

The Determinants of Trade in Services in Africa: A Gravity Model Approach

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ACRONYMS

2SLS	Two-Stage least squares
EU	European Union
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GLS	Generalized Least Squares
IMF	International Monetary Fund
JB	Jarque - Bera
LDC	Least Developed Countries
LM	Lagrangean Multiplier
OECD	Organization for Economic Co-operation and Development
OLS	Ordinary Least Squares
R&D	Research and Development
SSA	Sub-Saharan Africa
TOT	Terms of Trade
UN	United Nations
US	United States
USD	United States Dollar
WDI	World Development Indicators
WTO	World Trade Organization

CHAPTER ONE: INTRODUCTION

1.1 Background

In the current era of globalization, where countries interact and act together for a global development, trade plays a crucial role in fostering the aimed goal. There is no nation that stays in an isolated environment. All economic aspects of a nation, including its industries, service sectors, employment, levels of income and living standard are linked with the other partner nations (Carbaugh, 2005).

Trade is the transaction of two countries in terms of exchanging goods and services. If so, what is the underlying reason for trade? There is no as such a clear-cut reason for this question. Various propositions have been forwarded by different scholars. According to Adam Smith's theory of absolute advantage, countries should specialize in the product that they have a complete advantage of production than their trading partner (Sodersten & Reed, 1994). On the other hand, the theory developed by David Ricardo introduces the idea that technological differences across countries are the main reasons for trade because it leads to a variation in opportunity cost. Considering another trade theory, the Heckscher-Ohlin model that shows how factor endowments are the basis for trade (Feenstra, 2002) (Sodersten & Reed, 1994).

Despite having different reasons for trade, every nation ultimately aims at obtaining the optimal benefit out of it. This requires the proper identification of their respective potentials in terms of their resource endowments, economic performances and their socio-political state of affairs. Therefore, each country should know the product that has a lower

opportunity cost compared to the other product. All of these theories tell that countries should be aware of what to produce and what not to produce. Since nations, as any other economic agent, are rational optimizers, they have to act in a way that brings about the optimal output, as long as they are involved in an economic game.

Trade has an impact on the economic performance of a nation, which might be transmitted through different channels including, increasing national income, specialization, efficiency or productivity and job creation. According to (Jansen & Lee, 2007), trade has an impact on employment and job creation subject to certain trade policies as well as social and labor policies. In general, there is a gain from trade even though there might be groups within a nation that might not enjoy the benefit out of it. This is due to the strong effect that international trade leading to an income distribution (Krugman & Obstfeld, 2009).

Trade comprises the exchange of both goods and services internationally. The trade in goods consists of the movement of all tangibles across international borders. The other component, trade in services, includes all the different ways of providing an international service. GATS defines four distinct ways of providing an international service which are known as modes of delivery/supply. These four modes of service delivery are Cross-Border, Consumption Abroad, Commercial Presence, and Temporary Movement that have differences in the trading process (SMEDA).

Trade in services is a fast growing component of world trade, approaching 25% of the overall world trade value and representing approximately 60% of world foreign direct investment stock. In addition currently it constitutes at least 50% of employment in most

economies. Hence, it is possible to say that services also play a central role in economic development (SMEDA).

These being the cases for international trade in general and trade in services in particular, there should be made some distinction in the theory as well as the empirical study for the case of Africa from that of the conventional theories which are applicable to the developed nations (Carbaugh, 2005). Africa, in addition to being among the developing nations, it has been involved in political unrests, civil wars, cross border conflicts and colonial influences that hindered its economic development. Henceforth, all the reasons for trade that were developed need to inculcate few treatments in order to make them applicable for the continent.

Africa's trade performance is too low, its total exports being around 3% of the global total trade while its intra-continent trade is also low amounting to 10% of the overall exports of the continent. This poor performance is explained by the weak diversification of African trade in terms of structure and destination, the trade protection that prevails in the rest of the world against African products, the economic structure of African countries, poor institutional policies, poor infrastructure, weak financial and capital markets, political instability, insecurity in several regions and intra-African trade barriers (AfDB/OECD, 2010).

Most of African exports are few primary agricultural and mining commodities while their imports are manufactured goods from advanced countries. This trend will lead to the Prebisch-Singer hypothesis that suggested the deterioration in terms of trade for primary-

product producers will continue over time (Dunn & Mutti, 2004) (Feenstra, 2002) (Krugman & Obstfeld, 2009). In Africa, the global crisis was mainly felt through the collapse of commodity prices and the fall of export volumes. In 2009, due to the global financial crisis, Africa's export volumes declined by 2.5% while the import volumes by about 8%. Due to the fall in commodity prices, Africa's terms of trade deteriorated; export values declined sharply more than that of imports which led to a deterioration of trade and current account balances (AfDB/OECD, 2010).

Because of the world economic crisis, Africa's high economic growth slashed from an average of about 6% in 2006-08 to 2.5% in 2009 with per capita Gross Domestic Product (GDP) growth coming to a nearly complete halt. The economic slowdown was most pronounced in mining, manufacturing and tourism whose prices were exposed to the fall of commodity prices. On the other hand, agriculture and services were more resilient and mitigated the downturn (AfDB/OECD, 2010).

1.2 Statement of the Problem

In this world where all the theories are formulated based on the status quo of the developed nations, the economic study of the developing world cannot be carried out flawlessly (Carbaugh, 2005). It is important to analyze the theories by applying supplementary theories and ideas in order to alter and make them appropriate for the specific context.

The same argument pertains for the case of trade in services in Africa. This topic needs lots of exertions for two reasons. One service as a trade component is not given the emphasis that it deserves compared to its contribution and potential to the world trade as a whole.

Most of the time, comprehensive studies are done on the export and imports of manufactured goods only, regardless of the significant share that services have in the world trade. (Lejour & Smith, (2008)) pointed out that even though the economies of the developed nations are dominated by services, the treatments of international trade remains dealing with the goods part only.

The other reason is that, even though there are limited studies undertaken on services, most of them are on developed nations, specifically OECD countries. It might be due to the insignificance of the trade volume as compared to the world total or failure of the African nations to report an up to date and detailed data and report on their respective trade in services performances.

Africa with its abundant population, land size, natural resources and economic potential, it has underutilized all these potentials. Due to the political unrests it has been experiencing since the time of colonization, it was unable to operate to the maximum. Taking, this and the globalizing world into consideration, Africa has to identify its potentials and get involved in the world market intensively for both goods and services.

Regarding the trade in goods, it has been able to perform better to some extent. Since most of Africa's exports are primary commodities, which are the gifts of nature, it has been able to benefit out of the leftovers of the colonial powers, regardless of its deteriorating TOT effect indicated by Prebisch and Singer. But the other aspect of trade, which is trade in services, is still underway and needs a lot of work to know the potentials they require and

to understand what it takes to have a better gain out of the services. Besides, at this point in time, trade in services will not have a deteriorating TOT effect.

Nowadays, the services sector is the major part of the economy in most non-oil producing Sub-Saharan African countries. As these countries develop, the importance of the services sector tends to rise further in terms of energy, education, health services, telecommunications, transport, and business services that influence productivity and competitiveness. Therefore, it is important to look for better mechanisms to increase the availability, affordability and quality of these services which will enhance the economic growth and helps to alleviate poverty (Brenton et al., 2010). Therefore, Africa has to be able to classify the types of goods and services that it trades with other nations.

Based on this, this paper will deal with the following research questions. What are the determining factors for the demand and supply of trade in services of Africa? What is the current direction of the African trade in services? What should be done in order to enhance the exports of African services?

1.3 Objectives of the Study

1.3.1 General Objective

The general objective of the study is to identify the major determinants of Africa's trade in services

1.3.2 Specific Objectives

The specific objectives of the study are:

- i. Identify the determinants of trade in services of Africa with the rest of the world.
- ii. Identify the African patterns of trade in services.

1.4 Hypothesis of the Study

In this study it is hypothesized that:

- Colonization will have a significant effect in determining the patterns of trade in services of Africa because has been under the influence of its colonizers and donating nations.
- Economic performance and total labor force of both the trading partners is expected to have an effect of enhancing trade in services. Especially, in terms of education, transport and information technology, significant share of trade in services is going to take place with the relatively advanced economies of the continent.
- Among the components of the gravity model, distance between the trading partners and land lockedness are not expected to have an impact because services are intangibles that do not necessarily require to travel or cross the border physically.

1.5 Methodology and Data

1.5.1 Methodology

To achieve the intended objectives, the paper will try to employ the gravity model on a balanced panel data gathered for the period 2003-2007. Gravity model is an equation which shows that the volume of trade between two countries is proportional to the product of their masses (GDPs) and inversely related to the distance between them (Kimura & Lee, 2006).

The reason for using this model is because it helps to check if the trades in services are affected by the factors that the gravity model comprises and additional variables of interest. In addition, it helps to show the patterns and direction of the trade in services.

1.5.2 Data

This study will utilize a balanced and unbalanced panel data gathered from the United Nations Services Trade Database (UN Service Trade). Since the African nations do not report in a timely consistent manner, it was not possible to gather sector specific data. Regarding the variables other than the value of services, the rest are collected from trustworthy web sites that gather country information such as the UN, World Bank, WDI etc.

1.6 Significance of the Study

Africa being among the developing nations with lots of economic potential, it needs to pinpoint the sectors that it should be involved and benefit from the world market. It has to enjoy the gains from trade through efficiency in production, accruing to the national income and winning the market for goods and services it produces. In order for this to happen there is a need to study the potentials and the factors that would affect its trade and its trade patterns. Hence, this topic is selected to point out the determinants of the current trade in services so that the continent would be able to work on the factors that should be corrected in order to enhance its performance.

1.7 Limitations of the Study

This research paper is expected to face certain slowdowns. One is the shortage of literature on the subject in the developing nations' context, specifically on Africa. The other hindrance might be the lack of data on each and every sector of the services in trade. In addition, some countries do not report their economic and demographic indicators on time or do not report at all. All these problems are expected to hinder this research paper's flawless progress.

1.8 Organization of the Study

The rest of the study proceeds as follows. Chapter two will be the review of literature where the theories on trade in services and gravity model as well as some empirical studies will be discussed. Chapter three will be the data analysis followed by the final chapter which concludes and state the policy implications of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Trade in Services: Overview

Because of the presumption of regarding services as non-tradables in the traditional economic literature, their importance has gone unnoticed and they have not been figured in economic growth and development literature. For this reason, most have examined the determinants of comparative advantage in the international trade of goods (Francois & Hoekman, 2008) (Nyahoho, 2010) (Grünfeld & Moxnes, 2003). But this situation started to change with the emergence of services on the international policy agenda in the 1980s, as a result of technological progress and in part as a consequence of US. proposals to negotiate multilateral rules on policies affecting trade and investment in services (Francois & Hoekman, 2008) (Park, 2002).

Services are heterogeneous and have wide spectrum which led to the absence of international consensus on their definition. But the definition that is proposed in the OECD's System of National Accounts 1993 is widely accepted. This definition shows that it is difficult to disentangle the services that are incorporated in goods (Francois & Hoekman, 2008) (Nyahoho, 2010) (Walsh, 2006).

"Services are outputs produced to order and which cannot be traded separately from their production; ownership rights cannot be established over services and by the time their production is completed they must have been provided to the consumers; however as an exception to this rule there is a group of industries, generally classified as service industries, some of whose outputs have characteristics of goods, ..." (OECD (2000), P. 40)

The expansion of trade in services and its contribution to the GDP and employment is a result of growth and development by itself. Advancement in information and communication technology is one of the driving forces of trade in services. Its development in turn will increase the competitiveness of manufacturing firms in open economies through its permeability of low cost and high quality of services for the production process itself such as through provision of telecommunications, transport and distribution services, financial intermediation, etc. From this argument it is possible to observe the importance of the sector by other measures, such as employment shares, cost shares for industry, and sector share of overall FDI (Francois & Hoekman, 2008).

Services' contributions include their use to facilitate transactions such as transport, telecommunications and financial services, or as determinants of the productivity of labor and capital such as education, R&D and health services. Therefore the growth in national and international outsourcing by manufacturing firms leads to a higher demand for services as intermediate inputs (Francois & Hoekman, 2008).

Recently the international trade in services represents more than 20% of the global trade, and they have an increasing contribution in the national economies accounting for about 50-70 % of internal products. Regardless of this fact, there is no economic consensus on how they should be considered in international trade analysis. In fact there are some economists that argue that there is no significant difference between services and goods (Grünfeld & Moxnes, 2003).

There are certain differences of services as compared to goods. One is that they are not storable; their exchange requires the proximity of the consumer and the supplier. This makes distance have a cost burden on service delivery (Hill 1977 cited in (Christen & Francois, 2009)), (Francois & Hoekman, 2008). This proximity burden has progressively weakened as a result of technological advancements since the early 1980s.

The other problem of services is a problem of regulation. Since, there exists imperfect and asymmetric information, as the buyers are unable to assess the quality of services, it needs to have a regulation to disseminate a similar service to all consumers. For this reason, many types of services are publicly provided or are produced by regulated monopolies. Unlike the trade in goods, relatively few services are subject to simple discriminatory taxes on trade while the rest are upshots of domestic regulations that often serve the dual purpose of responding to market failures (such as ensuring quality standards for medical practitioners) and protecting local suppliers from foreign competition (Mattoo et al., 2008) (Francois & Hoekman, 2008).

The intangibility of services makes their measurement too difficult than that of goods. Even though, some services such as transport and hotel services are possible to measure through their function others are conceptually abstract and more complicated. Appropriate examples for these might be consultancy services or education. Since services do not involve any packaging that pass by the customs office or other internationally recognized bodies for registration, their descriptions, information on quantity, origin and destination are difficult to be obtained. Therefore, the data and other required information is obtained based on the

common international understanding of the concepts by statisticians and data providers (Lindner et al., 2001).

The WTO/GATS has identified four possible modes of services. Nowadays, most of the analysis of international service trade is done based on the classifications of the GATS, namely cross border, consumption abroad, commercial presence and presence of natural persons. The first mode which is known as Mode 1 is a cross-border supply of services where the buyer and the seller are separated geographically. The second mode, Mode 2, also known as consumption abroad, is where the consumers travel abroad. A good example for this category is international tourism and education services. Mode 3, also called commercial presence is a system by which firms establish a foreign affiliate, which sometimes requires FDI. The final mode, Mode 4 or presence of natural persons is where the producers are the ones to travel abroad to provide the service (Mattoo, Stern, & Zanini, 2008) (Grünfeld & Moxnes, 2003) (Christen & Francois, 2009).

According to Karsenty (2000) cited in (Grünfeld & Moxnes, 2003), mode 1 and mode 3 dominate the pattern of international service trade, where each category represents approximately 41% of total service trade and 37.8% respectively while trade of mode 4 is marginal. Mode 4 is where the strongest barriers of trade prevail.

2.2 African Trade in Services

Africa is a continent that has a record of poor performance in international trade. Its export trade amounted to 3% of the world total before the global financial crisis. This poor performance is attributed to the prevailing trade protection outside the continent against

continent's products and internal constraints that inhibit trade within Africa. Of all these reasons, the critical one is the weak diversification of export in terms of export portfolio and destination. Africa exports primary agricultural and mining commodities while importing manufactured goods from developed nations (AfDB/OECD, 2010).

It is believed that trade in services can play a crucial role in the development of services sectors in Africa as it is an important component of the growth of developing nations. As the nations open up to imports of services and FDI, competition will increase resulting to a greater efficiency. In addition to this, trade in services offers new opportunities for export diversification especially true for the landlocked nations whose opportunities to diversify among manufactured goods are limited due to the high cost of transportation of goods. For instance, over the past 10 years exports of services from non-oil exporting land-locked countries in Africa have increased at a rate more than 3 times faster than their exports of goods (PREM, 2010).

