

**GROWTH OF KENYAN EXPORTS WITHIN EAC REGIONAL  
BLOC**

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**DECLARATION**

This research paper is my original work and has not been presented for the award of a degree in any other university.

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This research paper has been submitted for examination with our approval as University Supervisors.

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## **DEDICATION**

This research is dedicated to my daughter to encourage her to always work hard and do her best in all her endeavors.

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## LIST OF ABBREVIATIONS

<b>EAC</b>	-	East African Community
<b>COMESA</b>	-	Common Market For Eastern and Southern Africa
<b>CU</b>	-	Custom Union
<b>FDI</b>	-	Foreign Direct Investment
<b>FTA</b>	-	Free Trade Area
<b>GDP</b>	-	Gross Domestic Product
<b>LDC</b>	-	Least Developed Countries
<b>REC</b>	-	Regional Economic Communities
<b>RTA</b>	-	Regional Trade Areas
<b>SADC</b>	-	Southern African Development Community
<b>SAP</b>	-	Structural Adjustment Programmes
<b>OECD</b>	-	Organization for Economic Cooperation and Development
<b>WTO</b>	-	World Trade Organization

## **ABSTRACT**

This study applied the gravity trade model to evaluate Kenya's benefits from regional trade within the EAC partner states and the role played by each partner country towards the growth of Kenyan exports. A panel data analysis was used to accommodate the time invariant country specific effects and to capture the relationship between the relevant variables overtime. We found the fixed effects model suitable and preferred to the random effects gravity model. The study affirmed the gravity model expectations that National income, population and Distance (proxy for transport costs), are important determinants of bilateral trade. In addition, openness variable was found to be insignificant though it had a positive relation with growth of Kenyan Exports. The results further reveal that Kenya has tremendous trade potential with Uganda, Tanzania and Burundi hence trade should be encouraged in the bloc.

# **CHAPTER ONE**

## **1.0 INTRODUCTION**

Regional trade refers to exchange of goods and services between member countries that come together with a common objective of improving economic growth, through pooling of resources and developing of appropriate trade agreements. The formation of Regional Trade Areas (RTA) is crucial for the Least Developed Countries (LDCs) to open up to the international markets to boost trade since international trade accounts for about 25% of the Gross National Product of the Least Developed Countries. (World Development Indicators, 2012)

The trade among the member states within a region which is considered a Free Trade Area is guided by a free trade agreement aimed at increasing trade between the member countries through elimination of tariffs and import quotas on preferred goods and services traded among them. This implies that member countries belonging to the free trade area trade freely with each other while maintaining trade barriers for non-member countries (Kirkwood 2011).

The East African trade report for 2012, advocates for the establishment of Free Trade Areas within the East Africa Community (EAC) and Common Market for Eastern and Southern Africa (COMESA) regions to encourage increased intra-regional trade leading to increased Government Revenues and improved livelihoods. The increased intra-regional trade may be realized through increased investments in infrastructure, abolishing trade barriers, opening borders and harmonization of customs regulations among others.

RTA's have helped the trading partner States become more competitive by enhancing economies of scale and eliminating the less productive products in the marketplace. Through regional agreements, the trading partner states can set up and make the product value chains stronger and ease technological and knowledge transfer through spillover effects. It also leads to attraction of the foreign direct investments and development of the infrastructure. Thus the expansion of intra-regional trade is important towards encouraging increased economic growth in the EAC. (Mwangi et al 2011)

### **1.1 Historical background of the East African Community**

Free Trade Area is regarded as the second stage towards regional integration by the EAC which involves economic and political cooperation aimed at achieving a common objective of steering economic growth. Regional integration within the EAC began with the Customs union between Kenya and Uganda in 1917 and later joined by Tanganyika in 1927. (EAC Secretariat, 1998). Between 1948 and 1961, these three economies were under the East Africa High Commission while between 1961 and 1967; they were under the East African Common Services organization.

The old East African Community established in 1967 under the treaty of the East African Co-operation served Kenya, Tanzania and Uganda for 10 years and disintegrated in 1977 a time when many of the economic activities were concentrated in Kenya. (EAC Secretariat, 1998), implying unequal distribution of benefits of integration. The Treaty sought to achieve acceptable allocation of the gains of co-operation among the states, but

with minimal success. The Community eventually crumpled in 1977 as a result of numerous drawbacks in the treaty, ideological disparities and increased inequalities. (EAC Secretariat, 1998)

The efforts to revive the community were initiated by EAC Development strategy in 1997-2000. The strategy aimed at avoiding the weaknesses related to the earlier integration initiative. Although there was change within the three countries' economic conditions, Kenya was seen gaining more from integration. (EAC Secretariat, 2001)

The EAC has made significant steps towards the achievement of full free trade within EAC states. The EAC member countries are also members of other regional economic blocs, like the Common Market for Eastern and Southern Africa (COMESA), and Southern Africa Development Community (SADC), leading to overlapped memberships and conflicting interests. Regional market openness would enhance gains from increased trade, economies of scale, efficiency variations as a result of enhanced investment levels, growth and realization of political goals.

The community is faced with a lot of challenges towards the achievement of the objectives key among them is the problem of over reliance on a few primary commodities that include tea, sugar, coffee and hides and skin for trade; though Kenya has an added advantage of exporting Petroleum products, articles of apparel, lime and cement. (EAC Development Strategy 2011/12 -2015/16). Similarly, over reliance on labor as opposed to capital intensive production technologies implies that the products from this region are

