establishing these regional agreements should become more practical and should be serious in translating the agreed agenda into implementation. This is based on the fact that most of the RECs in Africa are effective during the agreement signing but becomes dull in the implementation processes. Of course one of the reasons is the hesitations by some of the

member countries to fully implement some of the integration programmes (especially when it comes to sacrificing some of the national interests for the union). One reason could be the fact that many of these RECs are composed of individual countries that are at varying stages of development. Another challenge is the fact that many of the African countries are members to more than two groupings which in some cases they compete, conflict each other instead of complementing each other.

Moreover, while something need to be done to rectify the fact that most of the regional integrations in Africa have names that reflect the goal (stage)to be achieved rather than the stage of integration attained so far; the African experience of regional integration shows that the most effective arrangement has been those with few member countries. A good example is the SACU and EAC; it is a call for policy advisors in the African countries to consider these facts for an effective regional integrations. Enhancing the effectiveness of these RECs will not only end up boosting intra and inter regional trade in Africa, but will bring improvement in the continents participation in the global economy through a regionalised African platform with a better bargaining power.

Firth: **On the booming ties with the BRIC countries;** the increasing ties with the BRIC countries seem to bring in new hopes for the African economy. This is particularly for the China Africa ties which have helped to enhance economic developments in the African countries through countless aid without preconditions, huge debt cancellation and enhancing trade between the two regions. Besides the non-intrusive nature in China's external policy, which differs from the Western countries policy which subjected African economies with the 1980s SAP and the democratisation reforms in 1990s, makes it the most favourable option for many of the African governments.

Despite these facts it is important that governments and policy makers in Africa realise that they need to do something on the ongoing competition that Chinese traders brings to African producers who cannot endure it. The protection of job market in the African economies is jeopardised by Chinese imports in Africa which results into win-lose situations, as cheap Chinese products overpowers African local industries. There is also an issue of trade imbalance as Chinese interest in the African countries which is vividly seen to be in natural resources extractives, particularly minerals and fuel deposits. To this, policymakers in the African economies need to be ware in the increasing number of investment contracts they sign for the extraction of the natural resources. A desirable approach would be to have a portfolio of investors coming from different countries, not only from China irrespective of the attractiveness of the promises offered.

However, something to note is that of all the BRIC countries, China remains to be a potential economic growth engine and a good catalyst for the reduction of poverty in Africa. African governments can take advantage of the many cooperation and engagements that are being signed with China to make use of the largest amount of unfarmed arable land in the continent so as to boost up the agricultural sector and reducing the rate of unused arable land.

Lastly all the policy implication above can be said to act together, diversification strategies are important for restructuring the export commodity composition and export markets for African countries. But also the realization that this diversification will be effective if countries embark on adopting the dynamic sectors in their economies, that is manufacturing, necessitates the need for having effective infrastructure. Adequate investment in the development of infrastructure will reduce transport/ transaction costs and hence competitive export commodities. However African economies could achieve this effectively by enhancing regional integrations available in the region. This is based on the fact that infrastructure

development might be costly for a single country to do alone, so cooperation through the REC will reduce these costs. Eventually the transportation costs from one country to another in the region would go down; this should also lead to lower costs to inter African trade. All these will be possible in the environment of well-established policies, institutions and good governance.

7.2 Contributions of the Study

While there is an extensive literature on the factors that determine foreign direct investment flows for the African countries, so far there has been no research on the determining factors for the degree of trade openness on African countries. Many of the studies that have been done on the area of trade openness for the African countries has only examined the impact trade openness on the macroeconomic variables such as GDP growth and factor productivity as proxies for economic growth, on financial development and on the flow of foreign direct investment. And in most of the studies that examine the economic growth, openness has been included as one of the regressors in the growth models. Chapter four of this research work has examined the determinants of trade openness in the African countries, in trying to explain why these countries have the level or degree of openness they have. As a contribution to the existing literature, this research has concluded that the most important factors that determine the degree of trade openness for the African countries include the population size, GDP per capita and economic location. However, given the nature of the exports composition of most of the African economies being dominated with primary commodities, the research included the variable capturing the role of minerals and agriculture in the African exports. Both variables proved to be significant. Later in the chapter the logistic performance index (LPI) is modelled on trade openness. The study has proved that LPI is very important in boosting trade openness in the African economies.

The research realise the existence of various literature examining factors behind intra African bilateral trade. Several studies examine and explain the reasons behind intra African trade levels being relatively lower than other regions in the world. However these studies have either examined intra African trade alone, or even trade within certain economic regional group alone or even a set of countries. There has not been any literature examining the determining factors for the bilateral trade flows between Africa and BRIC countries, or bilateral trade flows between African countries and the OECD. Though for the later there is slight similar study by Coe and Hoffmaster (1999) which examines the unusual low level of African trade, but it is not specifically to the OECD countries. As pointed out in chapter six, it is necessary for this kind of examination as these countries (BRIC and OECD) represents a significant portion of the African trade (refer to table 40). For African policymakers therefore this is equally important as they can know which factors need more emphasis or priority so as to increase the level of African trade.

Chapter six examine two interesting variables that have not been associated with bilateral trade flows at least in the studies on African trade. The first is the importance of private sector on the African bilateral trade relations. The rationale for its inclusion in the econometric model is based on the realization of the increased participation of the private sector in the economic development initiatives in the African countries. This research has empirically proved without doubt, at least for the intra African bilateral trade, that the provision of financial resources (as credits) by financial institutions to enterprises representing private sector increases the intra African bilateral trade flows.

The second variable is the inclusion of the mobile phone subscriptions variable. Considering the increasing mobile phone subscriptions in Africa, there have been several studies examining this wave of subscription but they have focused on other aspects in the social economic circle

leaving aside the implied role on trade. The empirical results in this research has concluded that the increased use of mobile phones enhances the communication sector in the continent hence reduces communication costs. Considering the infrastructure deficit in Africa and its role in reducing the levels of bilateral trade, the increase in mobile phones subscriptions has been found to have positive impact on the intra African bilateral trade. Though the coefficients for this variable seem to be very tiny, it is expected that with time changes can be expected.

7.3 General limitations and suggestions for further research

This research is however not free from limitations, the most critical limitation is the issue of data particularly the bilateral trade data which has often been characterised with missing data. It is even serious when researches use data for African countries where there are problems in the records of trade transactions. Limited timeliness on the data on trade for these countries has been used as a criterion for the sample period in all the chapters in this research. Besides, the sample of countries used in the chapters was determined by the available data. In some cases due to missing data, some countries were removed from the sample so that only those countries with full data for the whole period in the sample period were included. There is also a question of bilateral trade data being imprecise for African countries due to poor recording and loose border controls, implying that even what is recorder does not reveal the actual transactions that took place. The literature on the subject matter of the research keep on growing as time passes by, the thesis might have not included the very recent stuff.

It is anticipated that future research work are required to find the statistical determinants of African regional blocks and the RECs bilateral trade with the BRIC and the OECD. This is vital considering the regional diversity of Africa as discussed in chapter one. Moreover, future studies should make a further consideration of the element of logistics performance index considering the role logistics plays in reducing the costs of trading enhancing the global integration. So far the World Bank provides data for logistic performance index for more than

160 countries from 2007 to 2014; with time as the database will have long period coverage, it necessary that studies include this as a variable to examine the role it has on trade openness. Moreover, this variable is very relevant for international trade studies considering the "logistics gap" that is evident in most of the developing countries. It is also because implications from the study could have important insights to policy makers in governments, businesses, and civil societies so as to take corrective measures in creating competitive environment for international trade interventions in their respective economies.

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