The Economic Report on Africa 2010 revealed that the continent's merchandise trade is undiversified both in terms of its portfolio mix and destination. Instead, it is the service sector that has a promising progress in diversifying its export portfolio, particularly the mode 4 that involves natural presence. This is justified by looking at the remittance earnings of the SSA which grew by 37.2% between 2000 and 2008 (UNECA, 2010).

The growth of services is determined by many factors of which technological advancement is one. It is observed that developing countries are lagging behind the developed countries in the adoption and use of the most efficient technologies such as the internet (PREM, 2010).

Acquisition of an up to date data is a major problem in Africa that hinders the progresses of policy makers. Detailed sector and sub-sector breakdowns are not available and sometimes even an aggregated level may not be available for the emerging services exporters. In addition, inconsistency of the series reported for trade in services between African countries has contributed to the failure of the policy makers. But based on the available data, The EU is typically the main trading partner, although there is very little information on intra-African trade in services (PREM, 2010).

Figures show that Africa in general remained relatively isolated from the global services markets. Africa's shares of global services exports and imports have been roughly constant, at a low level, contrary to that of East Asia which has increased drastically over the past two decades (PREM, 2010).

In the non-oil producing parts of the sub-Saharan Africa, it is service that takes the largest part of the economy. In 2007 the service sector accounted for the 37% of the GDP of the African nations except South Africa on average. But this figure is lower than that of the high income countries, LDCs, and low and lower middle income countries amounting to 70%, 46%, 46%, and 45% respectively. This is due to the low share of the oil exporting countries which is 30% while non-oil exporters alone account for 60% of GDP, which is considerably above the averages for LDCs, low and middle income countries (PREM, 2010). In the same year, the continents total service trade reached 174 billion USD, of which more than half of it was imports. The export amount was only 76 billion USD (UNECA, 2010).

Using another point of comparison, the land-locked countries have a lower share of services as compared to those of the coastal nations, which might be attributed to their low level of income spectrum. But this difference between the landlocked and coastal nations does not prevail when it comes to the share of imports and exports to the respective GDPs. This partly reflects that overall trade plays a smaller role in the economies of the land-locked African countries than that of the coastal ones. Even though this is the case, it is observed that the land-locked countries in Africa have seen the fastest growth of exports of services which grew at a rate more than 3 times faster than the rate of growth of their exports of goods from 1998-2007 (PREM, 2010).

While it comes to the specific service sectors, access to health and education services is fundamental in allowing the poor to escape from poverty. But this is at its rudimentary level in Africa. It is only 58 % of the population of sub-Saharan Africa has access to safe water and it is only 31% that has access to sanitation. Electricity is another basic component that has a low outreach, only 24% of the total population of sub-Saharan Africa. But when it comes to the telephone density (landlines and cellular telephones), Africa is ahead of South Asia, with 64 versus 56 subscribers per thousand people (PREM, 2010).

The banking sector is an expensive sector in Africa. The difference between lending and borrowing rates offered by financial institutions in Africa is larger than in other regions. In addition to this, Africa appears to suffer from lack of competition that would reduce interest rate margins (PREM, 2010).

The within comparison for Africa shows that, there is a substantial difference across countries in terms of the provision of the basic services. For example, over 95% of the population of Botswana has access to improved drinking water while its only 46% for D. R. Congo. In Ghana 80% of the population has access to improved water source but only 10 per cent has access to improved sanitation (PREM, 2010).

The share of recorded services' exports to the total exports is about 11% in sub-Saharan Africa excluding South Africa, on Average. Again this is due to the inclusion of the oil-exporting nations which is around 3%. If it was not for them it would have been around 20%. In contrast, the imports of services, in 2007 the imports of services accounted for 31% of total imports of goods and services. Out of this, Africa's oil-exporting countries registered a higher average share 37% of service imports in total imports while for non-oil exporters it remained to be only 20%. For the non-oil countries the importance of services in total imports matches the importance of service in total exports (PREM, 2010).

While looking into the shares of certain nations, there is a wide variation across countries. For instance, service is only 4% of the Guinean export revenues and 15% of Botswana's total exports while for Tanzania it is over 40%. In Rwanda and Ethiopia trade in services accounts for around half of total exports (PREM, 2010).

Sector wise, the largest component of Africa's service exports are in the travel services which consumes 50% of the total. Its share to the world total travel services exports has doubled in the past ten years. But it is still too low as compared to the East Asian nations 2% versus 10%. This figure reflects the importance of tourism in many African economies of

which nearly half of them have significant tourism sectors that accounts for more than 2% of their GDP (PREM, 2010).

In contrast, other commercial services accounted for the largest share of Africa's services imports with 48% of the total in 2007, followed by transportation services with 39% and travel services with 17%. Africa is running a substantial surplus on trade in travel services and large deficits in trade in transportation and other commercial services (PREM, 2010).

Due to lack of proper measurement and recording systems, the intra-African trade in services may be significantly understated. For instance, the transportation service is an important service, especially the one that is provided by the non-landlocked to those landlocked nations from the sea port. Another example is Uganda's exports of education to other East African nations (PREM, 2010). But the ones that are measured reflect that the within trade is too low. The reason for this might be the economic structure of the continent, poor institutional policies, weak infrastructure, weak financial and capital markets, and failure to put trade protocols in place (AfDB/OECD, 2010).

After looking at the African service as a whole it is worth mentioning few country level facts of trade in services. Different countries in Africa have dissimilarities in terms of their exports and liberalization levels. Furthermore, the nations that have liberalized have experienced different results.

For instance, regarding the functioning of services in the nations, Cote d'Ivoire is a nation that has a fully developed its trade in services with an increasing volume of exports (Meleu & Nouhoun, 2008). On the contrary, Congo, where the recurrent wars have blown the

service sector in the country and currently, it is a net importer of services (Tsatssa & Kimpolo, 2008). In Ethiopia, the service trade is attributed to the airline service which consists of more than 50% of the total service exports. The export and import of Ethiopia are dominated by Mode 1 services that account more than 75% in terms of both import and export. Despite this fact, this share is decreasing through time while Mode 2 is increasing but still marginal (Alemayehu & Daniel, 2008). Kenya's service is also dominated by Mode 1 followed by consumption abroad. Its tourism contributed to 8.7% of its GDP and is expected to grow by 5.6% till 2012. Due to the terrorism it showed a decline in 2001 to 0.12% from 0.17% in the previous year (Ikiara, Nyandemo, & Ikiara, 2008). Unlike Ethiopia and Kenya, Nigeria earns the largest foreign exchange from Mode 3 services followed by Mode 1 (Bankole, 2008). Sierra Leone, being a nation that has shown a great effort to improve the services' trade, has registered more than 27% of its GDP from services (Davies, 2008).

While looking at the effects of liberalization on services' trade, Congo's telecommunications and air transport benefited from liberalization (Tsatssa & Kimpolo, 2008). In Cote d'Ivoire, liberalization has not benefited the all modes except Mode 3 and Mode 4. In fact it has resulted in the deterioration of the service balance of travel (Meleu & Nouhoun, 2008). In Ethiopia, it has benefited the airline industry (Alemayehu & Daniel, 2008). Kenya's barriers are high on Mode 4 that involve movement of foreigners. It accounts more than 40% if the barriers documented (Ikiara, Nyandemo, & Ikiara, 2008).

2.3 The Gravity Model and its Applications on Trade in Services

Various researches have been conducted in order to identify the best model that explains the trade in services. Along the way, some scholars have tried to assess the applicability of the gravity model on services' trade as it is applicable to the goods' trade.

The gravity model is originally inspired by Newton's law of universal gravity equation in physics. It relates bilateral trade flows to GDP, distance and other factors that affect trade barriers. It states that the volume of trade between two nations is proportional to the product of their masses which is their GDP in this case and inversely related to the distance between them. Tinbergen (1962), Pöyhönen (1963) and Linneman (1966) initiated the application in the analysis of international trade (Anderson & Wincoop, 2003) (Grünfeld & Moxnes, 2003) (Linders & Groot, 2006) (Egger & Pfaffermayr, 2003).

Mathematically,

$$\text{---} \tag{2.1}$$

Where the F stands for attractive forces; M for respective masses; D for distance; and G for gravitational constant.

Dragging this to the international trade study,

$$\text{---} \tag{2.2}$$

Where the X_{ij} stands for exports from i to j; or total trade (i.e. $X_{ij}+X_{ji}$); Y for economic size (GDP, POP); and T for Trade costs which might include distance, adjacency, common

language, colonial links, common currency, island, landlocked, institutions, infrastructures, migration etc. (Paas, 2000)

This model is acknowledged for its empirical effectiveness in having sensible parameter estimates and explaining a large part of the variation in bilateral trade. Even though it is claimed as the most successful tool for estimating bilateral trade, it is criticized for not having a theoretical foundation (Grünfeld & Moxnes, 2003) (Linders & Groot, 2006) (Anderson & Wincoop, 2003) (Egger & Pfaffermayr, 2003).

But (Evenett & Keller, 2002) assert that since Anderson (1979), the gravity model has been increasingly recognized that it can be derived from very different models, including the Helpman and Krugman, and the Heckscher-Ohlin model, which have common characteristics. They all assume that there exists a perfect specialization by which each and every commodity is produced in only one country. On the contrary, this assortment of model has led some scholars to argue that the gravity prediction cannot be used to test any one of these trade theories.

Although (Deardorff, 1998) disagrees with the claim over the absence of theoretical foundation of the gravity models, he suspects its use for empirical tests because of its trial to characterize a large class of models mentioned earlier. But he affirms that it is not difficult to justify the gravity equation from standard trade theories. This is why (Evenett & Keller, 2002) declare this issue to be an empirical challenge that is referred to as a model identification problem because it could be easily applicable if it could be determined which theory actually accounted for the success of the gravity equation in a given sample of data.

Basing these arguments, different researches were undertaken using the gravity model on services as they are applied on the goods trade. Grünfeld and Moxnes (2003), using the OECD data tested the application of gravity model on trade in services and found out that the standard gravity model effects on goods apply to services too. Their results showed trade between two countries is positively influenced by their size which is their GDP while the distance between them and trade barriers affect negatively (Grünfeld & Moxnes, 2003).

Using the same source of data, (Kimura & Lee, *The Gravity Equation in International Trade in Services*, 2006) applied the standard gravity framework to services trade with the same objective as the former ones. In addition to the variables employed in the Grünfeld and Moxnes, (2003)'s, work, they included adjacency and language dummies. The findings of this study emphasized that the distance between the two partnering nations is much more important than it is for goods trade. Even though they called for a disaggregated level data for the major reason of this phenomenon, they have identified that there are higher transport costs for services. From their results, they were able to discover the interesting finding that says services trade is better predicted by gravity equations than goods trade. Regarding the variable adjacency, unlike for the goods' case, it does not influence the services' trade. But the effect of trade liberalization is much higher useful for services than that of goods (Kimura & Lee, *The Gravity Equation in International Trade in Services*, 2006).

(Lejour & Verheijden, *Services trade within Canada and the European Union: What do they have in common?*, 2004) analyze the bilateral trade between the provinces of Canada and between the member states of the European Union. In their conclusion the gravity equation

explains the variability in trade in services very well. Furthermore, market size of the partnering regions and distance are the most important explanatory variables. Regarding distance, it has a lesser hindrance effect on the services trade than that of for the goods trade. Differences in languages and the regulation of product markets hinder services and goods trade in Europe whilst regulation in the importing nation negatively affects the trade in services only.

Lennon (2006) cited in (Walsh, 2006) found out that the effects of variables related to physical geography, namely distance, contiguity and landlocked status have insignificant effect on trade in services. On the other hand, the variable language has a significant effect as it reflects its impact through cultural harmony and access to similar information.

Finally considering (Walsh, 2006) paper, which assured that the standard gravity framework explains the determinants of services well, has more or less similar findings to the other results. The GDP per capita of the importing and exporting countries and a common language are found to be the most important determinants of trade between two countries while distance, adjacency and membership of the European Union are not found to be significant as in the goods trade.

From the literature surveyed, it is observed that Africa has a potential for services. It is also claimed that it is important for the growth of the continent in both ways. One, through encouragement of competition and two by diversifying the export portfolio of the continent. So far the continent's services had shown dissimilarities in the pattern of the service trade amongst the nations. The non-oil exporting nations and the non-landlocked nations seem to

have a greater share of the continents service trade. Therefore, it is important to identify the reasons and the factors that affect the service trade in the continent, so that it would be helpful to work on the solutions to hasten the growth of the service trade of the continent and thereby facilitate its economic growth.

For this purpose and for the fact that the gravity model is acknowledged for its empirical effectiveness, it is convincing that it should be applied to study the bilateral trade in services of the African nations with the other partners from the rest of the world. Backing up this, the literature approves that gravity is applicable for the services' trade as it is for the goods trade. For these reasons, it is possible to implement the gravity model in this research work to identify the determinants of trade in services in Africa, and as well as the pattern of the trade in services.

CHAPTER THREE: DATA ANALYSIS

3.1 Data Source

The data used in this study is gathered from two major sources. The imports and exports of services of the African nations and the trading partners for the years 2000-2009 is obtained from the UN Service Trade database. Since the African nations do not have a well organized reporting system, it is gathered using the mirror image of their trading partners from the rest of the world. That means, instead of using their direct reports of imports and exports, it is the report of their partnering nations. In this manner, the export of the partnering nation will be the import of the African nation while the import will be the export of the African nation. The partnering nations are selected on their role in the global services trade. Nations that have more than 2% trade share in the global trade in services are used as partnering nations. These countries are 11 in number namely; Belgium, Canada, Hong Kong China, France, Germany, Italy, Japan, Netherlands, Spain, United States, United Kingdom. On the other hand, regarding the African nations, all the African countries that have taken place in the global service trade are considered in the study. All the selection of these nations is based on the UN Service Trade database.

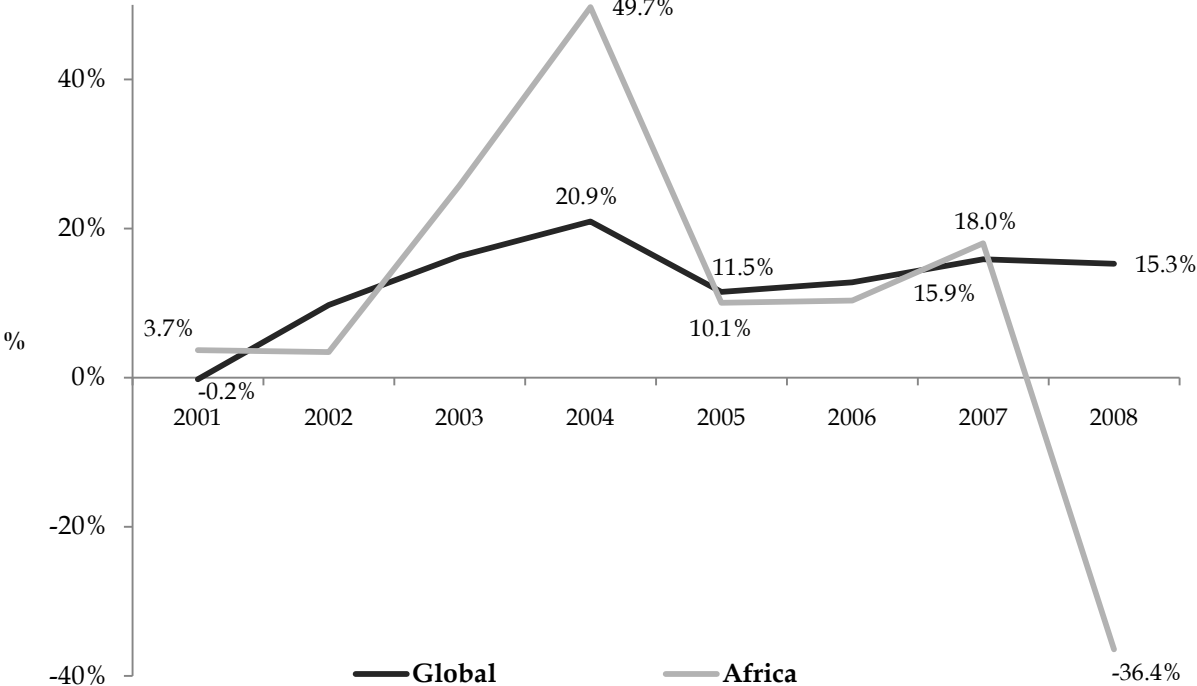
The other source of data is the World Development Indicators database (WDI) 2008 and 2009 editions. All the GDP, GDP per capita, population, total labor force and other socio-economic indicators are taken from this source. The exchange rates for the respective years for all the nations are obtained from the World Bank online data base. Other data sources such as the United Nations Statistics Division are used to supplement the data set. The rest

variables such as the distance, colony, language and the likes are collected from the internet, various web sites. The distance between the capitals of the two partnering nations is taken from the website <http://www.distancefromto.net/> (see Table A1).