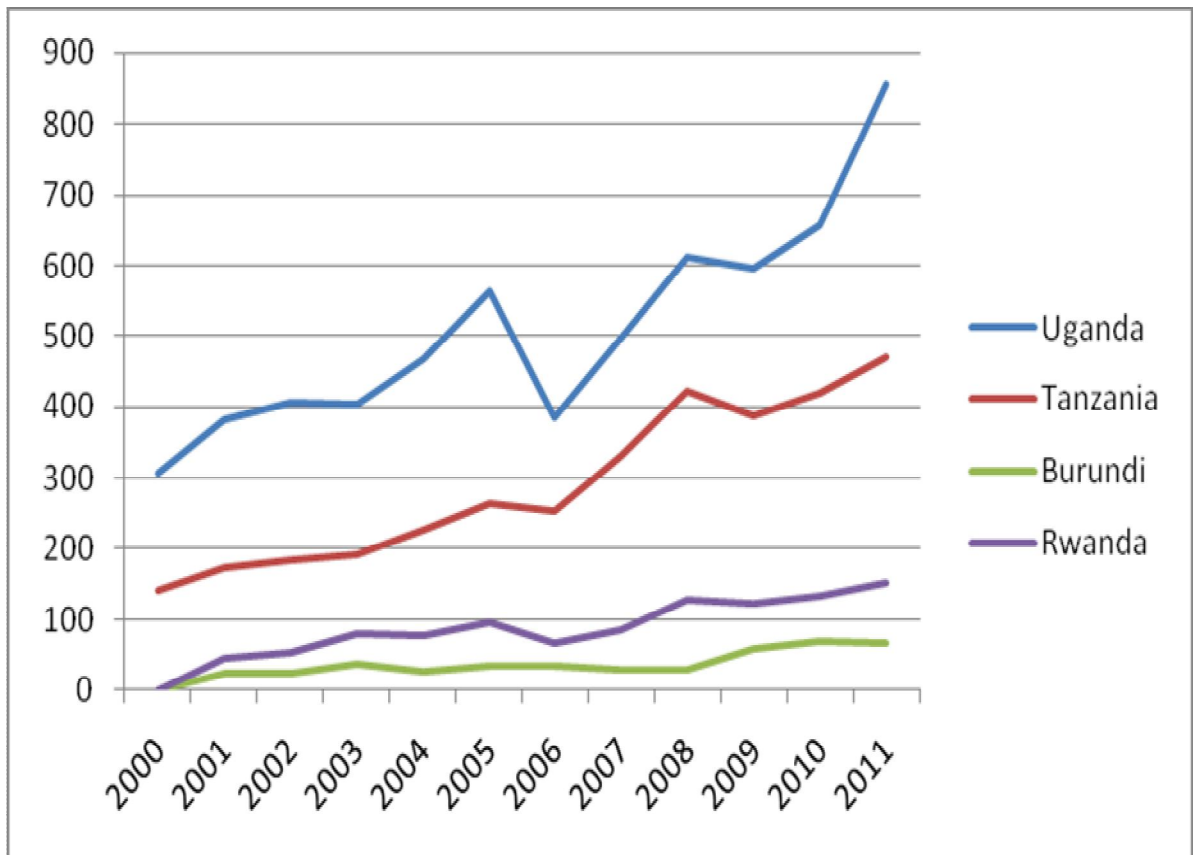
more or less of the same quality thus rendering them less competitive in the international markets.

## **1.2 Intra regional trade between Kenya and EAC**

Kenya's regional trade integration with the EAC sets out to standardize customs systems and tariffs to enable easy movement of people using an external tariff that is common among the members. This sets out to boost trade between them and with a ready market from the combined population that would lead to increased trade. However this has not been the case for Kenya and Uganda, where free trade remains a distant goal due to non-tariff barriers. (Mkenda, 2000)

Figure 1 shows the trend of Kenya's intra-regional exports with East African Community for the period 2000 to 2011 whereby Kenya has been undergoing a continuous and favorable export with the EAC. In 2010, the EAC absorbed 53% of Kenya's total exports while the rest of the world absorbed 24% while Uganda was the leading export destination accounting for 12.7 % of total exports, while Tanzania and Rwanda came in fourth and fifth at 8% and 10% respectively. Overall Kenya's trade value in the region has significantly grown to \$1.52 billion in 2010 from \$1.2 billion in 2008, representing a 26.7% increase.

**Figure 1: Kenya's Regional Exports to the EAC (Million USD)**



Source: EAC Secretariat (2012)

Kenya has not yet fully exploited the opportunities offered by the EAC's integrated market, a problem that is increasingly associated with institutional and regulatory barriers to trade in the region. (EAC Secretariat, 2012)

### **1.3 Problem Statement**

Kenya is a major trading partner within the EAC from inception. The trading partners rely on Kenyan exports within the region but still Kenya's annual GDP growth rates compared to other regions e.g. Uganda, Tanzania and Rwanda is low. Regional trade between Kenya and its border countries has been considered as one of the major drivers

towards economic growth. Policies to promote trade such as reduction of taxes and custom duties were adopted but still the Kenyan economy experiences low economic growth with an annual GDP growth rate of 4.6% for the period 2012 compared to Uganda's 6.7%, 6.9% for Tanzania and 8% for Rwanda. This raises the question as to what factors should be put in place to encourage more growth.

As a result there's need for thorough research on appropriate policy measures that should be put in place to realize Kenya's growth potential in the region. This study thus aims at evaluating the contribution of regional trade within the EAC towards the growth of the Kenyan Economy. The big question remains as to what impact has EAC regional trade contributed to the growth of Kenyan trade.

#### **1.4 Research Questions**

This study sets to answer the following questions:

- What benefit does Kenya derive from trading with the EAC?
- What role do the partner countries play towards the growth of Kenyan exports?
- What policies should be adopted to boost the regional trade?

#### **1.5 Objective of the Study**

##### **General Objective**

The main objective of this study is to examine the trade potentials that Kenya has with the EAC partner states towards the growth of Kenyan economy.



## **Specific Objectives**

- To determine if regional trade has been beneficial to Kenyan growth or not and by what magnitude.
- To determine the role played by each partner country towards the growth of Kenyan exports.
- From the findings of the study, draw conclusions and make policy recommendations on how to enhance economic growth between EAC trading regions.

## **1.6 Justification of the Study**

Kenya's income levels and economic performance are comparatively low as compared to other regions of the world. This has been attributed to many factors among them being lack of effective structures for resource mobilization to enhance trade competitiveness and high trading costs among the neighbours, inability to access the international markets, leading to marginalization. (EAC Secretariat,2008). The EAC partner states are faced with various economic challenges unlike Kenya. For instance, Uganda being a landlocked economy does not have direct access to international markets for trade thus inadequate income from trade, making it reliant to Kenya for imports, yet Uganda's GDP growth rate is higher compared to Kenya. With these setbacks in place the region face the challenge of spurring meaningful growth through trade.

Kenya stands to gain from trading within the region if the appropriate policy measures included in the Vision 2030 blueprint which seeks to address issues like infrastructure

development, promote security, enhanced food security, public private partnerships among others are fully implemented. The country has a vibrant constitution in place aimed at fostering economic freedom and legal framework. Promoting free trade within the region therefore will lead to boosting economic freedom that in turn would lead to investor confidence from the international markets thus boosting trade. The revenue collected from the increased trade would increase the country's income and help the country to overcome the balance of payments problems and spur accelerated growth.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 THEORETICAL LITERATURE**

The role of trade in fostering economic growth has a long history dating back to the classical and neoclassical economists who attached much importance to trade terming it as an engine of growth. Trade plays a critical role towards growth and development especially in the Least Developed Countries (LDCs).

The free movement of goods and services across the EAC partner states is theoretically derived from the Jacob Viner's Theory of Customs Union. (Viner 1950). This theory advocates that a group of countries among which trade takes place freely leads to increased trade in the member countries that in turn spurs growth.

The theory of Free Trade Areas (FTAs) which is largely rooted in the theory of Customs Union encourages abolition of tariff and non-tariff restrictions on trade of goods and services among a group of countries in a given geographical area as is the case with the EAC. FTAs benefits are heavily enclosed in the gains that are expected to emerge from the expanded market. Trade responds easily to the requirements of market demand and supply as a result of free movement of people, goods and services leading to economic growth.

