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An Empirical study on the determinants of trade openness in the African economies

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Abstract

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, this paper conducts an examination of the determinants of trade openness in the African countries. In examining these factors for the African countries, the study adopts an openness equation which is estimated using panel data approach for 49 African countries in the Africa from 1989 to 2009. 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 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. However the empirical results in this paper shows also that the economic location of any of the African country matters in the analysis of the rate with which economies trade internationally.
Given the scant research on trade openness for African countries especially on the determinants of trade openness, this paper provides the first empirical analysis on the factors that correlate with trade openness of Africa.

JEL classification numbers: F1, F3, F4
Keywords: Trade openness, international trade, openness equation, GDP per capita.

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1 Introduction

One of the topical issues in the international trade literature today 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 has made it possible for 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 south of Sahara, transportation infrastructure set up still determines the levels of its involvement in the regional as well as in 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[2] in Africa, and a regional bloc with countries that have recorded 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, 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

[2] Regional Economic Communities

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.

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. Given the scant research on trade openness for African countries especially on the determinants of trade openness, this study provides the first empirical analysis on the factors that correlate with trade openness of Africa.

The rest of the paper 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 part three, section four presents the empirical results, section five discusses the results and finally section six concludes.

2 Trade openness importance and measurement

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). 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 (Yanikkaya, 2003). 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, not to forget that it also bring along new technologies which positively affect productivity levels.

The literature presents economic openness as trade openness or capital account openness/financial 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).

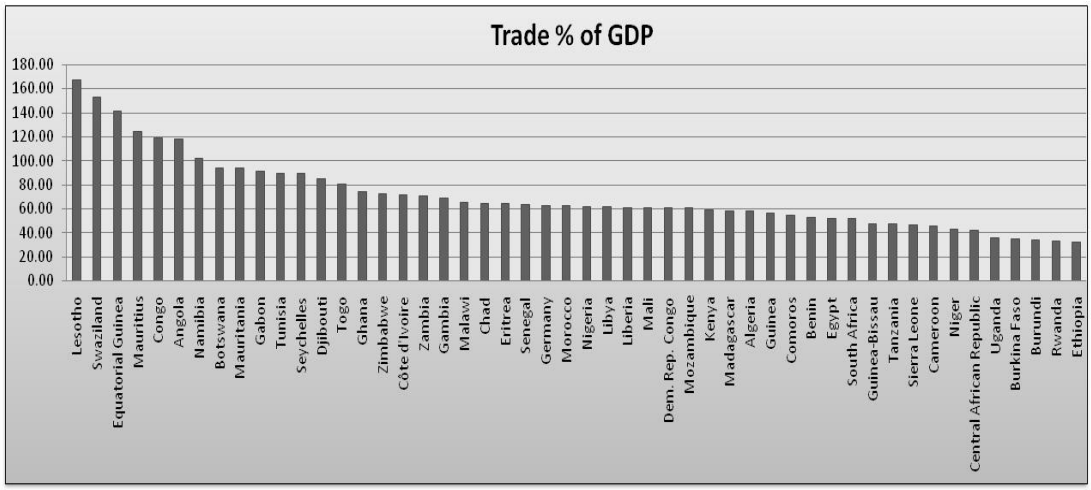

Figure 1: Trade openness degrees for African countries (average for 1989- 2009)
Source: Author's calculations based on World Bank development indicators, 2014.

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.