3.2 Performance of the African Service Sector in the Global Trade in Services

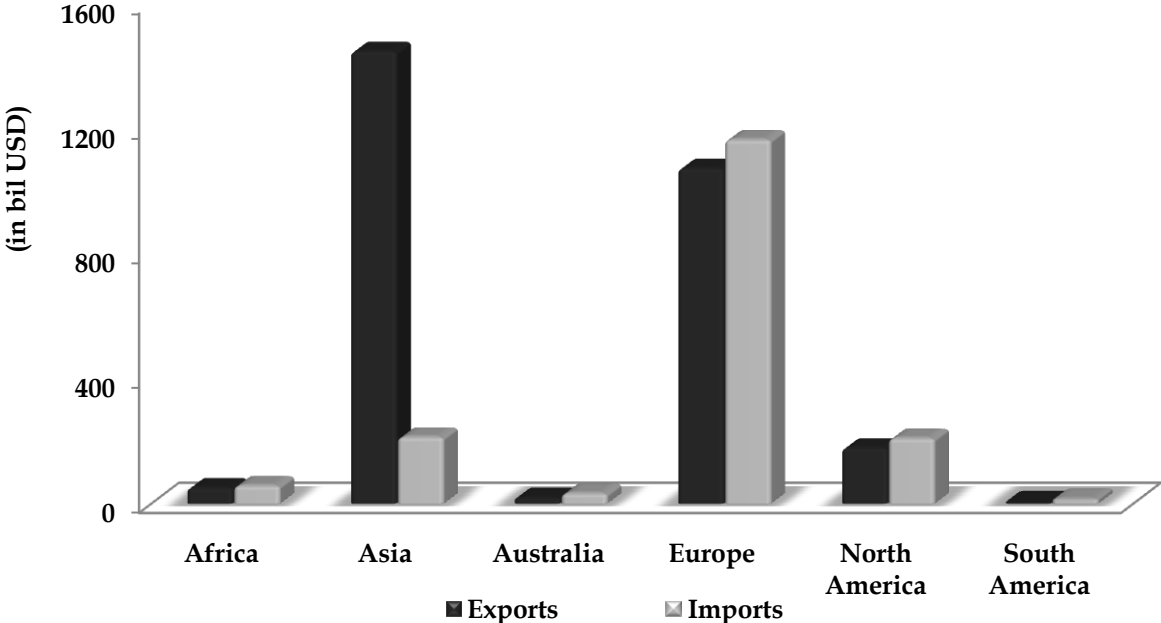
Trade in services has shown distinct noticeable patterns over the past decade. According to Karsenty (2000) cited in (Grünfeld & Moxnes, 2003), mode 1 and mode 3 trade dominate the pattern of international service trade, where each category represents approximately 41% of total service trade and 37.8% respectively while trade of mode 4 is marginal. Mode 4 is where the strongest barriers of trade prevail.

Figure 3.1: Growth Rates of Exports of Services (2001-2008)



In 2008, the total exports of services around the globe accounted for more than 3 trillion which has scored a 15% increment than the previous year (see figure 3.1)¹. In this year, the principal exporters of services were the United States, the United Kingdom, Germany and France. Their export share to the global total exports was 14.14%, 7.48%, 6.41% and 4.18% respectively (UNServiceTrade). Following the same pattern, Africa’s service trade could sustain its encouraging growth until 2007 which was 15.9%. But in 2008, Africa experienced a sudden downfall of nearly 36.4% from the previous year.

Figure 3.2: Global Trade in Services Shares of the Continents in 2008



On the aggregate level in 2008, the global export share of services was dominated by Asia and Europe while that of imports was by Europe followed by North America and Asia with

¹ Source: UN Service Trade, own computation

a wider margin. Considering the share of Africa in terms of both the exports and imports, it shows that it was at its infancy stage (see figure 3.2)².

Figure 3.3 (a): Global Shares of the Major Service Sectors in 2008 (in billion USD)

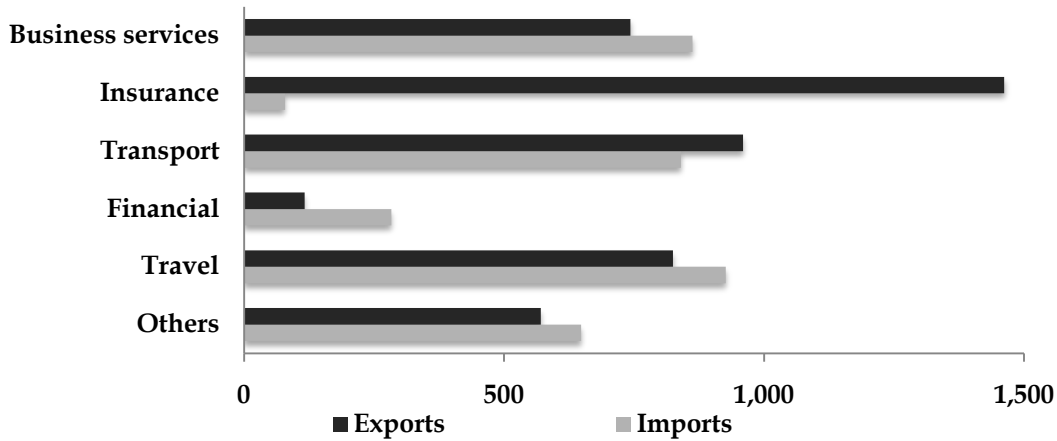
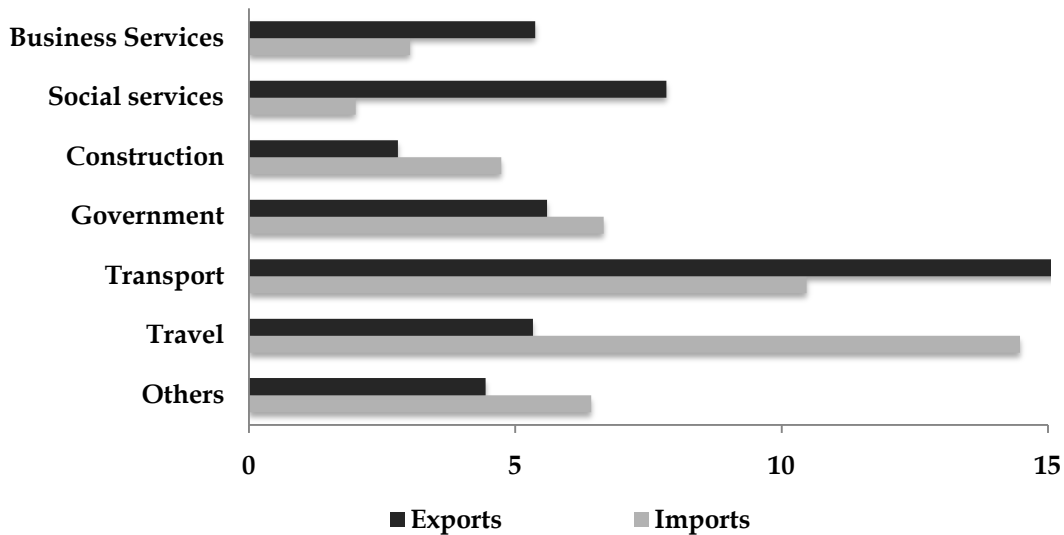


Figure 3.3 (b): African Shares of the Major Service Sectors in 2008 (in billion USD)



Sector wise, the trade shares indicate that Africa is involved in dissimilar sectors than that of the whole world together (see figures 3.3 a and b)³ In 2008, it was the transport sector that

² Source: UN Service Trade, own computation

³ Source: UN Service Trade, own computation

takes the lion's share of Africa's service exports while the travel service sector takes the majority of the service imports of the continent. Globally, it is the insurance sector that dominates the exports of services. On the other hand, the transport sector, the business sector and the travel sector have nearly equal shares of the global service imports.

From the above two graphs it is clearly observable that the financial and the insurance sector's share are minimal in Africa. This low share might be due to the level of technological advancement and lack of infrastructure that can accommodate these sectors. In addition to that, as discussed in (PREM, 2010) the banking sector is an expensive sector in Africa because of the difference in lending and borrowing rates offered by financial institutions in Africa is larger than in other regions and also due to lack of competition that would reduce interest rate margins. It is possible to claim that most of the service types that Africa provides and receives are more of labor intensive such as social services, government services, transport and travel etc.

3.3 Econometric Analysis: Model Specification

This paper tries to study the major determinants of Africa's trade in services with the rest of the world. As mentioned in the data source section, the rest of the world comprises the major 11 nations that have a larger share in the global service trade, which is computed to be more than 2% of the total world service trade. Using this data, gravity model is applied to see the major factors that give way for the international trade in services of Africa.

Gravity model originates from the Newton's law of universal gravity equation in physics. It tries to see the bilateral trade patterns in relation to the GDP of the partnering nations, the

distance between the capital cities of the two nations and other factors that affect the trade pattern. This means, it drags the law of gravity to the international trade case. It states that the volume of trade between two nations is proportional to the product of their masses which is their GDP in this case and inversely related to the distance between them (Anderson & Wincoop, 2003) (Grünfeld & Moxnes, 2003) (Linders & Groot, 2006) (Egger & Pfaffermayr, 2003). Its application in international trade was initiated by Tinbergen (1962), Pöyhönen (1963) and Linneman (1966).

Mathematically,

$$\text{---} \tag{3.1}$$

Where the F stands for attractive forces; M for respective masses; D for distance; and G for gravitational constant.

Dragging this to the international trade study,

$$\text{---} \tag{3.2}$$

Where the X_{ij} stands for exports from i to j; or total trade (i.e. $X_{ij} + X_{ji}$); Y for economic size (GDP, POP); and T for Trade costs which might include distance, adjacency, common language, colonial links, common currency, island, landlocked, institutions, infrastructures, migration etc. (Paas, 2000).

Transforming the above equation,

$$\tag{3.3}$$

Based on equation (3.3), we can derive the following benchmark model to be estimated by expanding .

(3.4)

Where: *af* and *row* stand for the African nations and the partnering nations from the rest of the world (the selected 11 nations).

$(M+X)_{ar}$ = Total imports and exports of services between the two partnering nations

$gdppc_{af}, gdppc_{row}$ = Per capita GDP of country i and j, respectively

$labfor_{af}, labfor_{row}$ = Total labor force of country i and j, respectively

$extrat_{af}, extrat_{row}$ = Exchange rate of country i and j, respectively

$laloc_{af}, laloc_{row}$ = Dummy variables - 1 if the country is land locked, 0 otherwise for countries i and j, respectively

$intuser_{af}, intuser_{row}$ = Total internet users in country i and j, respectively

$dist_{afrow}$ = Distance between the capital cities of the two countries

$Language_{afrow}$ = Dummy variable - 1 if the two countries have the same language, 0 otherwise

$Colony_{afrow}$ = Dummy variable - 1 if the two countries have the colonial history, 0 otherwise

μ_{it} = Error term

As the gravity model tries to explain the major reasons for a bilateral trade between two countries, this model tries to explain the major determinants of trade in services of Africa with the major trade partners of the world. In this benchmark model, total labor force is used instead of the total population. This is because, it is important to see the effect of labor indicates productivity of the nation. Since we cannot employ both variables in one equation, we are forced to go for one variable and hence total labor force is chosen. Another variable, total number of internet users, is employed to serve as a measure for technological advancement level. This variable is chosen among other variables for two reasons. One, it has a significant contribution on the global trade in services, and two, for being among the major indicators of technological advancements. It is included for the African nations only because, for the partnering nations it is no more an issue. They have developed their technology that can be fully employed in the service sector. They have reached the stage where they can supply and receive services from abroad (See (Friedman, 2006)). For this reason, it is believed that the effect of that variable can be seen only on the trade performance of the African nations where their technology is at infancy.

It is expected to obtain significant effects after the estimation of the parameters in equation (3.4) after all the necessary tests being undertaken. It is hypothesized that the mass of both partnering nations, which is the GDP per capita of the African nation and the rest of the

world in this case, to have a positive and significant effect on the total service trade value between two nations, all other factors being constant. The same true is the respective total labor force, total number of internet users, usage of common language between the two nations and if one nation, particularly the African nation, was a colony of the other partnering nation.

On the contrary, the other variables, such as exchange rate, being land-locked and distance between the capital cities of the two nations are expected to have a negative effect on the total service trade value between the two nations. But being land locked and distance are not expected to have a significant effect, because unlike the trade in goods, service does not require transportation cost and other costs that will be exacerbated because of the lack of proximity of the two partnering nations.

3.4 Data Exploration

Before going into the estimation of an econometric model it is crucial to explore the statistical characteristics of the data set. Alemayehu *et al.*(2011) state data exploration as a pre-requisite for good model formulation and econometric estimation. It is important to know the pattern of the data in order to model it in a mathematical form. They indicated the three major techniques that are comprised in data exploration and inference, namely, graphical inspection, data transformation, and diagnostic Analysis. Subsequently, the data exploration and estimation are done based on the techniques aforementioned.

The graphical inspection will be made on the major variables that will be included in the gravity model mentioned in equation (3.4). Accordingly, the two way scatter plots for the

variables reflect that almost all variables are concentrated near zero, their peaks being highly dispersed. For instance, the total trade in services between two countries has most values concentrated near zero. The peaks are also highly dispersed. This might be due to the difference in trade diversification and as well as the difference in the level of development that is attributed to the African nations. This is also reflected in the scatter plot diagram for the GDP per capita of the African nations. It exhibits a similar pattern where most values are concentrated near zero with highly dispersed peak values. As discussed above, since the data includes all African nations, the difference in the level of development, growth rate and national income has a weighty effect. Here it is noteworthy to mention that this variation prevails among the nations of Sub-Saharan Africa, South Africa and the countries from North Africa. Consequently, the variable that contains number of internet users in Africa shows the same pattern which can be affixed to the same reason. One thing that is worth mentioning here is that the peak values start to get dispersed after the midpoint of the time frame which is after year 2004. This might be due to recent developments in technological innovations and developments (See Figures A1-A6).

The variables representing total population of Africa and total labor force of Africa have plots which are scattered uniformly. The same is true for the total population of the partnering nations and their total labor forces. Unlike the GDP per capita of the African nations, the per capita GDP of the partnering nations show a uniformly scattered plot. This might be because of the fact that the nations included in this variable are well developed and more or less in a similar development stage registering similar growth patterns.