The gravity model derived from the Sir Newton's law of gravity was developed by Tinbergen (1962) addressing the flow of goods, services and movement of people across borders as envisaged in the standard theories of trade. The model advocates that bilateral

trade between two or more countries is highly characterized by the economic masses which include the GDP, Population and Distance. According to the model, trade between two regions is positively affected by the economic sizes and population and negatively affected by the distance which is a proxy for transport costs.

Regional trade within Africa heavily borrows from the principles of the traditional trade theory, which postulates that free trade among two or more countries generally has positive trade effects for the countries concerned and leads to economic growth as developed by Heckscher –Ohlin (1928). Trade takes place when the relative economic sizes are different across the trading countries for instance the real Gross Domestic Products for the EAC partner states. International trade theory on the other hand, analyzes the performance and role of trade towards the growth and development of a given nation.

Krugman (1991) and Krugman and Venables (1995) models of economic geography give insight into the changing geographical location of production in East African Community. Krugman and Venables, (1995) advocated that various levels of transport costs (taken as distance in this study) and access to the market (which is openness to trade in this study) are important determinants to increased trade. A decline in transport costs implies access to a wide range of cheap intermediates thus firms may relocate to larger markets where intermediates are readily available. The population of the EAC partner states acts as the market to absorb volumes of trade.

## **2.2 Empirical Literature**

The Empirical evidence on the effects of Regional trade area on growth remains disputed. There is no consensus whether countries grow because they export or whether are they able to export because they grew (Rodrik, 1999). Thus this section will be divided into two, those supporting trade leads to economic growth and those that support otherwise.

### **2.2.1 Literature Supporting Regional Trade leads to Economic Growth**

Te Velde and Bezemer (2008), estimated a Regression model for the UK and US trading region for the period 1980-2000 and found that membership to a trading region significantly leads to increased trade. The size of a country's economy within a region is important in promoting trade that spurs economic growth and therefore countries within the region can expect a larger increase in trade volumes as a result of joining than those of countries that have not joined. This relates to the case of the EAC whereby the economic size of the Kenyan economy is the largest thus the need to find out whether Kenya benefits from the EAC regional trade.

Dollar (1992) estimated a cross-country index for 95 developing countries in the period 1976- 85. The index is used to determine if a country is outward or inward oriented. Based on estimations for 95 and concluded that more outward oriented countries grow faster. The rigorous measure of openness to trade in developing countries, distinguish the study and thus this study would incorporate openness to trade within the EAC to evaluate its impact in the region.

Levine and Renelt (1992) used cross-country regression analysis for 84-86 countries for the period 1960-1989 using gravity model. They found that free international trade

indirectly affects growth. Countries that have low trade barriers invest more and therefore grow faster. This result is robust to different specifications and to different indexes of openness. Since the EAC partner states have adopted free trade then this would imply that the community should also grow faster from trading with each other.

Musila (2005) used a gravity model for the period 1991-1998 on the effects of joining Free Trade Areas in the ECOWAS, COMESA and ECCA regions and found out that economic size, population and distance are important determinants of flow of international trade. Coulibaly (2004) established that six ECOWAS member countries experienced increased exports that led to income growth after joining the REC, largely attributed to reduced intra-regional tariffs thus encouraging free trade. This study aims at finding out if the same would apply to the EAC region since the study would adopt the population of the member states as a proxy for the market.

Bergstrand (1985) looks at trade flows for sixteen industrialized countries for nine different industries during the period 1965, 1966, 1975 and 1976 using gravity model. The variables used were GDP, GDP per capita, distance and trade agreements. The results indicated that there exists a positive relationship between GDP, GDP per capita, population and trade flows (exports and imports), while distance negatively affects the trade flows.

Ben-David (1993) used a cross- section analyses to show that open economies trade more and that the free trade of the European Union have resulted in the increased incomes for the member countries. Ben-Davids work shows that the only economies that grow are

those that are open to the world economy through trade thus emphasizing the need to include openness as a variable that determines trade growth.

Zarzo, I.M. et al (2003), adopted a gravity model to evaluate trade potential between two trading blocs (the EU and Mercosur) for the period 1996-99. Panel data analysis was used and they found out that fixed effects model was preferred to the random effects model in interpreting the results.

Sachs and Warner (1995) also confirmed Zarzo, et al (2003) by constructing a dummy variable of openness based on five protection dimensions, including tariff and nontariff barriers, black market premium, and the role of the state in the economy. Using this index they found that open economies grow on average 1.5 percent faster than closed economies and that unconditional convergence is true only for open economies.

EAC regional trade has had a positive impact on members' intra-regional exports. This was found in a much more comprehensive study by Coulibaly (2009) with a view to evaluating trade effects of developing RTA which focused on 22 RTA from all continents and used a two-steps estimation approach. The findings showed a negative relationship between distance and bilateral trade flows while higher GDP induced higher trade.

### **2.2.2 Studies that are indifferent**

Brada and Mendez (1988) using cross country growth regressions failed to find a positive association between Regional Trade Area and growth on 20 LDCs over the quarterly period of 1973-98.

Sheila Page (2000) evaluated regionalism and regional Integration in Africa for the SADC region during the period 1990-96 using gravity model. The variables used include Geography, population, economic size (GDP), political instability and common background. The findings indicate that belonging to a region as opposed existing international systems does not necessarily affect growth.

The benefits of a regional trade area may not be evenly spread among members of a region. Ethier (1998), argued that small developing economies forms regions depending on incentives that encourage trade away from other members as is the case with the EAC. While Venables (1999) using a production function for 33 firms and 14 EU countries during the 1980-97 period argued that countries with a comparative advantage closer to the world markets do better in a region than for the countries that are at the extreme position. This might apply to Kenya and Tanzania since Kenya has proximity to the world markets through the ports as opposed to the other EAC member states that rely on international products that passes through Kenya first.

Jones (1995), performed time series tests of endogenous growth models to examine the growth rate of 14 OECD countries for the period 1900-1987 on the properties of per capita GDP growth and using the ADF test found the growth rates to be stationary. This implied nothing major in these countries had a large impact on the growth rate.

Vamvakidis (1998) estimated panel data regressions over 1970-90 on 35 developing countries and finds out that open economies grow faster and that economies that have large and open neighbours experience faster growth though the rate of growth of the neighbouring countries has insignificant effect on the growth rate of a country. This



implies that a country may be leading in terms of the economic size as the case of Kenya within the EAC region but when it comes to the growth rates the other partner states are leading.

In Africa, there are a number of empirical studies that have employed the gravity model in analyzing the impacts of regional trade. A bilateral study of trade flows within COMESA by Alemayehu and Hale (2002) shows insignificant effects of regional groupings which according to them could be explained by conventional gravity model on the standardized variables involved. Whereas Sheila Page (2000) disagrees with this and states that belonging to a trading region does not necessarily encourage trade.