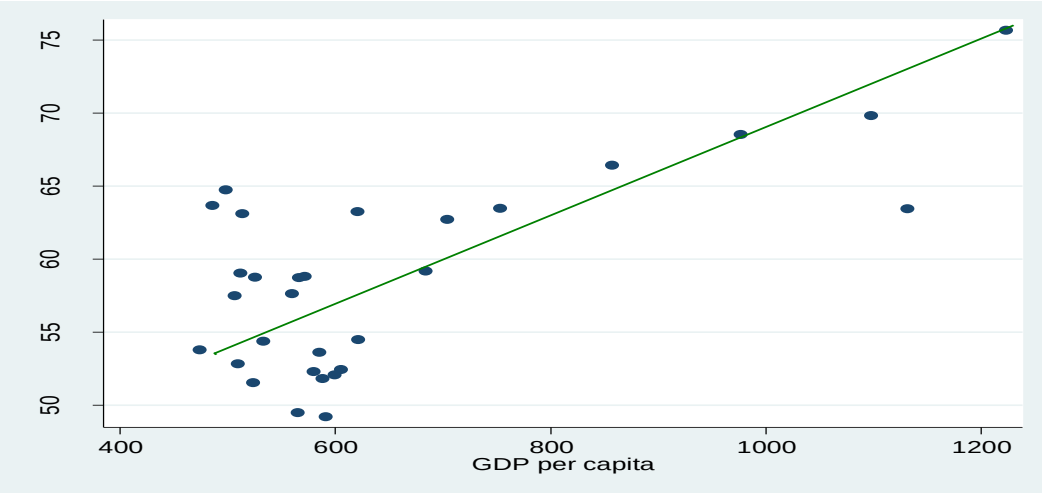

Figure 2: Trade openness as related to GDP per capita in Africa (average for 1989- 2009)
Source: Author's calculations based on World Bank development indicators, 2011

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.

2.1 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 1: 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, 2006, 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[3] 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.

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

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, 2006, Dollar et al., 2001).
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.

3 Economic specifications, hypothesis and data sources

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, 1966), income per capita and contiguity (Sanso et al., 1993, Frankel and Wei, 1998, Frankel et al., 1995, Eichengreen and Irwin, 1998, Vicard, 2011). 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:

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log\ (economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 log(area_{it}) + \beta_5 trade\ policy_{it} + \mu_{it} \quad (1)$$

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

The table below 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 2: 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)

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;

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log(economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 trade\ policy_{it} + \alpha_i + \mu_{it} \quad (2)$$

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;

$$log(openness_{it}) = \beta_0 + \beta_1 log(GDP\ per\ capita_{it}) + \beta_2 log\ (economic\ location_{it}) + \beta_3 log(population_{it}) + \beta_4 log(area_{it}) + \beta_5 trade\ policy_{it} + \alpha + \mu_{it} + \varepsilon_i \quad (3)$$

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.

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.

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 involves distance data available from the CEPII database, which provides the distances of countries from all their potential trading partners.

$$Economic\ Location = \sum_{j \neq i}^{l} \frac{w_j}{dis\tan ce_{ij}^{\alpha}} \qquad (4)$$

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.

Table 3: 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

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 mean value on 7901.50 and 8511.23 kilometres and has the countries with as high as 8,907 kilometres (see table 3). 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 duration of a little over four years, while the average recession lasted just under one year (NBER, 2002). Below are the descriptive statistics and the correlation matrix for the variables in the econometric models.

Table 4: 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 5: 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 Empirical Results

Table 6 provides regression results for the equation (2) and (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 6 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 6: Regression results for Fixed Effects Model *(a)* and Random Effects Model *(b)*

	(a)	***(b)***
ln(economic	1.08***	-0.04
location)	(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 6) 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. The area variable might also be relevant in explaining trade openness in the African countries.

5 Main Results

The results in table 6 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.

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 7 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 7: Fixed effect regression results on the relationship between trade openness and GDP per capita

	1	***2***	***3***	***4***	***5***
ln(economic location)	-	-	-		*dropped*
				1.08***	
				(0.22)	
ln(GDP per capita)	0.10	0.04	0.04	-	-
	(0.07)	(0.08)	(0.08)	0.92***	2.00***
				(0.21)	(0.42)
ln(population)	-	0.03	0.42*		
		(0.19)	(0.23)	1.26***	1.26***
				(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 7 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 8, 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 8: 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.

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[4], 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 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.

[4]The tables of results are presented in the Appendix.

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 9 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 9: 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, 1999) 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[5], however results were not significant though their coefficients took expected signs.

Table 9 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 9). The parameter estimate agriculture as a percentage of GDP in negatively related to openness, and in both cases (model *1* and *2*) it is significant.

Another variable of interest 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

[5] Results are reported in the appendix

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.

5.2.1 How Tanzania compares with the sample countries

The openness equation used in the regression analysis in table 6 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 10 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 10: 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 6 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 6, the second column of table 10 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.

6 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 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.

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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