Subsequently, the variable representing the total number of the internet users of these nations has also a uniformly scattered two way plot.

Following this, it is important to closely study the summary statistics of the variables. According to the reported summary statistics in table A3, most of the variables, except the GDP per capita of the partnering nations, happen to have positively skewed and leptokurtic distribution which lacks kurtosis. For instance, total trade value has skewness and kurtosis of 4.28 and 25.69, respectively. Similarly, GDP per capita of the Africa has 3.64 and 22.62 skewness and kurtosis, respectively. This means both variables have positively skewed and leptokurtic distributions.

Regarding the variability of the variables, they show variability that ranges from 2.22 being the maximum for total trade value to 0.2 being the minimum for per capita GDP of the partnering nations.

After all these inspections, it is necessary to test if the samples of the variables are drawn from a normally distributed population. To assess this, box plot and the Jarque-Bera test for normality can be employed.

The box plots except that of the GDP per capita of the partnering nations and their total number of internet users, reveal that the variables have some degree of skewness. In addition to their non-normal distribution, they also contain outliers. But those two variables seem to be drawn from a normally distributed population even though they appear to have outliers (See Figures A13 and A14).

The other method to test normality is the JB test, which is a popular LM test (Verbeek, 2004).

The test statistic can be computed as,

$$JB = \frac{1}{T} \left[\frac{1}{\sqrt{T}} \left(\frac{1}{T} \sum_{i=1}^T \frac{z_i^3}{\sigma_i^3} \right)^2 + \frac{1}{T} \left(\frac{1}{T} \sum_{i=1}^T \frac{z_i^4}{\sigma_i^4} - 3 \right) \right] \quad (3.5)$$

Where; \bar{z}^3 and \bar{z}^4 which represent the skewness and kurtosis coefficients respectively. T stands for the sample size of the respective variable (Jarque & Bera, 1980).

The null hypothesis is that the calculated LM value to be zero. This means, in order to satisfy normality, the skewness has to be 0 and the kurtosis must be 3 so that there will be no excess kurtosis.

H_0 : $\bar{z}^3 = 0$ and $\bar{z}^4 = 3$

Against

H_1 : Not H_0

(Jarque & Bera, 1980) showed that the LM is asymptotically distributed as χ^2_2 and a test based on equation (3.4) is locally powerful. Based on this, the null hypothesis will be rejected if the calculated statistic is greater than the tabulated values of χ^2_2 .

Looking at the results in table A5, it is observed that all variables exhibit a p-value of 0.000 which forces us to reject the null hypothesis of skewness being zero and kurtosis being 3, to make the excess kurtosis zero, which is a typical property of normal distribution. Thus we can say that all the variables show that they are not normally distributed.

In order to overcome the problems regarding the distributional properties of the variables, it is better to use transformation. As recommended by Alemayehu *et al.*(2011), transformation of variables is among the three major techniques of data exploration and inference. According to these authors, transformation of a variable, particularly into logarithmic form, helps to show influential points in a very sharp manner and also corrects skewed variables into the right distribution towards normality which is relevant in the context of regression analysis.

In this paper, after all the data exploration is done, it is identified that there is a need to transform the variables into logarithmic forms. Logarithmic form is chosen over differenced form of variables, not only due to the need to correct their non-normal distributions, but also due to nature of the model. Gravity model's parameters are initially non-linear in parameters, while the classical econometric approach requires linearity in parameters. Therefore, to suit that requirement it is important to use logarithmic forms of the variables included in the model, equation (3.4).

By doing so, the variables show an improvement in their distributions. The scatter plots for all variables reveal that the variables are uniformly scattered(see Figures A7-A12). The box plots indicate that most of the variables are now close to normal distribution (see Figures A15 - A16). In addition, the JB test for the log values also show that they have improved than their distribution in levels (see Table A4 and A6). Therefore, in this paper we will proceed with the log values of the variables for our further estimations.

3.5 Diagnosis and Estimation Procedure

In order to proceed with our estimation, we need to diagnose our estimation procedures so that it would be possible to identify which estimation technique fits our model and data well. Therefore, the important panel data tests are discussed accordingly.

i. Test for Poolability:

It is important to test the poolability of a data set before proceeding with the estimation process. It tests whether the coefficients are the same for all entities of the panel variable, which is the set of partnering nations in this paper. The test statistic goes as,

$$\text{—————} \tag{3.6}$$

Using this test statistic we test the hypothesis

$$H_0: \beta_i = \beta \text{ for all } i$$

Against

$$H_1: \text{Not } H_0$$

This is the standard Chow (1960) test extended from two regressions to the case of N regressions (Baltagi, 2008) (Baltagi, 2009).

Since the calculated value of the test statistics at 1% significance level is 0.45 which is less than the tabulated value, 1.37, we fail to reject the null hypothesis. Thus we can show that this test result proves the poolability of the data (see Table A7).

ii. Test for Fixed Effects:

We perform fixed-effects test in order to answer the question of whether to use fixed effect or pooled OLS. The test statistic according to (Baltagi, 2009) is;

$$\frac{\text{F-statistic}}{\text{Critical Value}} \quad (3.7)$$

The null and alternative hypotheses are:

H_0 :

Against

H_1 : There are time specific effects.

Using this test statistics, the calculated value does not allow us to reject the null hypothesis since it is less than the tabulated value at 1% significance level. Therefore we can conclude that there are no time specific effects (see Table A7).

iii. Hausman-Taylor Test for Fixed Versus Random Effect Estimation:

It is important to have a method for choosing between random effects and fixed effects by testing whether μ_i and x_{it} are correlated. Since FE is consistent when μ_i and x_{it} are correlated, while RE is not a statistically significant difference is interpreted as evidence against the random effects (Wooldridge, 2004).

(Hausman & Taylor, 1981) pinpointed that if the crucial assumption of cross sectional specification, which is the expectation of the disturbances given knowledge of the explanatory variables is zero, is violated the within, between, and GLS estimators are

affected differently. For this reason it is important to test it using the following test statistic.

The Hausman test is a way of comparing two estimators; one which is consistent under both the null and alternative hypothesis and one which is consistent (and typically efficient) under the null hypothesis only. A significant difference between the two estimators indicates that the null hypothesis is unlikely to hold. The test statistics goes as (Verbeek, 2004):

$$(3.8)$$

Where; *FE* is for fixed effects and *RE* is for random effects.

Under this test the hypotheses are:

H_0 : Difference in coefficients is not systematic

Against

H_1 : There is a systematic difference in coefficients

Using this statistics, the calculated value is 11.36, which is less than the tabulated value of 15.09 at 1% significance level. This makes us fail to reject the null hypothesis that claims the difference in coefficients is not systematic. From this we can conclude that we can stick to the random effects model (see Table A7).

iv. Test for Heteroskedasticity:

When the usual assumptions of homoskedastic disturbances and fixed coefficients are not met, the loss in efficiency in using OLS may be substantial and, more importantly,

the biases in estimated standard errors may lead to invalid inferences (Breusch & Pagan, 1979).

Even though heteroskedasticity does not affect the consistency of the estimators, it creates a minor trouble on inference. (Wooldridge, 2004) claims heteroskedasticity test as a means to justify the use of the usual OLS or 2SLS statistics.

A simple test for heteroskedastic disturbances in a linear regression model is developed using the framework of the LM test (Breusch & Pagan, 1979).

The null and alternative hypotheses in this test are,

H_0 : Homoskedasticity

Against

H_1 : Not H_0

Based on this test, the calculated value which is very high and the p-value that is less than 0.01, show the existence of heteroskedasticity (see Table A7).

v. Test for Serial Autocorrelation:

When one or more explanatory variables are not exogenous and are correlated to the error term, it is said to possess serial autocorrelation. Ignoring this autocorrelation will result in consistent but inefficient estimates of the regression coefficients and biased standard errors (Baltagi, 2008). For this reason it is important to undertake the test for autocorrelation.

The null hypothesis is:

H_0 : No first order autocorrelation

Against

H_1 : Not H_0

The test statistics indicate the prevalence of serial autocorrelation because the calculated F-stat result at 1% significance level is greater than the tabulated value (see Table A7).

vi. Test for Endogeneity:

As recommended by (Verbeek, 2004), since the Hausman test is a way of comparing two estimators, we can apply this test to identify if there is endogeneity or not.

(3.9)

Where:

b = consistent under H_0 and H_1 ; obtained from IV regression

B = inconsistent under H_1 and efficient under H_0 ; obtained from OLS regression

Under Hausman test for endogeneity the null and alternative hypotheses are:

H_0 : Difference in coefficients is not systematic

Against

H_1 : There is a systematic difference in coefficients

Based on this the test statistics the computed value is less than that of the tabulated value at 1% significance level. This makes us fail to reject the null hypothesis indicating that there is no endogeneity.

Based on all these tests, it is observed that serial autocorrelation and heteroskedasticity prevail. Since GLS accounts for first order autocorrelation and heteroskedasticity it is chosen over all other estimators (see Table A7).

3.6 Estimation Results and Interpretation

As discussed in the previous sub-section, GLS will be used to estimate the gravity model specified under equation (3.4). The dependent variable is log of total trade value of services between two countries, one country being from Africa and the other partner being from the top 11 service exporters in the global service trade. The data set that is used in this study is gathered for the years 2003-2007, five years period. It is a strongly balanced panel data set, where each set of partnering nations has information of the 5 years mentioned.

From the estimation result, we note that overall, the variables in the model are jointly significant. It is tested using the Wald test statistic which is computed to be 381699.63 with a p-value of zero at 1% significance level. It is worth noting that the number of observation has declined from 810 to 793 due to existence of missing values in some of the variables.

Most of the estimates are as per the expectations which were based on the literature on gravity model. All variables, but log of exchange rate of Africa, show significance at 1% significance level. The log of exchange rate of Africa is significant at 5% significance level.

TABLE 3.1: ESTIMATION RESULTS OF THE LOG VARIABLES

<i>Independent Variable</i>	<i>Coefficient</i>	<i>z-ratio</i>	<i>p-value</i>
<i>LOG of GDP per capita of the Africa</i>	<i>0.594154</i>	<i>13.79</i>	<i>0.000</i>
<i>LOG of GDP per capita of the partnering nation</i>	<i>0.4888409</i>	<i>5.38</i>	<i>0.000</i>
<i>LOG of total labor force of the Africa</i>	<i>0.5524925</i>	<i>13.94</i>	<i>0.000</i>
<i>LOG of total labor force of the partnering nation</i>	<i>0.3385375</i>	<i>8.83</i>	<i>0.000</i>
<i>LOG of exchange rate of the Africa</i>	<i>-0.030594</i>	<i>-2.06</i>	<i>0.039</i>
<i>Land locked African nation</i>	<i>-0.6056608</i>	<i>-7.45</i>	<i>0.000</i>
<i>Use the same language</i>	<i>0.8817897</i>	<i>7.86</i>	<i>0.000</i>
<i>Presence of colonial history</i>	<i>0.7899815</i>	<i>7.19</i>	<i>0.000</i>
<i>LOG of distance between the capital cities</i>	<i>-0.7647396</i>	<i>-13.34</i>	<i>0.000</i>
<i>LOG of total internet users of the Africa</i>	<i>0.0849973</i>	<i>3.04</i>	<i>0.002</i>

Number of observations = 793

Number of groups = 160

Wald chi²(10) = 381699.63

Prob > chi² = 0.000

From the estimation result, it is observed that a 1% increase in the GDP per capita of the two partnering nations, the African nation and the partnering nation, will increase the total service traded value by 0.59% and 0.49% ceteris paribus, respectively. Hence, here it is observed that the respective GDP per capita have positive and significant effects on value of trade in services of Africa. This indicates that service is highly affected by GDP. (Mann,

2007) classify service as price and income elastic, claiming it as superior or special product. This is what we can drag from the finding of the gravity model estimated in this paper. As nations develop, as their income increases they tend to demand for services and therefore be involved in service trade.

Considering the labor force, total labor force has a positive and significant impact on services trade. A 1% increase in the labor force of Africa tends to increase the total services value by 0.55% while that of the partnering nations have a 0.34% effect, all other factors being equal.

The other two variables that have a positive impact are the dummies of common language and colonial history. If the partnering nation was a colonizer of the African nation, the total service trade between the two nations is will increase by 0.79%, *ceteris paribus*. In relation to that, if the two nations have the same official language, the total service trade is likely to increase by 0.88%, other factors being constant. It is evident that the former colonizers are still intact with their ex-colonies in terms of economic and political affairs.

From the results' table, as a nation's total number of internet users increase by 1%, which is used as an indicator of technological advancement, other factors remaining unchanged, the total services trade will increase by 0.09%. Internet facilitates trade in services by reducing transaction costs. According to (Mann, 2007), cheaper Internet and information technology, digitization, and codification of information allow tasks to be separated so that they would create both domestic market and international outsourcing. (Freund & Weinhold) concluded that the internet will affect growth directly through its impact on productivity.

According to (PREM, 2010) developing countries are lagging behind the developed countries in the adoption and use of the most efficient technologies such as the internet.

The effect of devaluation on the service trade is as per the expectation. A 1% increase in the exchange rate of the African nation will reduce the total value of services traded between two nations by 0.03%, *ceteris paribus*.

The distance between the capitals of the two partnering nations is showing unexpected result. Theoretically, distance is expected to have a negative impact on trade in goods and services in general. But specifically for trade in services, that is not expected to happen. Under this estimation, it has a negative and significant effect on the dependent variable. As the distance between the two partnering nations increases by 1%, total value of services traded will decline by 0.77%.

Another variable that is showing unexpected significance is land-lockedness. If an African nation is land locked, its trade in services will decline by 0.61% than those African nations that are not landlocked, other factors being equal. These two variables indicate that most of the services traded in Africa are more of labor intensive that require physical movement. As it can be seen in figure 3.3 (b), most of the services involved in Africa are the likes of travel, transport and construction, which require labor power.

CHAPTER FOUR: CONCLUSION AND POLICY IMPLICATION

4.1 Conclusion

Trade in services in Africa, being at its infancy stage is positively influenced by the nations' GDP and the number of total labor force that they possess. In addition to these variables, an expected indicator, which is advancement of technology that is reflected through the total number of internet users positively affect the trade in services in Africa.

Having a colonial history and using similar language between the two partnering nations has also a positive contribution to the trade in services. This is an interesting finding in a way that it reflects the pattern of Africa's trade in services. We can see that most of the African nations trade with their ex-colonials for different reasons. One reason might be the fact that the cultural similarity that was inherited during the colonial period. This makes the African nations to behave in a way that their former rulers do. The other factor might be the similarity of language, which is still a result of the colonization. The language dummy has depicted this by itself. Having the same language facilitates trade in services by reducing the cost of verbal communication as services unlike goods require a higher degree of communication.

Another reason might be the prevailing economic and political affiliation between the African nations and their ex-colonial rulers. It is evident that the colonizers are still concerned about their ex-colonies of Africa in every aspect. For instance, the ex-French colonies are still in connection with France. They formed a union named Union Monétaire Ouest Africaine (Monetary Union of West Africa) UMOA, whose members are West African

French ex-colonies, that uses a common currency that is pegged the French franc. They have maintained a fixed bilateral exchange rate against the French franc since October 1948 (Macedo, 1986). These kinds of affiliations affect the trade patterns of the nations, as they tend to trade more with their ex-colonial nations.