### **2.2.3 Overview of the Literature**

Several studies have confirmed that countries which are member states to one or more RTAs experience recognized economic growth through increased volumes of trade between the trade partners due to reductions in the trade barriers and the spillover effects. (Dollar,1992).

Having analyzed the EAC as a regional trading area for Kenya, we find that Kenya is the major trading partner in the bloc (EAC Secretariat, 2012). However no comprehensive studies have been conducted to evaluate the effectiveness and impact of the trading partners towards Kenya's trade improvement in the bloc. Thus this study aims at improving on the standardized variables of the gravity model by bringing in the element of openness to trade and find out if the empirical findings would apply Kenya within the EAC trading bloc.

## CHAPTER THREE

### METHODOLOGY

#### 3.1 Theoretical Framework

Regarding the methodology used in most previous empirical studies on the effects of regional integration on economy, such as Endes and Hum (1994), Mkenda(2000), Buigut and Valer (2004) and Falagiarda(2010), among others, employed positivist quantitative methodology including the use of applied general equilibrium (AGE), Vector auto regression (VAR) model, gravity models and cointegration analysis.

The AGE, VAR and cointegration analysis models suffer from the problem of identification which cannot be solved by a purely statistical tool, since it's difficult to differentiate between correlation and causality, thus these methodologies combine the effects of shocks and responses. Using regional integration as a dummy variable the gravity models are mis-specified from an econometric point of view; which leads to incorrect interpretations of the dummy regional variables and improper economic inference. (Helpman, 1998)

The Gravity Model has been widely used since the 1940's to address movement of goods, services and production factors like human capital under varying conditions. This dates back to Helpman (1998), who discussed the importance of the model concluding that identifying factors that influence the flow of trade between two trading partners is important towards establishing a growing economy between the trading blocs.

Although the trade theories tend to justify why some partner nations' trade in particular goods and services, they fail to address the issues on why the trade links in some

countries may be stronger as opposed to others and reasons as to why the volume of trade between the partner countries tend to fluctuate with time. This is a major setback with the theories of trade towards explaining the volumes of trade among nations. This disadvantage is therefore overarched by the gravity model which successfully addresses the issue by allowing various factors of trade to be considered in explaining the patterns of international trade flows. (Paas, 2000)

The Gravity Model takes the functional form:

$$F_{ij} = G (M_i^{\beta_1} M_j^{\beta_2} / D_{ij}^{\beta_3}) \dots\dots\dots(\text{Equation 1})$$

Where:

$F_{ij}$  represents attractive forces

$M_i$  and  $M_j$  represent the masses

$D_{ij}$  represents distance between the two regions

$G$  is a constant of proportionality

Various empirical studies among them Tinbergen (1962) used the gravity model to address the flow of trade towards economic growth in international economics, aimed at finding out the usefulness of RTAs on trade creation and trade diversion. The model advocates for use of national income given by the GDP, the population and economic distance as the main variables used to measure the flow of exports among countries. The multiplicative form of the model then becomes:

$$\text{Trade}_{ij} = A.(GDP_i.GDP_j)^\beta / \text{Distance}_{ij}^\alpha \dots\dots\dots(\text{Equation 2})$$

Where;

Trade<sub>ij</sub> - represents volume from country i to country j

GDP<sub>i</sub> and GDP<sub>j</sub> - represent the national incomes for country i and j respectively

Distance<sub>ij</sub> - represents the economic distance between the capital cities for country i and j

A - represents a constant of proportionality

We therefore take the natural logs of equation 2 to obtain a linear relationship between the variables as follows:

$$\ln(\text{Trade}_{ij}) = A + \beta_1 \ln(\text{GDP}_i \cdot \text{GDP}_j) + \beta_2 \ln(\text{Distance}_{ij}) + \varepsilon_{ij} \dots\dots\dots(\text{Equation 3})$$

Where  $\beta_1$  and  $\beta_2$  are the estimated coefficients while  $\varepsilon_{ij}$  is the error term that would capture any other factor that affects the trade flows between the trading countries.

### **3.2 Empirical Framework**

This study sets to measure potential of trade between Kenya and East African Community towards the economic growth by using the Gravity Model. Most of the empirical studies advocated for use of total bilateral flows as the dependent variable though Cernat (2001) advocates for the use of bilateral export flows arguing that using total bilateral trade, one may not distinguish the effects of RTAs on exports from other counties that are not member states on a given pair of member states. Therefore this study will adopt the use of exports from Kenya to other countries as a proxy to total bilateral trade.

The Gravity model used in this study would take the form;

$$X_{ij} = \beta_0 \text{GDP}_i^{\beta_1} \text{GDP}_j^{\beta_2} \text{Pop}_i^{\beta_3} \text{Pop}_j^{\beta_4} \text{D}_{ij}^{\beta_5} \dots\dots\dots \text{(Equation 4)}$$

Taking natural logs we get the estimated Gravity model as:

$$\ln X_{ij} = \beta_0 + \beta_1 \ln \text{GDP}_i + \beta_2 \ln \text{GDP}_j + \beta_3 \ln \text{Pop}_i + \beta_4 \ln \text{Pop}_j + \beta_5 \ln \text{D}_{ij} + \varepsilon_{ij} \dots\dots\dots \text{(Equation 5)}$$

Where;

$X_{ij}$  represents total exports from country i to country j

$\text{GDP}_i$  represents the GDP for country i

$\text{GDP}_j$  represents the GDP for country j

$\text{Pop}_i$  represents the population for country i

$\text{Pop}_j$  represents the population for country j

$\text{D}_{ij}$  represents the economic distance between country i and country j as a proxy for transport costs

Incorporating openness into the equation gives us an augmented gravity model. The model is then specified as follows:

$$\ln X_{it} = \beta_0 + \beta_1 \ln \text{GDP}_{it} + \beta_2 \ln \text{GDP}_{jt} + \beta_3 \ln \text{Pop}_{it} + \beta_4 \ln \text{Pop}_{jt} + \beta_5 \ln \text{D}_{it} + \beta_6 \text{Open}_{jt} + \varepsilon_{ij} \dots\dots\dots \text{(Equation 6)}$$

Where:

$X_{it}$  represent the trade exports from country i to country j

$\text{Open}_j$  represent country j's openness to trade

$\varepsilon_{ij}$  represents the error term

The subscript  $t$  in the model has been used to indicate the time element.

### **3.2.1 Data Sources and Type**

The study adopted panel data estimation technique for the period 2000- 2011 using secondary data. The data on GDP and Population was obtained from the World Development Indicators, database of the World Bank. Data on EAC bilateral exports of goods and services (country  $i$ 's exports) to other countries (Country  $j$ ) were obtained from the Direction of Trade Statistics Yearbook (2013) of IMF. Data on Distance (in miles) between the partner countries was obtained from d'Etudes Perspectives et d'Informations Internationales (CEPII), while data on openness were collected from the Penn World Tables.

