

Determinants of Kenyan Exports:
A Gravity Model Approach

By

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A research paper submitted to the School of Economics, University of Nairobi in partial fulfillment of the requirements for the award of Master of Arts degree in Economics.

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This paper has been submitted with our approval as university supervisors

Signed: Date: I. P.

Dr. Kiriti-Ng'ang'a

Mr. Maurice Awiti

Dedication

To my sons; Hillary and Joe.

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First and foremost I glorify Jehovah God for the most precious gift of life, a reason to smile and a second chance to live. I would like to express my profound gratitude to the University of Nairobi for the scholarship award, and the School of Economics that I was able to undertake this Master's programme. I am also grateful to AERC for the sponsorship of the Joint facility for Electives; it was an experience of its kind.

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Whereas great care has been taken in preparing this research paper, any errors are highly regretted and I remain solely responsible for any such mistakes.

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List of Abbreviations

AGO A	African Growth Opportunity Act
APEC	Asia-Pacific Economic Cooperation
BoPs	Balance of Payments
COMESA	Common Market for Eastern and Central Africa
CPI	Consumer Price Index
EAC	East African Community
EEC	European Economic Community
EPC	Export Promotion Council
EPPO	Export Promotion Programmes Office
EPZ	Export Processing Zone
EU	European Union
EXP	Exponential
FDI	Foreign Direct Investment
FEM	Fixed Effects Model
FTA	Free Trade Area
GDP	Gross Domestic Product
H-0	Heckscher-Ohlin
ISI	Import Substitution Industrialization
KETA	Kenya Export Trade Authority
KNBS	Kenya National Bureau of Statistics
Kshs.	Kenya Shillings
Log ^{ln}	Logarithm
MDF	Medium Density Fibreboard
MUB	Manufacturing Under Board
NAFTA	North American Free Trade Area
NESC	National Economic and Social Council
NTT	New Trade Theories
OLS	Ordinary Least Squares
REM	Random Effects model

SADC	South African Development Committee
SAPs	Structural Adjustment Programme
SSA	Sub-Saharan Africa
ToT	Terms of Trade
VAT	Value Added Tax
WB	World Bank
WDI	World Development Index

ABSTRACT

Under the Kenya's blue print Vision 2030, the government identified marketing as a challenge to the agricultural sector. Efforts to maintain existing markets and create new ones to increase Kenya's bargaining power, and value addition in agriculture are emphasized. Hence, it is envisaged that Kenya will export value-added goods to regional and global markets. The development of this strategy will contribute towards conquering new markets and export expansion. This paper analyses the determinants of exports, Kenya's major export destinations and the unexploited markets using the gravity model approach. Analysis shows that Kenya's exports highly depend on foreign demand, the importer's GDP and population. Transportation costs are found to influence Kenya's exports negatively, hence better off trading with her neighboring countries. The analysis also showed that there is unexploited export potential among some of Kenya's export markets, of which if fully exploited, can contribute to the achievement of the agricultural sector's short-term goals of the Vision 2030.

CHAPTER ONE

1.0 INTRODUCTION

Exports are important in the process of growth and from the international trade theory point of view, export growth contributes positively to economic growth. Expansion of exports is an integral part of economic growth process which can be measured by output growth through such means as; Firstly, facilitating the exploitation of economies of scale for small open economies (Helpman and Krugman, 1985) due to larger international markets. Secondly, increased efficiency and productivity through increased competition (Balassa, 1978) and specialization; thirdly, adoption of superior technologies embodied in foreign-produced capital goods, the learning effects (Graner and Isaksson, 2007), and lastly, creation of employment. Similarly, export revenue can enable a country to accumulate foreign reserves for her import cover. This hypothesis is supported by Khan and Knight (1987) that a developing country's imports are constrained by the availability of foreign exchange. The revenues can relieve the binding foreign exchange constraint to allow increases in imports of capital goods and intermediate goods (McKinnon, 1964).

The debate on the relationship between export expansion and economic growth has exhibited considerable interest in the field of development economics. Several empirical studies have been conducted to assess the role of exports in the economic growth of developing countries (Michaelv, 1977; Tvler, 1981; Balassa, 1985 and, Ram, 1987). Most of these studies have concluded the beneficial effects of export performance on economic growth (as listed above). In this regard, the theoretical argument of exports as the drivers of economic growth and their role in economic development has been widely acknowledged (Were, et al., 2002). Export performance is usually regarded as a sound measure of the sustainability of a country's overall balances.