Distance and land-lockedness has a deteriorating impact on trade in services. This is backed by (PREM, 2010) that the land-locked countries have a lower share of services as compared to those of the coastal nations. This might be due to their low level of income spectrum which results from their low level of overall trade that also includes trade in goods. This is proved by the evidence that the difference between the landlocked and coastal nations does not prevail when it comes to the share of imports and exports to the respective GDPs. This shows that the overall trade in the land-locked African countries is less than that of the coastal ones. Therefore, one reason for this justification might be low level of trade in goods and services a whole for the landlocked nations that led them to have a low level of GDP. Since the estimation result in table 3.1 shows that an increase in GDP will increase the trade in services, countries with low level of GDP will have a lesser trade in services.

In conclusion, African trade in services is positively influenced by its GDP, labor force, internet facility, colonial history and common language while exchange rate, distance and land-lockedness weaken the services trade of the continent. Looking into the patterns of the trading partners, the countries are more affiliated with their former colonizers. This indicates that, there is a low level of diversification in terms of service destination.

4.2 Policy Implication

As suggested by (PREM, 2010), trade in services would be a very good potential for export diversification especially true for the landlocked nations whose opportunities to diversify among manufactured goods are limited due to the high cost of transportation of goods. Therefore, it is vital to work on the expansion of trade in services, to achieve more than what has been done so far.

As has been seen from the figure 3.3 (b), there is a low level of service portfolio diversification, where most services are travel and transport. This being accompanied by the low level of diversification in terms of service destination, it verifies the relatively poor performance of the continents trade in services. To improve this situation, it is imperative to forward some policy implications.

Since the service trade requires skilled labor force for the manufacturing process and delivery of the service, it is essential to train the abundant labor in the countries of Africa. This has been observed in the Asian nations such as India, where the unemployed are trained to take over the tasks of the western world. They are trained, not only the skill of the operation that they are involved, but also the language, the native accent, so that they would imitate as native workers from the west (Friedman, 2006). Therefore, the African nations have to work on these trainings to take over, the works as the Indians did.

But this is not enough. It should be accompanied by an improved access to the internet. In view of the fact that most of the service sector, such as consultancy, financial service that

includes banking and the works of audit, information transmission, telecommunication, can be done through the internet, it is mandatory to improve the access. That is why these services are at their stage of infancy. Africa, despite its low level of development, has to try to improve its technological advancement.

The other possible way to improve the service sector is to alter its policy in terms of its service destination. It has to try to start trading with other nations, other than the colonies. Above all it has to expand its intra-continental trade. More has to be done regarding this aspect.

Looking into its benefits, the nations need to have a focused policy on trade in services. They need to regulate the market as they do for the goods trade. This includes recording and reporting the transactions in a timely manner, adjusting the trade policies in a way that they can be applicable for the service sector in the specific nation's context.

A lot more can be done to enhance the trade in services in Africa. Since this study cannot capture all the causes of the service trade in Africa, due to methodological and data availability reasons, further research has to be done in order to forward more policy recommendations.

BIBLIOGRAPHY

- AfDB/OECD. (2010). *African Economic Outlook - Public Resource Mobilisation and Aid*. Paris: OECD Publishing.
- Alemayehu, G., & Daniel, Z. (2008). African Service Sector Imperatives in the New World Trade Order: A Case Study of Two Sectors in Ethiopia. In T. A. Oyejide, & W. M. Lyakurwa, *African Imperatives in the New World Trade Order* (pp. 202-223). Nairobi: African Economic Research Consortium.
- Alemayehu, G., Ndung'u, N., & Daniel, Z. (2011). *Applied Time Series Econometrics: A Practical Guide for Macroeconomic Researchers with a Focus on Africa*. Central Bank of Kenya and African Economic Research Consortium and Addis Ababa University.
- Anderson, J. E., & Wincoop, E. v. (2003). Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review*, 93 (1), 170-192.
- Arjan M. Lejour & Peter M. Smith. ((2008)). International Trade in Services - Editorial Introduction. *J Ind Compet Trade* (2008), 169-180.
- Baltagi, B. H. (2009). *A Companion to Econometric Analysis of Panel Data*. Chichester, West Sussex: John Wiley & Sons Ltd.
- Baltagi, B. H. (2008). *Econometric Analysis of Panel Data* (4 ed.). Chichester, West Sussex: John Wiley & Sons, Ltd.
- Bankole, A. S. (2008). Services Sector Study: Nigeria. In T. A. Oyejide, & W. M. Lyakurwa, *African Imperatives in the New World Trade Order* (pp. 291-320). Nairobi: African Economic Research Consortium.
- Bo Sodersten & Geoffrey Reed. (1994). *International Economics* (Third ed.). London: Macmillan Press LTD.
- Breusch, T. S., & Pagan, A. R. (1979). A Simple Test for Heteroskedasticity and Random Coefficient Variation. *Econometrica*, 47 (5), 1287-1294.
- Carbaugh, R. J. (2005). *The International Economy and Globalization*. U.S.A.: Thomson Corporation.
- Christen, E., & Francois, J. (2009, June 8). Modes of Delivery in Services.

- Davies, V. A. (2008). African Imperatives in the New World Trade Order: Case Study of Sierra Leone's Service Sector. In A. T. Oyejide, & W. M. Lyakurwa, *African Imperatives in the New World Trade Order* (pp. 321-345). Nairobi: African Economic Research Consortium.
- Deardorff, A. V. (1998). Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?
- Dunn, R. M., & Mutti, J. H. (2004). *International Economics* (6th ed.). New York: Routledge.
- Egger, P., & Pfaffermayr, M. (2003). The proper panel econometric specification of the gravity equation: A three-way model with bilateral interaction effects. *Empirical Economics* , 28:571-580.
- Evenett, S. J., & Keller, W. (2002). On Theories Explaining the Success of the Gravity Equation. *Journal of Political Economy* , 110 (2).
- Feenstra, R. C. (2002). *Advanced International Trade: Theory and Evidence*. California: University of California, Davis, and National Bureau of Economic Research.
- Francois, J., & Hoekman, B. (2008). Service Trade and Policy. *Journal of Economic Literature* (48), 642-692.
- Freund, C., & Weinhold, D. The Internet and International Trade in Services.
- Friedman, T. L. (2006). *The World is Flat: The Globalized World in the Twenty-First Century*. London: Penguin Group.
- Fukunari Kimura & Hyun-Hoon Lee. (2004). The Gravity Equation in International Trade in Services. *European Trade Study Group Conference, University of Nottingham*.
- Grünfeld, L. A., & Moxnes, A. (2003). The Intangible Globalization: Explaining the Patterns of International Trade and FDI in Services. *Norwegian Institute of International Affairs Paper* , No. 657 .
- Hausman, J. A., & Taylor, W. E. (1981). Panel Data and Unobservable Individual Effects. *Econometrica* , 49 (6), 1377-1398.
- Ikiara, G. K., Nyandemo, S. M., & Ikiara, M. M. (2008). Kenya's Service Sector: Emerging National Regional and Global Issues. In T. A. Oyejide, & W. M. Lyakurwa, *African*

- Imperatives in the New World Trade Order* (pp. 270-290). Nairobi: African Economic Research Consortium.
- Jansen, M., & Lee, E. (2007). *Trade and Employment Challenges for Policy Research*. Switzerland: WTO Secretariat.
- Jarque, C. M., & Bera, A. K. (1980). Efficient Tests for Normality, Homoscedasticity and Serial Independence of Regression Residuals. *Economics Letters* , 6, 255-259.
- Kimura, F., & Lee, H.-H. (2004). The Gravity Equation in International Trade in Services. *European Trade Study Group Conference, University of Nottingham*.
- Kimura, F., & Lee, H.-H. (2006). The Gravity Equation in International Trade in Services. The Kiel Institute.
- Krugman, P. R., & Obstfeld, M. (2009). *International Economics Theory & Policy* (Eighth ed.). Boston: Pearson Education, Inc.
- Lejour, A., & Smith, P. M. ((2008)). International Trade in Services - Editorial Introduction. *J Ind Compet Trade* (2008) , 169-180.
- Lejour, A., & Verheijden, J.-W. d. (2004, December). Services trade within Canada and the European Union: What do they have in common? *CPB Discussion Paper* , No. 42 .
- Linders, G.-J. M., & Groot, H. L. (2006). Estimation of the Gravity Equation in the Presence of Zero Flows. *Tinbergen Institute Discussion Paper* . Rotterdam, The Netherlands: Tinbergen Institute.
- Lindner et al., A. (2001, October). Trade in Goods and Services: Statistical Trends and Measurement Challenges. *OECD Statistics Brief* . Paris, France: Statistics Directorate of the OECD.
- Macedo, J. B. (1986). Collective Pegging to a Single Currency: The West African Monetary Union. In S. Edwards, & L. Ahamed, *Economic Adjustment and Exchange Rates in Developing Countries* (pp. 333 - 368). University of Chicago Press.
- Mann, C. L. (2007). Technology, Trade in Services, and Economic Growth. *OECD Trade Committee Conference: Trade, Innovation, and Growth*.
- Marion Jansen & Eddy Lee. (2007). *Trade and Employment Challenges for Policy Research*. Switzerland: WTO Secretariat.

- Mattoo, A., Stern, R. M., & Zanini, G. (2008). *A Handbook of International Trade in Services*. New York: Oxford University Press.
- Meleu, M., & Nouhoun, C. (2008). The Impact of Liberalization on Trade in Services in Cote d'Ivoire. In T. A. Oyejide, & W. M. Lyakurwa, *African Imperatives in the New World Trade Order* (pp. 183-201). Nairobi: African Economic Research Consortium.
- Nyahoho, E. (2010). Determinants of Comparative Advantage in the International Trade of Services: An Empirical Study of the Hecksher-Ohlin Approach. *Global Economy Journal* , 10 (1).
- Paas, T. (2000). The Gravity Approach for Modeling International Trade Patterns for Economies in Transition. *IAER* , 6 (4).
- Park, S.-C. (2002, December 30). Measuring Tariff Equivalents in Cross-Border Trade in Services. *Korea Institute for International Economic Policy Working Paper* , No. 02-15 . KIEP.
- Paul Brenton, Nora Dihel, Larry Hinkle and Nicholas Strychacz. (2010). *Africa's Trade in Services and the Opportunities and Risks of Economic Partnership Agreements*. Africa Trade Policy Notes: Note #6.
- Paul R. Krugman and Maurice Obstfeld. (2009). *International Economics Theory & Policy* (Eighth ed.). Boston: Pearson Education, Inc.
- PREM. (2010). *Africa's Trade in Services and Economic Partnership Agreements*. Poverty Reduction and Economic Management (PREM) Africa Region.
- Robert M. Dunn, Jr. & John H. Mutti. (2004). *International Economics* (6th ed.). New York: Routledge.
- SMEDA. (n.d.). *SMEDA Publications*. Retrieved Dec. 12, 2010, from Small and Medium Enterprises Development Authority, Ministry of Industries and Production, Government of Pakistan:
http://www.smeda.org/publications/trade_in_services.php
- Sodersten, B., & Reed, G. (1994). *International Economics* (Third ed.). London: Macmillan Press LTD.

- Tsatsa, C., & Kimpolo, T. (2008). The Trade in Services in Congo within the Global Trade Context. In T. A. Oyejide, & W. M. Lyakurwa, *African Imperatives in the New World Trade Order* (pp. 161-182). Nairobi: African Economic Research Consortium.
- UNECA. (2010). *Economic Report on Africa - Promoting High-Level Sustainable Growth to Reduce Unemployment in Africa*. Addis Ababa, Ethiopia: United Nations Economic Commission for Africa.
- UNServiceTrade. (n.d.). *United Nations Service Trade Statistics Database*. Retrieved 02 20, 2011, from UN Service Trade: <http://unstats.un.org/unsd/ServiceTrade/default.aspx>
- Verbeek, M. (2004). *A Guide to Modern Econometrics* (2nd ed.). The Atrium, Southern Gate, Chichester, West Sussex: John Wiley & Sons Ltd.
- Walsh, K. (2006, October). Trade in Services: Does Gravity Hold? A Gravity Model Approach to Estimating Barriers to Services Trade. *Institute for International Integration Studies Discussion Paper , No.183* .
- Wooldridge, J. M. (2004). *Econometric Analysis of Cross Section and Panel Data*. London: MIT Press.

ANNEXES

TABLE A1: SOURCE OF DATA

Variables	Source	Date of access
Imports and exports of services	http://unstats.un.org/unsd/ServiceTrade/default.aspx	2/20/2011
GDP per capita	http://data.un.org/Data.aspx?q=gdp&d=SNAAMA&f=grID%3a101%3bcurrID%3aUSD%3bpcFlag%3a1	12/6/2010
Exchange rate	http://data.worldbank.org/indicator/PA.NUS.FCRF?	12/10/2010
Distance	http://www.distancefromto.net/	12/27/2010
Labor force	World Development Indicators (WDI,2009)	
Number of internet users	World Development Indicators (WDI,2009)	

TABLE A2: PARTNERING NATIONS USED IN THE ESTIMATION OF THE GRAVITY MODEL

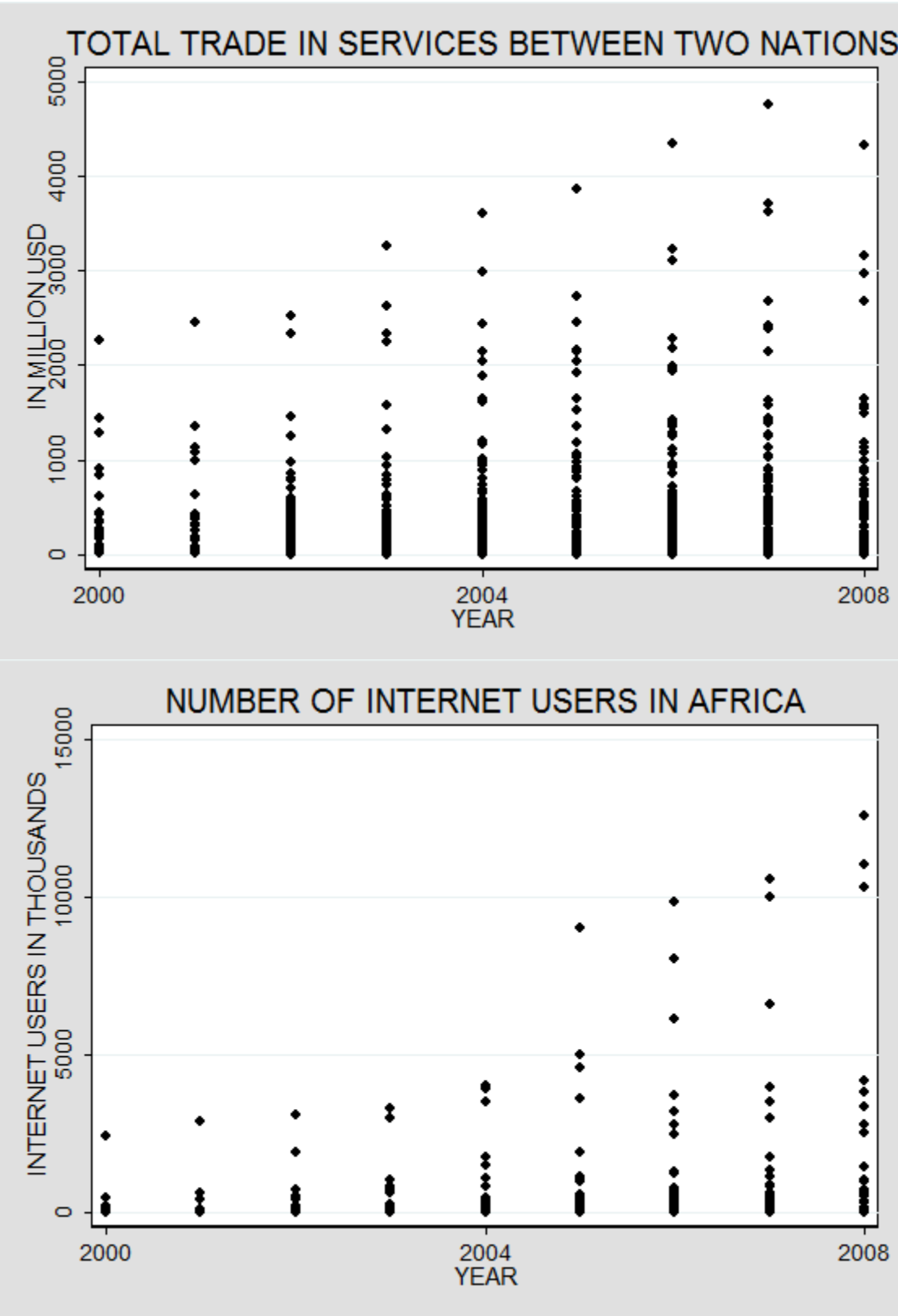
Algeria with Belgium	Cote d'Ivoire with Canada
Angola with Belgium	Egypt with Canada
Cameroon with Belgium	Nigeria with Canada
D. R. Congo with Belgium	Senegal with Canada
Egypt with Belgium	South Africa with Canada
Ethiopia with Belgium	Egypt with Spain
Ghana with Belgium	Morocco with Spain
Kenya with Belgium	South Africa with USA
Mauritius with Belgium	Egypt with United Kingdom
Morocco with Belgium	Morocco with United Kingdom
Niger with Belgium	South Africa with United Kingdom
Nigeria with Belgium	Algeria with Germany
Rwanda with Belgium	Angola with Germany
Senegal with Belgium	Benin with Germany
Seychelles with Belgium	Cape Verde with Germany
South Africa with Belgium	Chad with Germany
Sudan with Belgium	Egypt with Germany
Tanzania with Belgium	Equatorial Guinea with Germany
Algeria with France	Eritrea with Germany
Angola with France	Ethiopia with Germany
Botswana with France	Ghana with Germany
Burkina Faso with France	Kenya with Germany
Cameroon with France	Liberia with Germany
Cape Verde with France	Libya with Germany
Chad with France	Madagascar with Germany
Comoros with France	Malawi with Germany