### **3.2.2 Explanatory Variables and their expected relationship with the dependent Variable**

The Economic Distance between the two trading countries was measured in kilometers between the capital cities. A negative relation is expected between distance and the volumes of trade between the trading partners. This is because an increase in distance leads to increase in the transport and transaction costs which are important factors of trade. According to Paas (2000), different trade models may behave differently in the presence of demand and transport costs across countries, thus, distance between a given pair of nations determines the flow of trade between them. The transport costs are categorized depending on the time-related costs, physical road costs or costs of the unfamiliarity (Frankel, 1997). Distance is measured in Miles.

Real GDP<sub>i</sub>, and real GDP<sub>j</sub>, represent the economic size of the trading countries which is positively related to trade and their coefficients are all expected to be positive. The bigger a country's National income in terms of GDP, the larger the flow of trade volumes traded between the trading partner states. Therefore using economies of scale and product differentiation, the flow or volume of trade will depend on the size of the country in terms of GDP (Paas 2000). For the estimated model, we have used constant GDP (in 2000 US dollars).

The larger the country is in terms of its GDP, the larger the number of varieties of goods and services offered for trade. The more similar the countries are in terms of GDP the larger is the volume of this bilateral trade. Thus with economies of scale and differentiated products, the volume of trade depends on country size in terms of GDP (Paas 2000).

Openness refers to the accessibility to the trading partner country obtained by the Trade GDP-ratio and it is positively related to trade hence the coefficients for Open<sub>j</sub> are expected to be positive. The more open the countries are, the greater would be the trade between them. Since the model is being estimated using panel data this variable is considered for country j only. Kenya's trade-GDP is not considered as there is no variation of this variable when estimation is performed.

Pop<sub>i</sub> and Pop<sub>j</sub> are the population of the respective countries which would depend on the magnitude of absorption capacity and economies of scale thus could have either a negative or positive effect on trade.

The dummy for country specific contribution has been included in equation 6 to capture official communication language. A common language between trading partners is expected to reduce the costs of transacting since understanding each other speeds up the negotiation process. This in turn increases the trade between the trading partners. Therefore, if two trading partner states share a common language, the dummy is equal to one and otherwise zero. This variable is expected to have a positive effect on trade.

### **3.2.3 Estimation Techniques**

The two techniques that are used to analyze panel data are Fixed effects and Random effects techniques, which are obtained after conducting the Hausman test to evaluate whether to use the fixed effects model or the random effects model. In order to capture the time invariant country specific effects, a panel data analysis is encouraged. Distance is considered time invariant, thus adopting the panel data analysis.

#### **Fixed – Effects**

Fixed effects model is generally adopted when the study intends to analyze the effects of variables that change over with time. The model gives the relationship between the parameters and the specific variables within an entity for example a country. The assumption made in adopting this model is there could be something within the parameters that would have effects on the variable results.

In addition the Fixed effects model assumes uniqueness within the time invariant variables which should not have a correlation with the other individual characteristics.



Each variable is considered different and thus the variables error term and constant should not be correlated with the others. In case there exists a correlation between the error terms; the FE model would be unsuitable.

Therefore the equation to test for the fixed effects model is specified as:

$$Y_{it} = \beta_1 X_{it} + \alpha_i + u_{it} \dots\dots\dots 7$$

Where

$\alpha_i$  ( $i=1 \dots n$ ) is the unknown intercept for each entity (n entity-specific intercepts).

$Y_{it}$  represents variable where  $i$  = entity and  $t$  = time.

$X_{it}$  is the independent variable,

$\beta_1$  represents the coefficient for independent variable,

$u_{it}$  is the error term

**Random-effects model (random intercept, partial pooling model)**

The underlying principle behind use of the random effects model is that the variation across variables is assumed to be random and not correlated with the independent variable in the model unlike in the fixed effects model. (Greene, 2008)

The random effects model can be specified as:

$$Y_{it} = \beta X_{it} + \alpha + u_{it} + \varepsilon_{it} \dots\dots\dots 8$$

Random effects assume that the entity's error term is not correlated with the predictors which allows for time-invariant variables to play a role as explanatory variables.

### **Choosing between Fixed and Random: Hausman test**

In order to choose between the random and fixed effects, a Hausman test is conducted with the null hypothesis advocating for use of random effects as opposed to the fixed effects (Greene, 2008). This basically tests whether the error term is correlated with the regressors'. The null hypothesis states that they are not correlated. Therefore we ran both the fixed and random effects models and perform the Hausman test.

## **CHAPTER FOUR**

### **DISCUSSION OF THE RESULTS**

#### **4.1 Introduction**

The aim of this study was to investigate whether regional trade contributes significantly to Kenyan economic growth. This section presents the descriptive data of the chosen variables that play key role on the growth of exports that in turn stimulates economic growth. The section presents findings from descriptive statistics, correlation matrix and finally the regression findings.

#### **4.2 Descriptive Statistics**

Table 1 presents the tests for normality of the variables using the mean and standard deviation. Skewness characterizes the degree of asymmetry of a distribution around its mean with positive skewness indicating a distribution with an asymmetric tail extending towards more positive values and negative skewness indicating a distribution with an asymmetric tail extending toward more negative values.

Kurtosis on the other hand indicates the relative peakedness or flatness of a distribution compared with the normal distribution. Positive kurtosis indicates a relatively peaked distribution and negative kurtosis indicates a relatively flat distribution.

**Table 1 Descriptive statistics**

Variable	Obs.	Mean	Std Deviation	Min	Max	Kurtosis	Skewness
Exports <sub>ij</sub>	260	15.94094	2.9136	0	20.2175	8.4646	-1.5333
Real GDP	260	22.5656	1.0904	20.7264	23.96591	1.63886	-0.42995
Population	260	16.8264	0.6952	15.7137	17.6821	1.3335	-0.35976
Distance	260	6.3399	0.5572	4.9135	6.97757	4.59159	-1.47867
TradeOpenness	260	44.4685	16.47	18.73	65.3414	2.29045	0.48701

Source: Authors computations from STATA regression results

### 4.3 Correlation Results

The correlation matrix on table 2 shows that the variables depict both positive and negative correlation. From the table, real GDP and population for the exporting country, distance and openness depicts a positive correlation with exports while population and real GDP of the importing country has a negative correlation with the imports from country i.