Export promotion has been perhaps the one commercial policy issue that has attracted considerable attention both at national and international levels, and as analysts argue, this development has appeared to be a successful strategy for fostering growth and inclusive development. In this era of globalization and liberalization, the importance of exports can not be over-emphasized. Exporting products abroad enables a developing country like Kenya to widen its market beyond the size of the local market.

Kenya's external environment has been greatly influenced by the changing international and regional trading arrangement. For instance, the multilateral trading arrangements under the World Trade Organization (WTO) and the regional trading arrangement such as Common Market for Eastern and Southern Africa (COMESA), the East African Cooperation (EAC), and the European Union (EU), have greatly contributed to Kenya's export demand. The difficulties in arriving at multilateral solutions within WTO which take adequate account of development needs has led many developing countries to seek to reduce trade barriers through arrangements with neighboring countries and most recently, across continents. The south-south trade and regional economic and trade arrangements which are allowed by WTO rules, can provide a supportive environment for improving export performance.

Similarly, the unanimous agreement by 142 members of the WTO to launch the ninth in a series of multilateral negotiations to promote a global free trade system (the Doha Round) in November 2001 sought to address bilateral trade disputes and enhanced negotiations with a view to expand market access (Goddard, et al, 2005). The World Bank (WB, 2005) report on the Doha Round indicated that negotiations can also play a critical role in improving developing country foreign market access in areas such as agriculture, manufacturing, including textiles and clothing and services. Since then some developing economies have seen their Balance of Payments (BoPs) recording surpluses. Again, with the advances in economic integration, particularly the EAC and COMESA together with African Growth Opportunity Act (AGOA), there are potential export opportunities that can be explored to Kenya's advantage and this explains the shifting markets of Kenyan exports and expansion to other African countries and the decline of exports to the EU (Were, et al., 2002). South-south trade is increasing significantly and represents an important opportunity for developing countries to increase their exports (WB, 2005).

Within East Africa Kenya still maintains an exporting edge over the rest of the East African countries. Currently Kenya claims only 7% of the market share of the regional market for manufactured goods. However, the aim is to raise the Kenyan market share to 15% by 2012 (National Economic and Social Council of Kenya (NESC), 2007), and in order to realize the goal of the blue print Vision 2030, Kenya will need to identify- and eliminate the impediments to her competitiveness in the region (e.g. domestic policies for trade liberalization or openness, real

exchange rate, etc). Equally important is to identify the destinations of potential supply of exports to effectively exploit export opportunities. Since Kenya undoubtedly benefits from export activities; greater capacity utilization, economies of scale, adoption of more efficient technology, the learning effects, and relaxation of foreign exchange constraints and given the importance of exports in Kenya's economy, it is important to analyze the factors that determine export flows between Kenya and her trading partners.

The aim of this paper is to estimate the major determinants of Kenyan exports for the period 1964 to 2008 using the gravity-type of trade model. The plan of this paper is as follows; the next part of this section presents a background and trend of Kenya's exports. Section 2 is a review of the literature that discusses export models: the export supply and demand equations; and finally an empirical survey of the adopted gravity model. Section 3 explores the estimation procedure, with section 4 devoted to the discussion of the results and the final section taking up the conclusions and policy implications.

1.1 OVERVIEW OF KENYA'S EXPORTS

1.1.1. The Exports Trend

Kenya's exports can be distinctly divided into two categories; the agricultural and manufacture components but generally, the structure is predominantly composed of primary agricultural commodities mainly tea, coffee and horticultural products. These three commodities together with articles of apparel and clothing accessories continue to be the leading export earners, accounting for over 49.7% of the total domestic export earnings in 2007 (Kenya National Bureau of Statistics (KNBS), 2008). Kenya's exporting performance has roots among other factors, in the efficiency of primary production. For instance Kenya is the 4th largest tea producer in the world after China, India and Sri Lanka. Until the 1980's coffee exports contributed the largest share to total commodity exports but this performance trend however has changed in the recent times.

Until the late 1980's, coffee exports contributed the largest share to total commodity exports. The fourfold increase in coffee prices between 1976-1978 and a minor boom in 1986 contributed to coffee export's notable performance (WB, 1993); and during the boom years 1976-1978, real GDP grew, on average by 6.8%. However, the trend appears to have changed since the early

1990s with tea exports taking the lead. Coffee's performance has in the recent past continued to drop tremendously, even to a single digit percentage of total exports since 2000. Figure 1 shows the current widening gap between tea and coffee exports, while Figure 2 indicates the trends of the three major commodity exports.