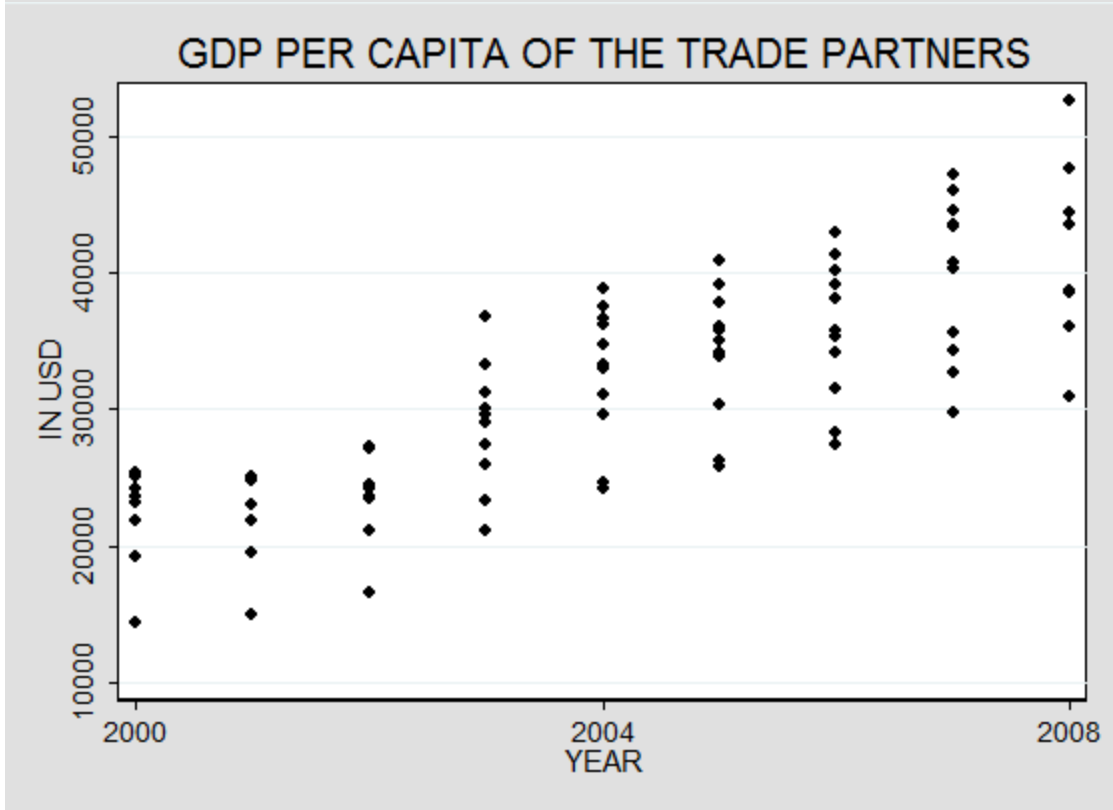
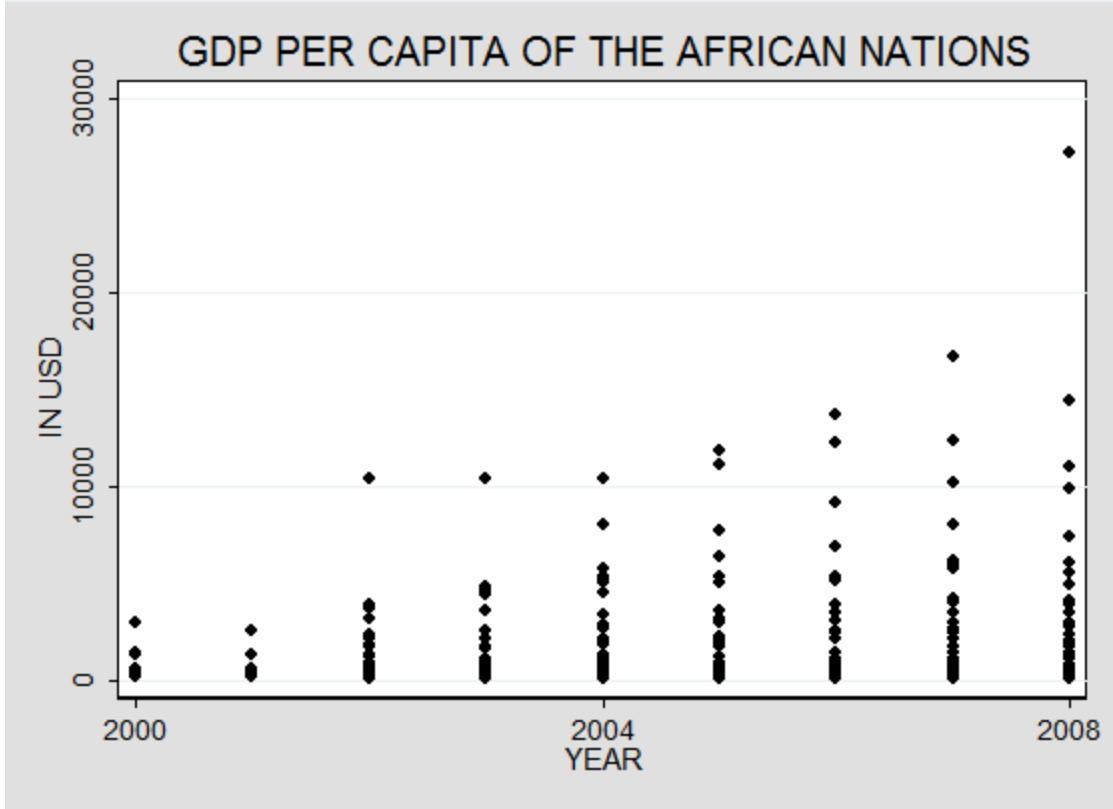
Congo Rep. with France
Cote d'Ivoire with France
Egypt with France
Gabon with France
Gambia with France
Guinea with France
Libya with France
Malawi with France
Mali with France
Mauritius with France
Morocco with France
Mozambique with France
Niger with France
Nigeria with France
Senegal with France
South Africa with France
Sudan with France
Tunisia with France
Algeria with Netherlands
Angola with Netherlands
Benin with Netherlands
Botswana with Netherlands
Burkina Faso with Netherlands
Burundi with Netherlands
Cameroon with Netherlands
Cape Verde with Netherlands
D. R. Congo with Netherlands
Egypt with Netherlands

Morocco with Germany
Mozambique with Germany
Namibia with Germany
Nigeria with Germany
Rwanda with Germany
Senegal with Germany
Sierra Leone with Germany
South Africa with Germany
Sudan with Germany
Tanzania with Germany
Tunisia with Germany
Uganda with Germany
Zambia with Germany
Zimbabwe with Germany
Algeria with Italy
Angola with Italy
Botswana with Italy
Burundi with Italy
Cameroon with Italy
Cape Verde with Italy
Chad with Italy
Congo Rep. with Italy
Cote d'Ivoire with Italy
D. R. Congo with Italy
Djibouti with Italy
Egypt with Italy
Eritrea with Italy
Ethiopia with Italy

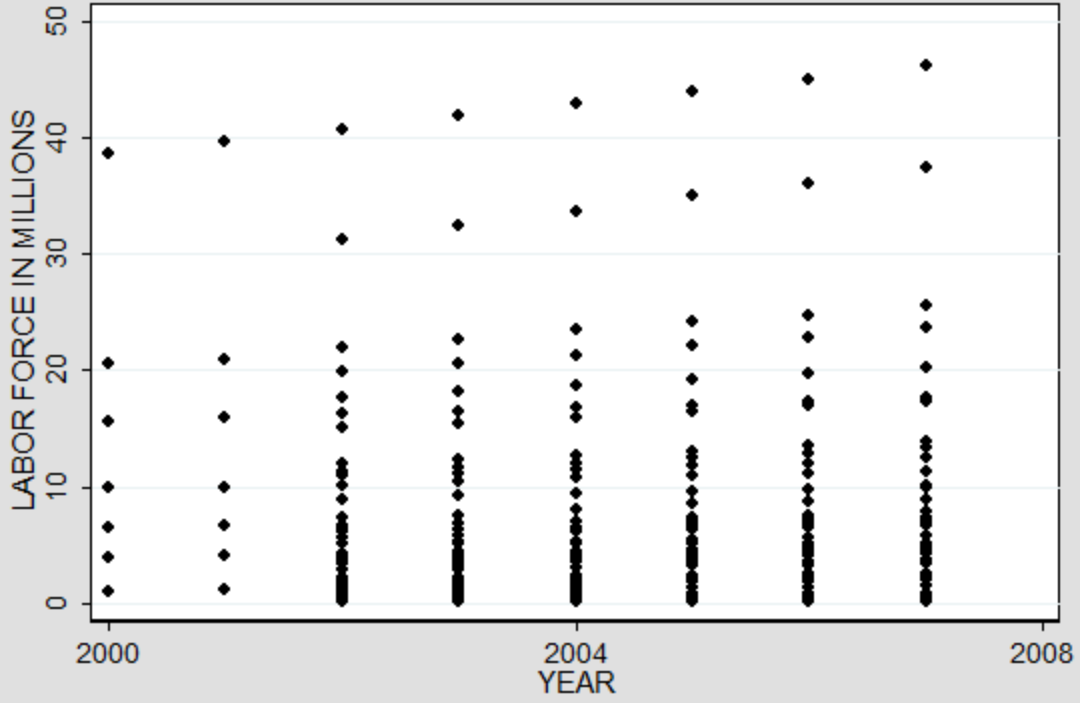
Ethiopia with Netherlands	Gabon with Italy
Gabon with Netherlands	Gambia with Italy
Gambia with Netherlands	Ghana with Italy
Ghana with Netherlands	Guinea-Bissau with Italy
Guinea with Netherlands	Kenya with Italy
Kenya with Netherlands	Lesotho with Italy
Liberia with Netherlands	Liberia with Italy
Libya with Netherlands	Libya with Italy
Malawi with Netherlands	Madagascar with Italy
Mali with Netherlands	Malawi with Italy
Morocco with Netherlands	Mali with Italy
Mozambique with Netherlands	Mauritius with Italy
Namibia with Netherlands	Morocco with Italy
Niger with Netherlands	Mozambique with Italy
Nigeria with Netherlands	Namibia with Italy
Rwanda with Netherlands	Nigeria with Italy
Senegal with Netherlands	Rwanda with Italy
South Africa with Netherlands	Senegal with Italy
Sudan with Netherlands	Sierra Leone with Italy
Tanzania with Netherlands	South Africa with Italy
Togo with Netherlands	Sudan with Italy
Tunisia with Netherlands	Swaziland with Italy
Uganda with Netherlands	Tanzania with Italy
Zambia with Netherlands	Tunisia with Italy
Zimbabwe with Netherlands	Uganda with Italy
South Africa with China, Hong Kong SAR	Zambia with Italy
South Africa with Japan	Zimbabwe with Italy