**Table 2 Correlation Matrix**

	lnexports <sub>ij</sub>	lngdpi	lngdpj	lnpopi	lnpopj	Indist	Openness
Exports <sub>ij</sub>	1.0000						
Real GDP <sub>i</sub>	0.7401	1.0000					
Real GDP <sub>j</sub>	-0.0389	-0.1988	1.0000				
Population <sub>i</sub>	0.7122	0.9745	-0.2036	1.0000			
Population <sub>j</sub>	-0.0793	-0.2036	0.9745	-0.2186	1.0000		
Distance	0.0653	0.3281	0.3281	0.3615	0.3615	1.0000	
Trade Openness	0.0758	-0.1161	0.7997	-0.1153	0.7229	0.2067	1.0000

Source: Authors computations from STATA regression results

#### 4.4 Regression Results

Before running the econometric tests and drawing out conclusion from the findings, this section inspected the data using the pooled OLS, fixed and random effects model to determine which model is most appropriate to the study. The table 3 presents results from the models for comparative purposes. The Variable Distance was omitted in the fixed effects model because of its invariant nature. Table 4 presents the econometric estimation results of equation 6 for the period 2000 to 2012.

**Table 3 Results of the Extended Gravity Model for EAC regional trade**

Variable	Ols	Fixed effects	Random effects
Real GDP <sub>i</sub>	2.277226* (0.4687759)	7.742644* (1.369046)	4.03571* (0.821384)
Real GDP <sub>j</sub>	1.178972** (0.064737)	2.209886*** (1.437055)	2.382623** (0.9067822)
Population <sub>i</sub>	0.064737**** (0.7603882)	2.235313**** (4.847093)	-2.624216*** (1.402941)
Population <sub>j</sub>	-1.287702**** (0.8265651)	-14.60816** (4.83313)	-2.925538** (1.445695)
Distance	-1.436703* (0.2500099)		-1.296872** (0.5585226)
Openness	0.0181551**** (0.0123095)	0.0040275**** (0.0124257)	0.0033804**** (0.0120156)
Constant	-33.17096* (5.738718)	-0.6321807**** (26.08301)	-27.43838** (11.50251)
N	260	260	260
R <sup>2</sup>	0.6388	0.3396	0.6211

Legend: \* p<0.01; \*\* p<0.05; \*\*\* p<0.1; \*\*\*\* p not significant at either of the levels: Robust Standard Errors in brackets.

**Table 4: Results of the country specific contributions**

<u>lnexportsij</u>	<u>coefficient</u>	<u>Standard Errors</u>
Kenya-Burundi	3.178027*	0.7074438
Kenya-Rwanda	4.472734*	0.7074438
Kenya-Tanzania	5.535453*	0.7074438
Kenya-Uganda	5.907237*	0.7074438
Rwanda-Kenya	0.3210274****	0.7074438
Tanzania-Kenya	3.421438*	0.7074438
Uganda-Kenya	4.473347*	0.7074438
<u>cdmy</u>	<u>4.473347</u>	<u>0.7074438</u>

N=104  $R^2 = 0.6855$

Legend: \*p<0.01; \*\*p<0.05; \*\*\*p<0.1; \*\*\*\*p not significant at either of the levels

#### 4.5 Discussion of the Results

Tables 3 and 4 present estimated results of the augmented gravity model for the period 2000 to 2012. Table 3 shows the estimated results for pooled OLS, fixed and random effects models while Table 4 shows estimated results for country specific contributions.

The standard variables of the gravity model are expressed in natural logarithms therefore interpreted as elasticities apart from the dummy variable that shows the contribution of each partner states towards the growth of Kenyan exports. Generally, it is evident that the economic masses variables have the expected signs and a significant p-value apart from population of the importer countries and openness. The estimated coefficient of GDP for the exporting country (Kenya) indicated that a 1% increase in Kenya's GDP would result to a 2.28%, 7.74% and 4.03% increase in the Kenyan exports as indicated by the OLS, fixed and random effects models respectively, while the coefficient GDP for the partner

country indicates that a 1% increase in partner country income will result to a 1.18 %, 2.21% and 2.38% increase in demand for imports from Kenya as indicated by the OLS, fixed and random effects models respectively. This confirms the Gravity Model expectations that the economic masses (GDP) should be positively related to bilateral trade which increases the trade potential. This concurs with the studies by Musila (2005), and Bezemer (2006), who found out that the economic size influences positively trade in that the higher the GDP the higher the demand for imports.

Based on the fixed effect results, the EAC partner countries GDP is not statistically significant in increasing Kenyan exports potential that would spur growth. This finding confirms the empirical findings by Vamvakidis (1998), who concluded that countries bordering high income partners experience faster growth though the growth rate of neighboring economies has no significant impact on a country's growth rate.

Population coefficient is strongly significant at 5% significant level for the random and fixed effects results, which then suggests that the Kenyan exports are greatly influenced by the changes in the trading partners' population. This indicates that a 1% increase in population of EAC member states would lead to a decrease in the Kenyan exports by 14.6% and 2.9% from the fixed and random effects results. Theory predicts a positive or negative coefficient for this variable depending on the absorption level of the market capacity.

The distance variable coefficient is negative and statistically significant at 1% and 5% confidence level for the OLS and the random effects models respectively. This implies that when the distance between Kenya and the EAC countries increase by 1% then the

exports would reduce by 1.43% and 1.29% from the OLS and random effects models. The fixed effects model dropped the variable distance because of its invariant nature. This indicates that trade within the EAC is still constrained by the costs of transportation which is compatible with the gravity model theory and empirical literature by Paas (2000), that distance influences negatively bilateral trade since it increases the costs of transportation.

The results of this study depict that openness of the EAC partner states is insignificant to Kenyan trade. The results show that an increase in opening up the trading markets accessibility by 1% would lead to a 0.018% increase in trade between Kenya and the EAC from the OLS results while the fixed and random results imply that a 1% increase in trade openness would lead to a 0.004% and 0.003% increase in Kenyan exports respectively. This concurs with findings by Vamvakidis (1997), who found out that though openness affects the growth potential of a country, the significance of openness disappears once other growth determinants like population are accounted for in the model.

From table 4 the results from the country specific contributions towards Kenya's trade potential, we found that bilateral trade within the EAC is relatively significant apart from the bilateral trade from Rwanda to Kenya. The country dummy variable used was language and this implies that trade between Rwanda and Kenya is heavily affected by language barriers since the official language for Kenya is English while for Rwanda is French. However we can see from the results the Kenya's EAC trade partners with which the country has great potential to trade with. From the results we learnt that Kenya's exports to Burundi, Rwanda, Tanzania and Uganda accounts for 3.17%, 4.4%, 5.53% and



5.91% growth in exports respectively. While Kenya's imports from Rwanda, Tanzania and Uganda account for 0.32%, 3.42% and 4.47% growth in Kenya's export potential.

#### **4.5 The choice between Fixed and Random effects**

According to the tests results, if  $\text{prob} > \chi^2 < 0.05$ , we use the fixed effects. The results from the tests show that  $\text{prob} > \chi^2 = 0.0046$  implying that the appropriate model to adopt is the fixed effects model thus this study adopted the interpretations and policy implications from the fixed effects results.