Figure 1. Coffee and Tea exports gap

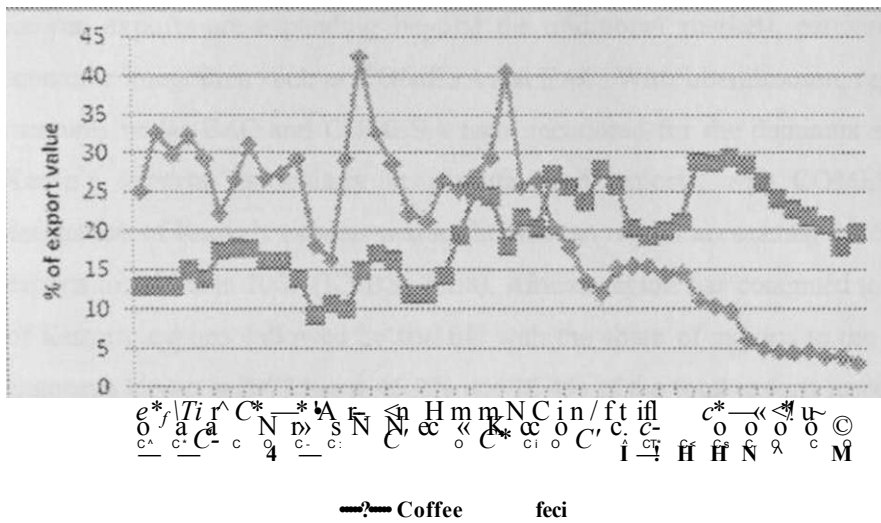
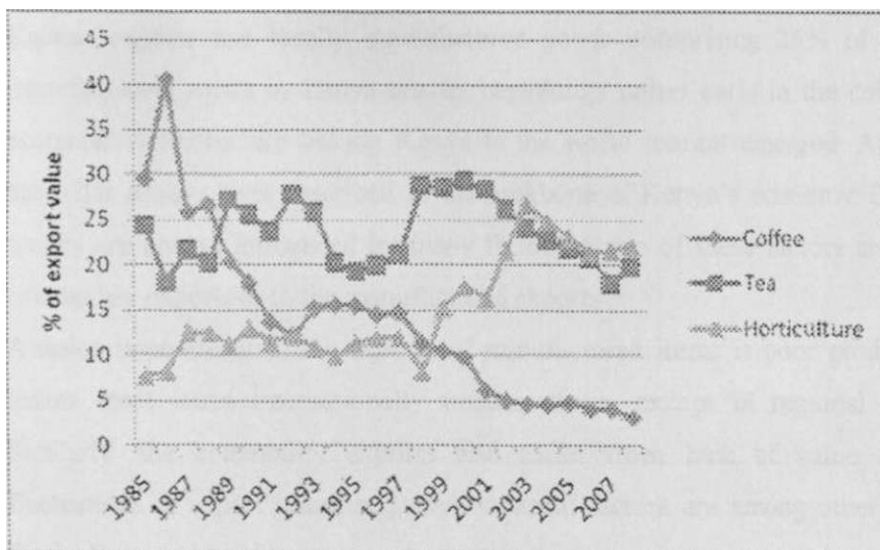


Figure 2. Top three commodity exports performance



Horticultural products have however, experienced rapid growth and are currently the leading export commodity accounting for about 20% of the total exports. This growth has placed Kenya among the top ten exporters of horticultural products, with the countries' total exports accounting for over 87% of the total value of the world's floriculture crops (Netherlands, Canada, USA, Ecuador, Kenya, Denmark, Germany, Belgium, Italy and Columbia)

Kenyan exports are expanding beyond the traditional markets, particularly with advances in economic integration such as COMESA and EAC. With liberalization, regional trade integration measures under EAC and COMESA have accounted for the dominant share of the increase in Kenya's exports, particularly in manufactured exports, with COMESA being the leading destination of Kenya's exports within the African region accounting for 69.5% share of the total exports to Africa in 2007 (KNBS, 2008). African region has continued to dominate the direction of Kenya's exports followed by the EU with the share of exports to the African region and the European Union in 2007 being 45.2% and 26.4% of the total exports respectively (KNBS, 2008).