FIGURES A1-A6: SCATTER PLOTS OF THE VARIABLES IN LEVELS

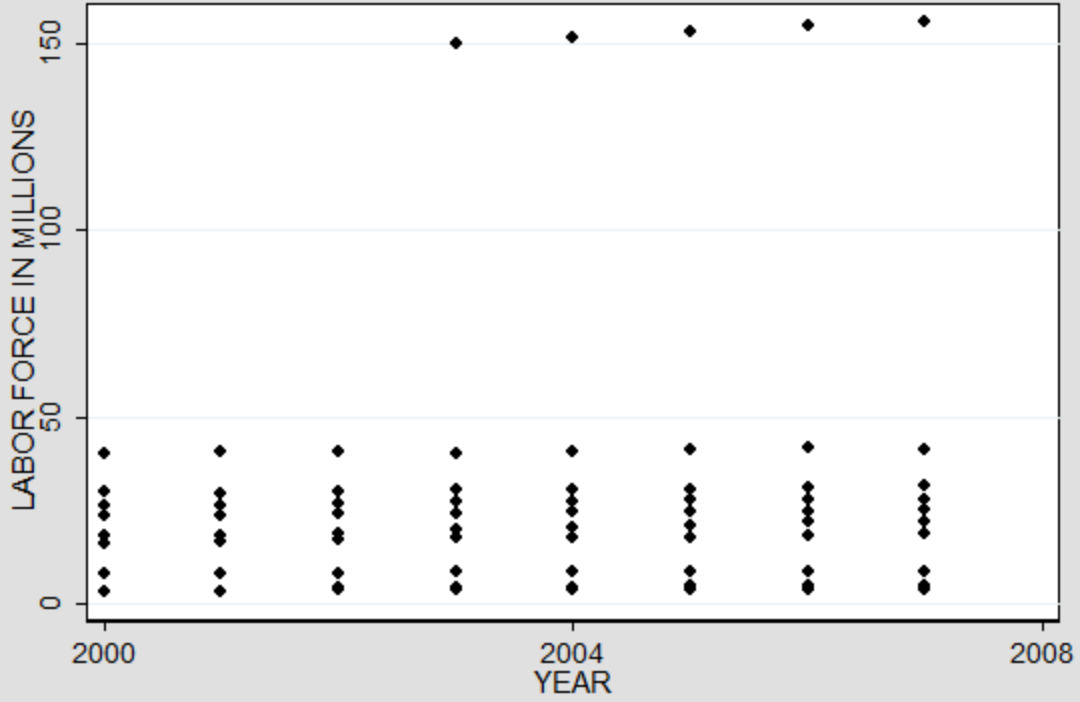




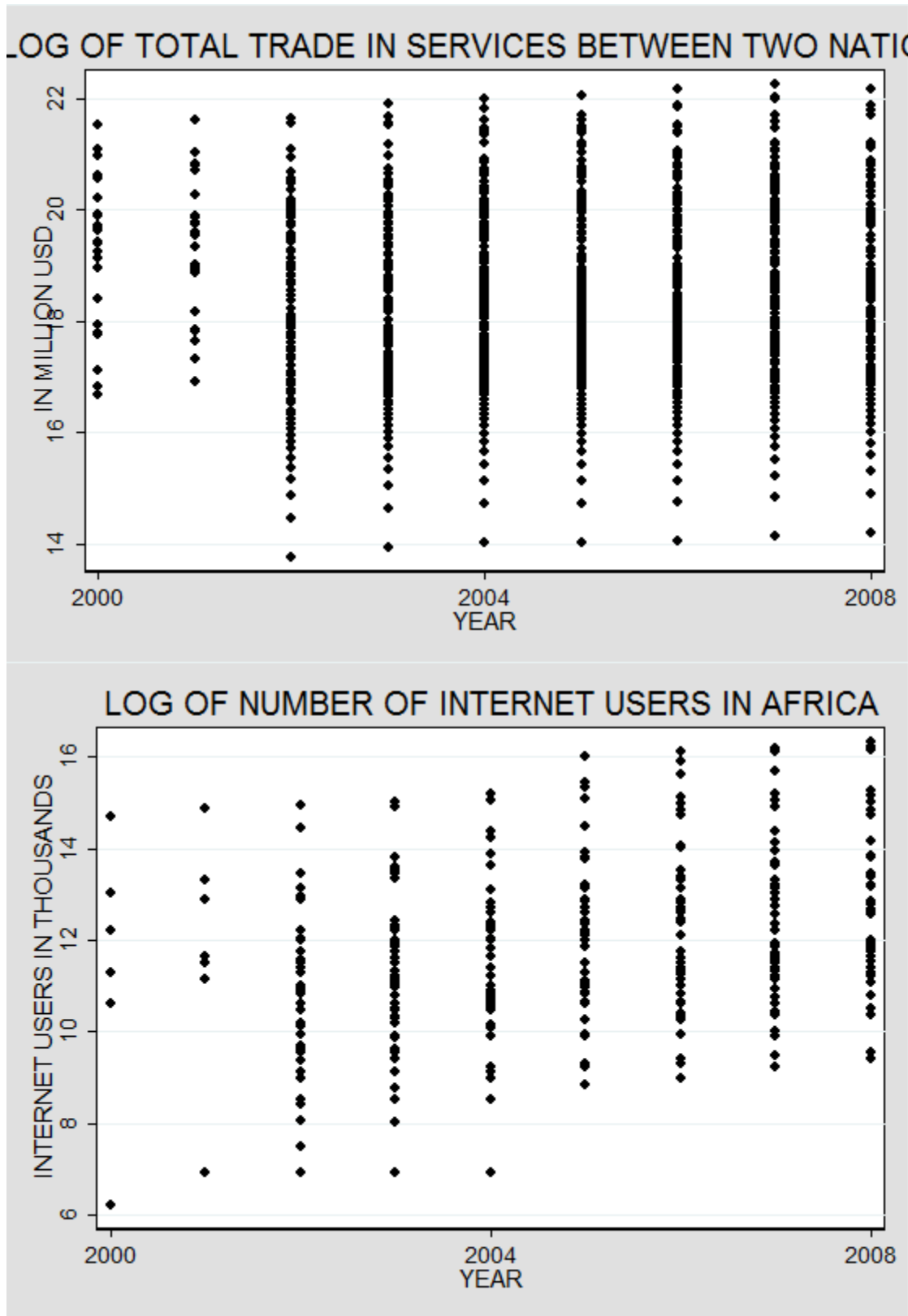
TOTAL LABOR FORCE IN THE AFRICAN NATIONS



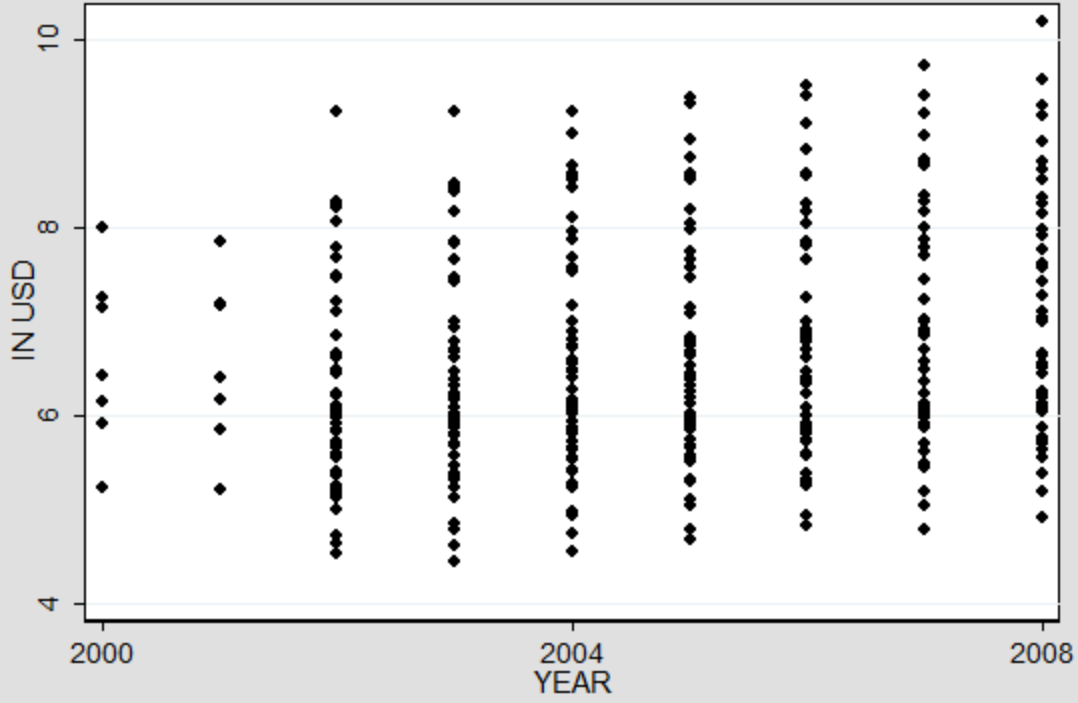
TOTAL LABOR FORCE OF THE TRADING PARTNERS



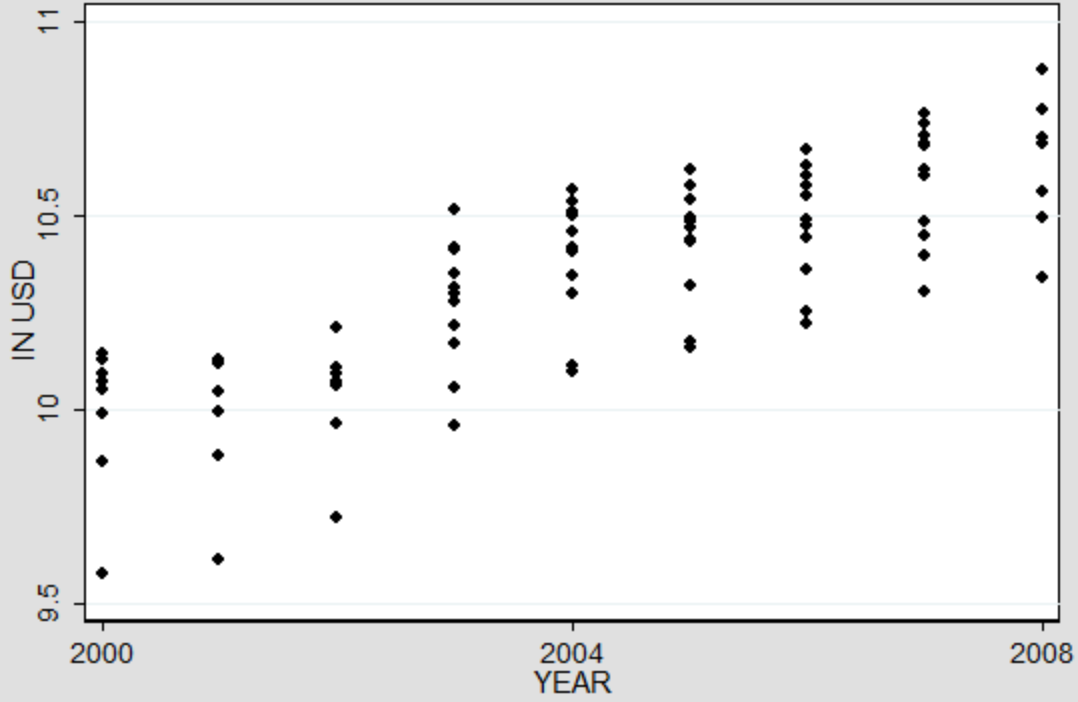
FIGURES A7-A12: SCATTER PLOTS OF THE VARIABLES IN LOGARITHMIC FORM



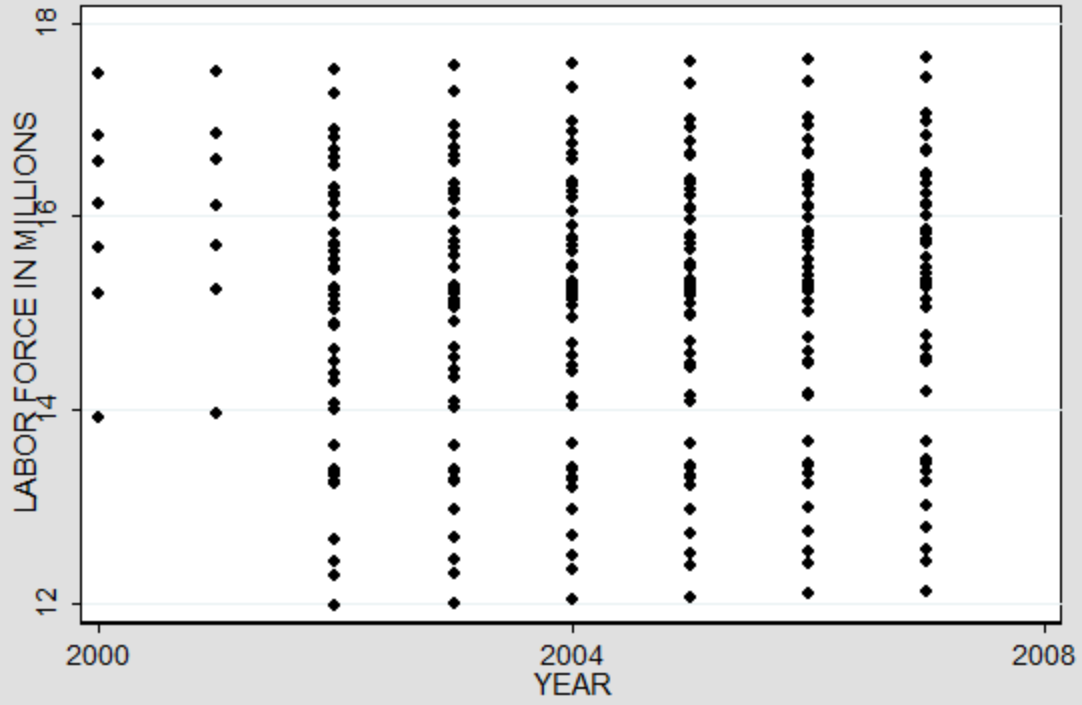
LOG OF GDP PER CAPITA OF THE AFRICAN NATIONS



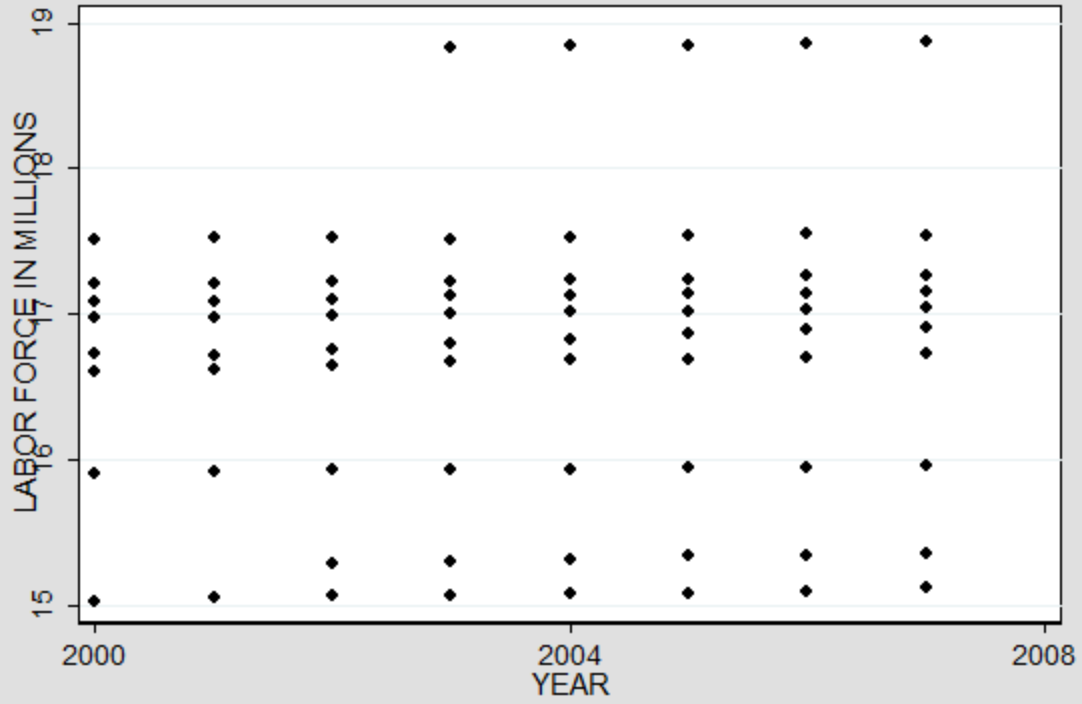
LOG OF GDP PER CAPITA OF THE TRADE PARTNERS