## **CHAPTER FIVE**

### **CONCLUSION AND POLICY RECOMMENDATIONS**

#### **5.1 Conclusion**

The main purpose of this research was to estimate Kenya's trade potential with the EAC partner countries. We pursued this research using the augmented gravity models. Theoretical justification for using the gravity model to analyze bilateral trade flows is also re-affirmed in this paper.

The study used panel data for the EAC partner states for the period 2000 to 2012. Trade with these 4 trading partners constituted about 33.96 percent of Kenya's total EAC trade. OLS was used as an estimation technique for comparison purposes.

Estimated results revealed that Kenya's bilateral trade is both positively and negatively affected by the economic size in terms of GDP, population and openness variables of the partner countries. The magnitude of this effect is the highest for the GDP and population of the exporting country (Kenya) followed by GDP of the partner countries and openness then negatively affected by the GDP and population of the partner country. Kenya's bilateral trade is also positively and significantly influenced by the common language that is to say Kenya tends to trade more with EAC countries where English and Swahili are the official communication languages. As anticipated, distance between trading partners negatively affects Kenya's bilateral trade.

#### **5.2 Recommendations**

Based on the findings from the study, the following policy recommendations can be drawn.

Since the GDP of the member countries affects the trade potential of Kenyan exports though insignificant, policies geared towards improving the member countries GDP should be reconsidered and instead adopt policies that would improve the Kenyan economy without relying on the growth of the member states.

The study found that distance negatively influences the volumes of trade. This then implies that policies towards reducing the transport costs for instance, policies towards improving the infrastructure should be adopted to reduce the costs of trade between member states.

The EAC has made tremendous efforts towards opening up of the borders for the member countries to facilitate free movement of goods and services between the member countries. However from the results, it is evident that these policy issues may not be fully implemented on the ground like tariffs and quotas thus openness showed an insignificant contribution to trade expansion. Therefore, more efforts should be put in place to ensure that these policies are adhered to, to the latter and corruption at the border points should be dealt with appropriately.

From the theoretical perspective population may contribute both negatively or positively towards trade growth. This study found the population variable to contribute negatively to trade growth and this implies the absorption level of the partner countries markets is low. Therefore it would be appropriate to recommend that Kenya expands its trade with the other countries both within and outside Africa. The products from Kenya should also

be modified by value addition where necessary, to avoid homogenous products within EAC community in order to compete adequately with the global products and enhance trade.

### **5.3 Conclusion**

Trade within the EAC community can foster growth in the Kenyan exports if appropriate policy measures are taken into account strictly. Kenyan Government should implement policies aimed at increasing trade volumes with the EAC countries where full potential of trade expansion is yet to be explored. Attempts to maintain and improve upon high level of trade, particularly export trade with the countries where Kenya has already shown trade potential should be encouraged.

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### APPENDIX 1: CORRELATION MATRIX

```
. correlate lnexportsij lngdpi lngdpj lnpopi lnpopj lndist openness  
(obs=260)
```

	lnexpo~j	lngdpi	lngdpj	lnpopi	lnpopj	lndist	openness
lnexportsij	1.0000						
lngdpi	0.7401	1.0000					
lngdpj	-0.0389	-0.1988	1.0000				
lnpopi	0.7122	0.9745	-0.2036	1.0000			
lnpopj	-0.0793	-0.2036	0.9745	-0.2186	1.0000		
lndist	0.0653	0.3281	0.3281	0.3615	0.3615	1.0000	
openness	0.0758	-0.1161	0.7997	-0.1153	0.7229	0.2067	1.0000

## APPENDIX 2: DESCRIPTIVE STATISTICS

lnexportsij

---

	Percentiles	Smallest		
1%	8.468711	0		
5%	10.92168	0		
10%	12.20895	8.468711	Obs	260
25%	14.27228	9.188435	Sum of Wgt.	260
50%	16.42897		Mean	15.94094
		Largest	Std. Dev.	2.913616
75%	17.88028	20.14976		
90%	19.10386	20.17588	Variance	8.489158
95%	19.80829	20.19144	Skewness	-1.533306
99%	20.17588	20.21757	Kurtosis	8.464667

lngdpi

---

	Percentiles	Smallest		
1%	20.72643	20.72643		
5%	20.79029	20.72643		
10%	20.88659	20.72643	Obs	260
25%	21.51798	20.72643	Sum of Wgt.	260
50%	23.02444		Mean	22.56563
		Largest	Std. Dev.	1.09046
75%	23.51229	23.96591		
90%	23.78279	23.96591	Variance	1.189102
95%	23.83375	23.96591	Skewness	-.4299569
99%	23.96591	23.96591	Kurtosis	1.638862

openness

Percentiles		Smallest		
1%	18.72604	18.72604		
5%	22.57203	18.72604		
10%	23.2845	18.72604	Obs	260
25%	32.27984	18.72604	Sum of Wgt.	260
50%	41.91716		Mean	44.46852
		Largest	Std. Dev.	16.46755
75%	53.94071	79.09142		
90%	70.39951	79.09142	Variance	271.1803
95%	75.22962	79.09142	Skewness	.4870105
99%	79.09142	79.09142	Kurtosis	2.290459

Appendix 2: continued

lnpopj

Percentiles		Smallest		
1%	15.71377	15.71377		
5%	15.79849	15.71377		
10%	15.90026	15.71377	Obs	260
25%	16.05935	15.71377	Sum of Wgt.	260
50%	17.20704		Mean	16.82645
		Largest	Std. Dev.	.6951876
75%	17.41985	17.68218		
90%	17.55384	17.68218	Variance	.4832858
95%	17.59148	17.68218	Skewness	-.3597648
99%	17.68218	17.68218	Kurtosis	1.333511

lndist

Percentiles		Smallest		
1%	4.91359	4.91359		
5%	4.91359	4.91359		
10%	5.422825	4.91359	Obs	260
25%	6.226653	4.91359	Sum of Wgt.	260
50%	6.475733		Mean	6.339902
		Largest	Std. Dev.	.5572351
75%	6.667329	6.977573		
90%	6.871553	6.977573	Variance	.3105109
95%	6.977573	6.977573	Skewness	-1.478671
99%	6.977573	6.977573	Kurtosis	4.591593