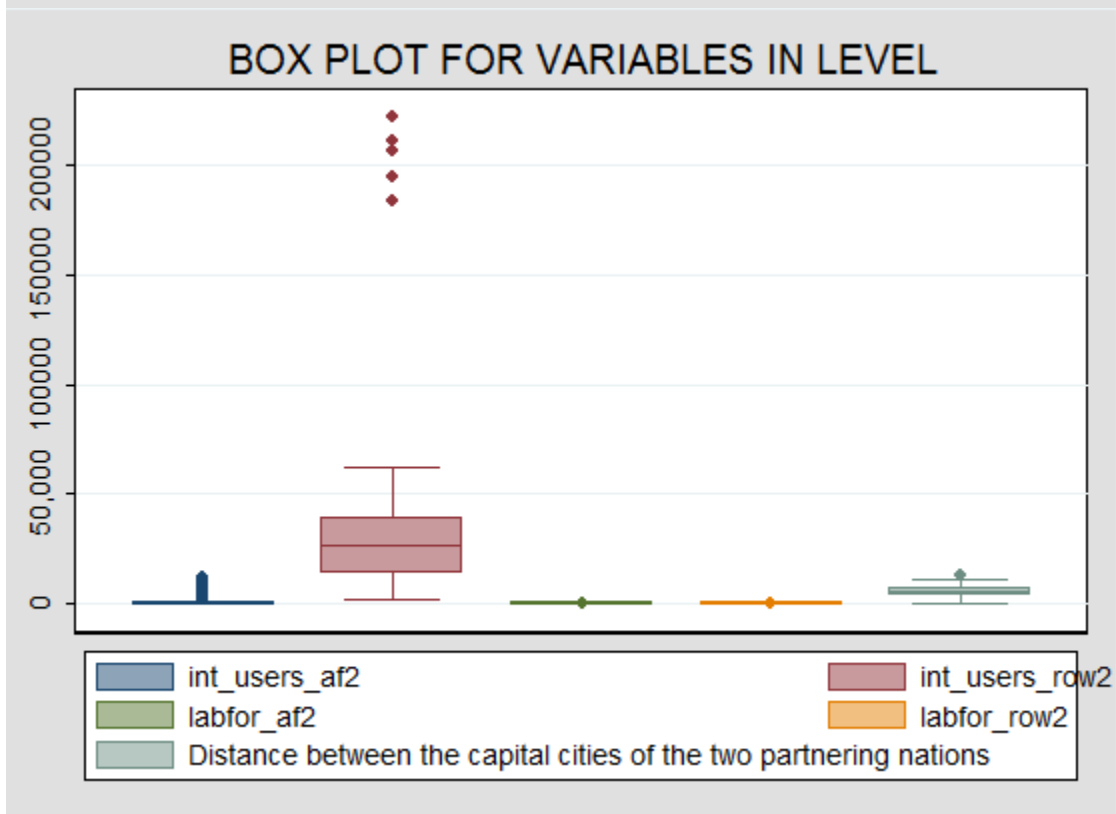
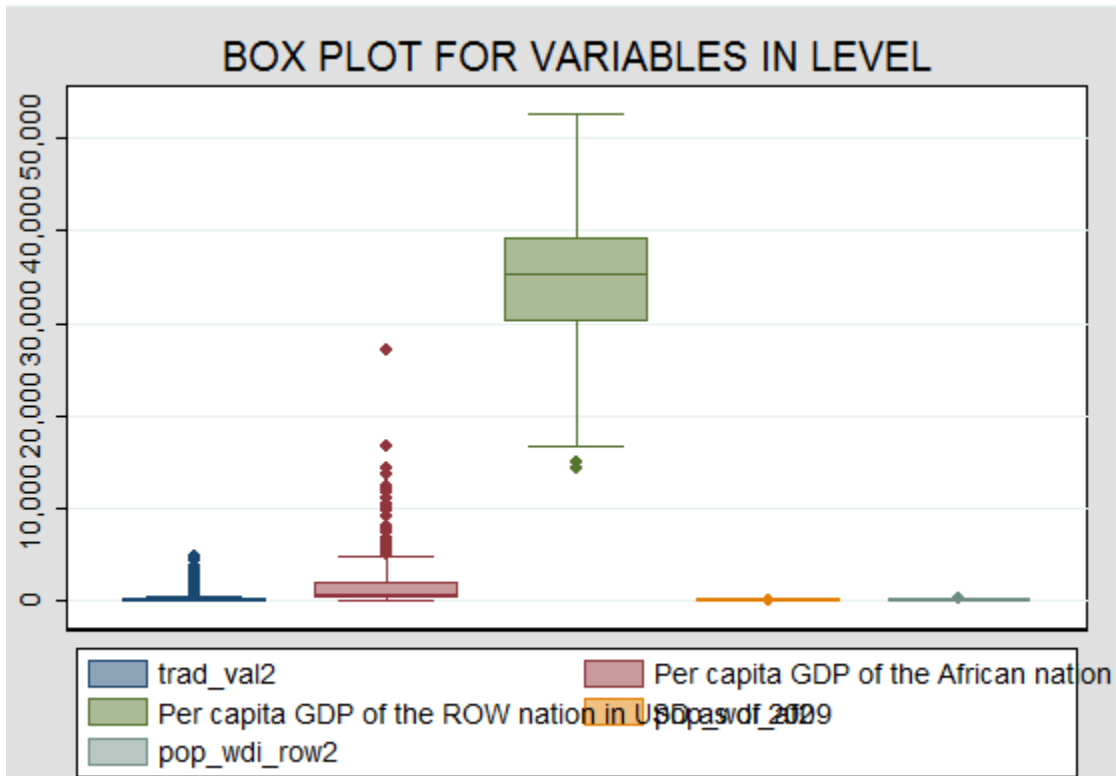
LOG OF TOTAL LABOR FORCE IN THE AFRICAN NATION



LOG OF TOTAL LABOR FORCE OF THE TRADING PARTNE



FIGURES A13 - A14: BOX PLOT OF THE VARIABLES IN LEVELS



FIGURES A15 - A16: BOX PLOT OF THE VARIABLES IN LOGARITHMIC FORM

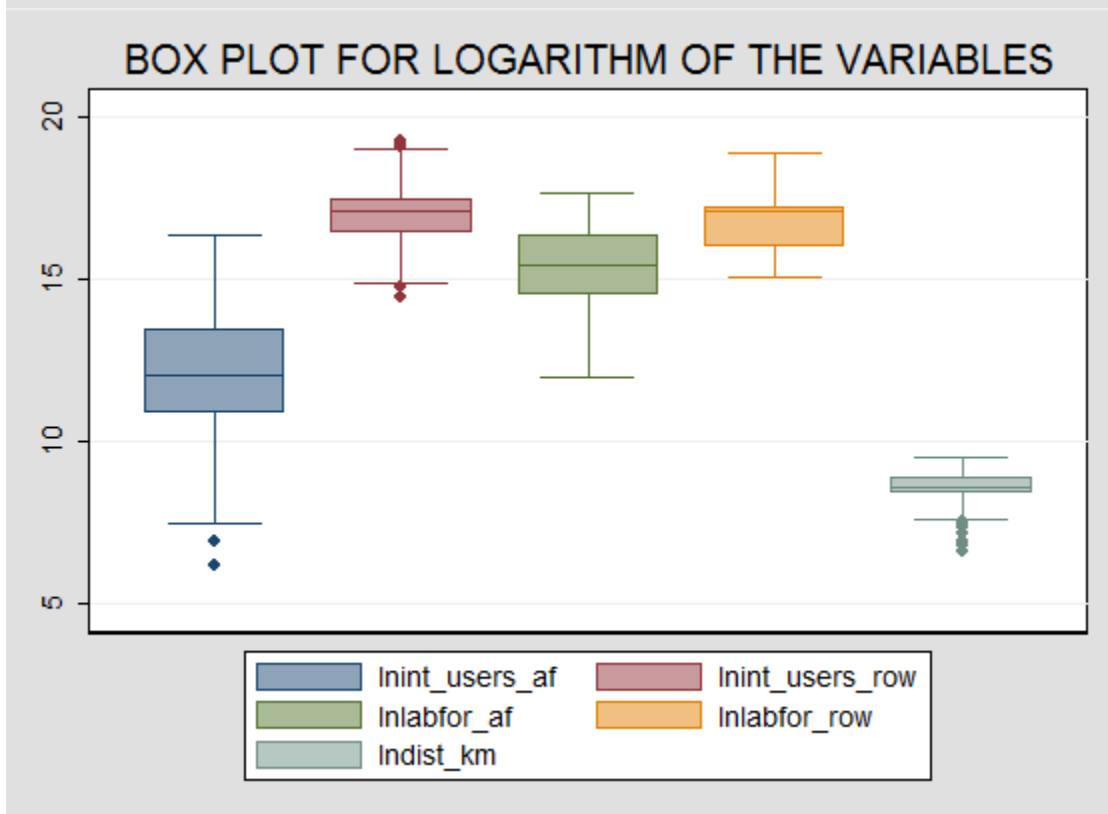
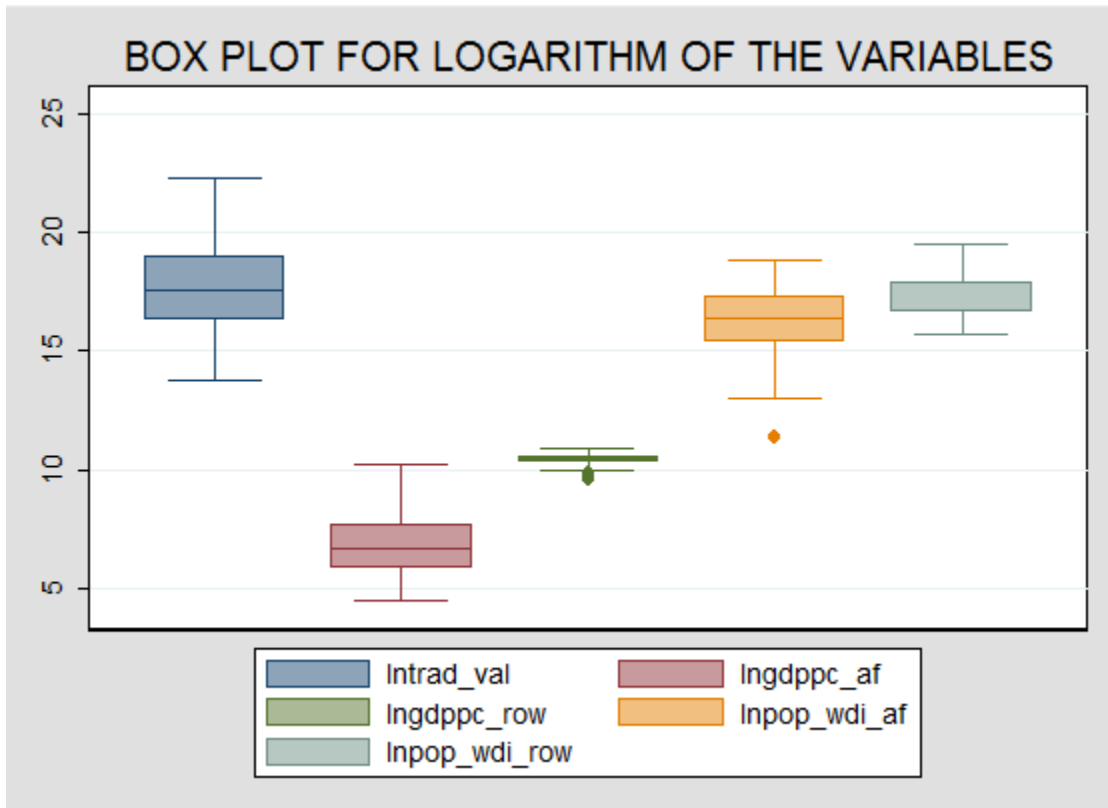


TABLE A3: SUMMARY STATISTICS OF THE LEVEL VARIABLES

	<i>Mean</i>	<i>Standard Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>CV (Variability)</i>
<i>Total trade value</i>	227000000.00	504000000.00	4.28	25.69	2.22
<i>GDP per capita of the Africa</i>	1878.70	2867.72	3.64	22.62	1.53
<i>GDP per capita of the partners</i>	34703.57	6855.42	-0.17	2.53	0.20
<i>Total population of the Africa</i>	24300000.00	29700000.00	2.25	8.67	1.22
<i>Total population of the partners</i>	51700000.00	28000000.00	1.76	20.02	0.54
<i>Total internet users of the Africa</i>	1053627.00	2172156.00	3.12	13.07	2.06
<i>Total internet users of the partners</i>	28900000.00	18500000.00	2.93	27.86	0.64
<i>Total labor force of the Africa</i>	9118338.00	9947835.00	1.78	6.15	1.09
<i>Total labor force of the partners</i>	24000000.00	14000000.00	2.62	27.49	0.58
<i>Exchange rate of the Africa</i>	13443.71	294564.50	22.72	516.99	21.91
<i>Exchange rate of the partners</i>	1.31	6.93	15.78	253.38	5.31

TABLE A4: SUMMARY STATISTICS OF THE LOG TRANSFORMED VARIABLES

	<i>Mean</i>	<i>Standard Deviation</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>CV (Variability)</i>
<i>Total trade value LOG</i>	17.65	1.89	0.11	2.37	0.11
<i>GDP per capita of the Africa LOG</i>	6.78	1.20	0.40	2.37	0.18
<i>GDP per capita of the partners LOG</i>	10.43	0.21	-0.67	3.20	0.02
<i>Total population of the Africa LOG</i>	16.19	1.52	-0.76	3.39	0.09
<i>Total population of the partners LOG</i>	17.56	0.72	-1.00	2.68	0.04
<i>Total internet users of the Africa LOG</i>	12.22	1.93	0.05	2.78	0.16
<i>Total internet users of the partners LOG</i>	16.97	0.71	-0.75	3.22	0.04
<i>Total labor force of the Africa LOG</i>	15.33	1.37	-0.56	2.54	0.09
<i>Total labor force of the partners LOG</i>	16.78	0.73	-0.93	2.79	0.04
<i>Exchange rate of the Africa LOG</i>	4.37	2.43	-0.05	2.72	0.56
<i>Exchange rate of the partners LOG</i>	-0.20	0.45	6.59	64.70	-2.20

**TABLE A5: SKEWNESS/KURTOSIS TESTS FOR NORMALITY (J-B TEST) - FOR
LEVEL VARIABLES**

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	----- joint -----	
				adj chi2(2)	Prob>chi2
<i>Total trade value</i>	1600	0.0000	0.0000	.	0.0000
<i>GDP per capita of the Africa</i>	1600	0.0000	0.0000	.	0.0000
<i>GDP per capita of the partners</i>	1600	0.0069	0.0000	28.04	0.0000
<i>Total population of the Africa</i>	1600	0.0000	0.0000	.	0.0000
<i>Total population of the partners</i>	1600	0.0000	0.0000	.	0.0000
<i>Total internet users of the Africa</i>	1500	0.0000	0.0000	.	0.0000
<i>Total internet users of the partners</i>	1500	0.0000	0.0000	.	0.0000
<i>Total labor force of the Africa</i>	1400	0.0000	0.0000	.	0.0000
<i>Total labor force of the partners</i>	1400	0.0000	0.0000	.	0.0000
<i>Exchange rate of the Africa</i>	1600	0.0000	0.0000	.	.
<i>Exchange rate of the partners</i>	1600	0.0000	0.0000	.	.

**TABLE A6: SKEWNESS/KURTOSIS TESTS FOR NORMALITY (J-B TEST) - FOR
LOG VARIABLES**

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	----- joint -----	
				adj chi2(2)	Prob>chi2
<i>Total trade value LOG</i>	1600	0.0743	0.0000	50.54	0.0000
<i>GDP per capita of the Africa LOG</i>	1600	0.0000	0.0000	.	0.0000
<i>GDP per capita of the partners LOG</i>	1600	0.0000	0.1135	.	0.0000
<i>Total population of the Africa LOG</i>	1600	0.0000	0.0054	.	0.0000
<i>Total population of the partners LOG</i>	1600	0.0000	0.0026	.	0.0000
<i>Total internet users of the Africa LOG</i>	1500	0.4417	0.0552	4.25	0.1192
<i>Total internet users of the partners LOG</i>	1500	0.0000	0.0886	.	0.0000
<i>Total labor force of the Africa LOG</i>	1400	0.0000	0.0000	68.2	0.0000
<i>Total labor force of the partners LOG</i>	1400	0.0000	0.0838	.	0.0000
<i>Exchange rate of the Africa LOG</i>	1600	0.4364	0.0110	7.04	0.0296
<i>Exchange rate of the partners LOG</i>	1600	0.0000	0.0000	.	.

TABLE A7: PRE-ESTIMATION TEST RESULTS

	Calculated Value	Tabulated Value	P-value
Poolability Test	0.45		0.9988
Hausman Taylor Test Fixed Vs Random	11.36	15.09	0.0778
Test for Time Fixed Effects	0.54	13.50	0.7040
Heteroskedasticity	210000.00		0.0000
Serial Autocorrelation	11.973	6.76	0.0007
Hausman Endogeneity Test	8.6	23.20	0.5702