### APPENDIX 3: POOLED OLS REGRESSION RESULTS

```
. reg lnexportsij lngdpi lngdpj lnpopi lnpopj lndist openness
```

Source	SS	df	MS	Number of obs =	260
Model	1404.55214	6	234.092023	F( 6, 253) =	74.58
Residual	794.139849	253	3.13889268	Prob > F =	0.0000
Total	2198.69199	259	8.48915825	R-squared =	0.6388
				Adj R-squared =	0.6302
				Root MSE =	1.7717

lnexportsij	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lngdpi	2.277226	.4687759	4.86	0.000	1.354026 3.200427
lngdpj	1.178972	.5866435	2.01	0.046	.023645 2.334299
lnpopi	.064737	.7603882	0.09	0.932	-1.43276 1.562234
lnpopj	-1.287702	.8265651	-1.56	0.121	-2.915527 .3401226
lndist	-1.436703	.2500099	-5.75	0.000	-1.929069 -.9443372
openness	.0181551	.0123095	1.47	0.141	-.006087 .0423971
_cons	-33.17096	5.738718	-5.78	0.000	-44.4727 -21.86922

## **APPENDIX 4: FIXED EFFECTS MODEL REGRESSION RESULTS**

```
. . xtreg lnexportsij lngdpi lngdpj lnpopi lnpopj lndist openness, fe
note: lndist omitted because of collinearity
```

```
Fixed-effects (within) regression      Number of obs   =      260
Group variable: ctry                  Number of groups =       20

R-sq:  within = 0.3329                Obs per group:  min =      13
      between = 0.4852                    avg   =      13.0
      overall = 0.3396                    max   =      13

                                          F(5,235)       =      23.46
corr(u_i, Xb) = -0.9880                Prob > F       =      0.0000
```

lnexportsij	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lngdpi	7.742644	1.369046	5.66	0.000	5.045473	10.43981
lngdpj	2.209886	1.437055	1.54	0.125	-.6212701	5.041043
lnpopi	2.235313	4.847093	0.46	0.645	-7.313994	11.78462
lnpopj	-14.60816	4.83313	-3.02	0.003	-24.12996	-5.086361
lndist	0	(omitted)				
openness	.0040275	.0124257	0.32	0.746	-.0204524	.0285075
_cons	-.6321807	26.08301	-0.02	0.981	-52.01859	50.75423
sigma_u	12.594949					
sigma_e	1.4886866					
rho	.98622193	(fraction of variance due to u_i)				

```
F test that all u_i=0:      F(19, 235) =      8.95      Prob > F = 0.0000
```

```
. estimate store fixed
```

## APPENDIX 5: RANDOM EFFECTS MODEL REGRESSION RESULTS

```
. xtreg lnexportsij lngdpi lngdpj lnpopi lnpopj lndist openness, re
```

```
Random-effects GLS regression           Number of obs   =       260
Group variable: ctry                    Number of groups =        20

R-sq:  within = 0.3091                  Obs per group:  min =       13
        between = 0.7987                                     avg =      13.0
        overall = 0.6211                                     max =       13

Wald chi2(6) =      169.23
corr(u_i, X) = 0 (assumed)              Prob > chi2     =      0.0000
```

lnexportsij	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lngdpi	4.03571	.8213848	4.91	0.000	2.425825	5.645594
lngdpj	2.382623	.9067822	2.63	0.009	.6053623	4.159883
lnpopi	-2.624216	1.402941	-1.87	0.061	-5.373929	.1254969
lnpopj	-2.925538	1.445695	-2.02	0.043	-5.759047	-.0920282
lndist	-1.296872	.5585226	-2.32	0.020	-2.391556	-.2021879
openness	.0033804	.0120156	0.28	0.778	-.0201697	.0269306
_cons	-27.43838	11.50251	-2.39	0.017	-49.98288	-4.893886
sigma_u	1.0446714					
sigma_e	1.4886866					
rho	.32995606	(fraction of variance due to u_i)				

```
. estimate store random
```

## APPENDIX 6: HAUSMAN TEST



. hausman fixed

Note: the rank of the differenced variance matrix (4) does not equal the number of coefficients being tested (5); be sure this is what you expect, or there may be problems computing the test. Examine the output of your estimators for anything unexpected and possibly consider scaling your variables so that the coefficients are on a similar scale.

	— Coefficients —			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lngdpi	7.742644	4.03571	3.706934	1.095269
lngdpj	2.209886	2.382623	-.1727363	1.114842
lnpopi	2.235313	-2.624216	4.85953	4.63962
lnpopj	-14.60816	-2.925538	-11.68262	4.611845
openness	.0040275	.0033804	.0006471	.0031659

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$\chi^2(4) = (b-B)'[(V_b-V_B)^{-1}](b-B)$   
= 15.07  
Prob>chi2 = 0.0046

## APPENDIX 7: COUNTRY SPECIFIC EFFECTS

```
. xi: regress lnexportsij dmy i.ctry
i.ctry      _Ictry_1-20      (naturally coded; _Ictry_1 omitted)
note: _Ictry_2 omitted because of collinearity
```

Source	SS	df	MS	Number of obs =	260
Model	1417.94835	19	74.6288605	F( 19, 240) =	22.94
Residual	780.743639	240	3.25309849	Prob > F =	0.0000
				R-squared =	0.6449
				Adj R-squared =	0.6168
Total	2198.69199	259	8.48915825	Root MSE =	1.8036

lnexportsij	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
dmy	-.8685188	.7074438	-1.23	0.221	-2.262111 .525073
_Ictry_2	0	(omitted)			
_Ictry_3	-4.436179	.7074438	-6.27	0.000	-5.829771 -3.042587
_Ictry_4	-1.04473	.7074438	-1.48	0.141	-2.438322 .3488617
_Ictry_5	3.178025	.7074438	4.49	0.000	1.784433 4.571617
_Ictry_6	4.472734	.7074438	6.32	0.000	3.079142 5.866326
_Ictry_7	5.535453	.7074438	7.82	0.000	4.141861 6.929045
_Ictry_8	5.907237	.7074438	8.35	0.000	4.513645 7.300829
_Ictry_9	-.6533296	.7074438	-0.92	0.357	-2.046921 .7402623
_Ictry_10	.3210274	.7074438	0.45	0.650	-1.072564 1.714619
_Ictry_11	-2.569826	.7074438	-3.63	0.000	-3.963418 -1.176234
_Ictry_12	-.5018773	.7074438	-0.71	0.479	-1.895469 .8917145
_Ictry_13	1.612381	.7074438	2.28	0.024	.2187896 3.005973
_Ictry_14	3.421438	.7074438	4.84	0.000	2.027846 4.81503
_Ictry_15	1.550322	.7074438	2.19	0.029	.1567297 2.943913
_Ictry_16	2.14543	.7074438	3.03	0.003	.7518386 3.539022
_Ictry_17	1.771348	.7074438	2.50	0.013	.377756 3.16494
_Ictry_18	4.473347	.7074438	6.32	0.000	3.079755 5.866939
_Ictry_19	1.5381	.7074438	2.17	0.031	.1445079 2.931692
_Ictry_20	1.71114	.7074438	2.42	0.016	.3175482 3.104732
_cons	14.86674	.5002383	29.72	0.000	13.88132 15.85216