The performance of manufactured exports however, was poor in the 1980's. Its share of the total exports had not only remained minimal but had also been declining with the contribution to the country's total exports having declined to 13% in 1991 from 16% in 1976. Currently, the manufactured export performance has improved with its value standing at 37% of the total Kenyan exports and locally manufactured goods comprising 25% of Kenya's exports. The manufacturing sector in Kenya has its beginnings rather early in the colonial period, when an economic infrastructure linking Kenya to the world market emerged. Agriculture on the other hand, has always been described as the backbone of Kenya's economy. Exports from these two sectors are always influenced by many factors. Some of these factors are peculiar to either the commodity exports or to the manufactured exports.

A major impediment to the exports of manufactured items is poor product quality, and which makes most items internationally uncompetitive, except in regional markets (WB, 1993). Similarly, the commodity exports also suffer from lack of value addition. Additionally, fluctuations in export prices and environmental factors are among other factors which account for the fluctuations of these exports' revenues.

1.2 KENYA'S TRADE POLICY

Since its independence in 1963, there has been considerable progress in the trade reform in Kenya, advancing from import-substitution from the colonial master to an export-oriented economy. The Import-Substitution Industrialization (ISI) policy began after the World War II (WWII) with a range of British firms investing in East Africa attracting the high tariff wall. The policy was heavily biased against exports due to the high-effective rates of protections, price and foreign exchange controls in the pre-liberalization era. Since the incentive structure was biased towards import-substitution, a large proportion of the industrial output was geared towards the domestic captive market, which was more profitable than the export market. This discouraged a strong drive towards export promotion and partly accounted for the poor export performance of Kenya's manufacturing sector (Were, et al, 2002).

With dwindling export revenues coupled with the dependency on manufactured exports, Kenya experienced Balance of Payments (BoPs) problem for the first time in 1971. The World Bank (1993) attributed the reason partly to falling Terms of Trade (ToT) at the time. The government however started recognizing the need for export oriented industrial strategy by the end of 1970's. The Structural Adjustment Programmes (SAPs) in the early 1980's partly explain the government's commitment to liberalization policy and hence a shift from an ISI to export promotion strategy. The major turning point in policy was in the form of *Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth* in which the government committed itself to liberalize the economy and adopt an outward-looking development strategy (WB, 1993). It outlined the government goals, the structural reforms needed as well as the guidelines for achieving them.

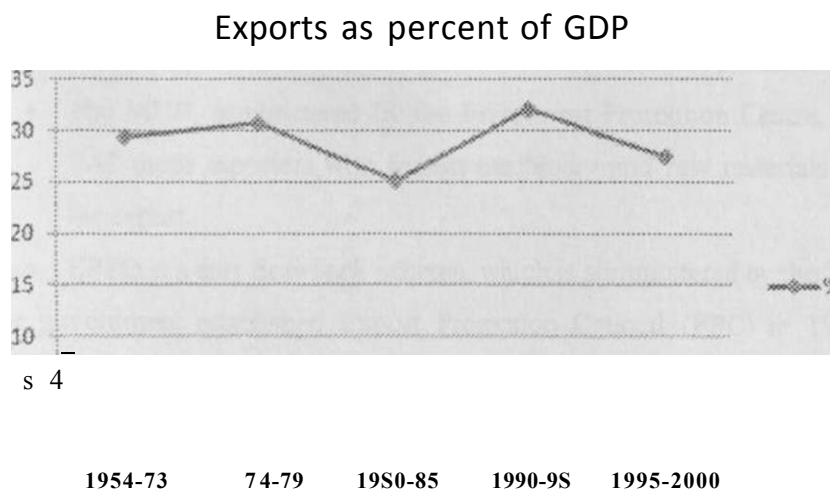
Kenya's trade policy can be traced to the later years of the colonial era during which the country was used and protected as a producer of agricultural and other raw materials for Britain's manufacturing sector and a ready market for manufactured goods from Europe. The country therefore relied on exports of commodities especially the agricultural products mainly coffee, tea and cotton, a situation which exposed the economy to higher volatility of commodity prices and to secular declines in commodity prices.

During the first decades of independence, import-substituting manufacturing in Kenya grew

rapidly, enabled by high import protection and the in-ward looking policies pursued at the time made it difficult to compete in the export markets (WB. 1993). In 1960s, the manufacturing sector in Kenya saw a rapid expansion with textiles and garments, food, beverages and tobacco as the leading in the sector. The growth of Kenya's manufacturing sector since independence has been notable and its share of GDP increased from 10% in 1964 to 13.6% in 1992.

During this era, the market for Kenyan manufactured products was potentially large, covering most of East Africa. This was enabled by the abundance of neighbors at a lower level of industrialization and Kenya could therefore export some surplus from the import-substituting activities. In the early 1980s, the government adopted an outward-looking development strategy. By this time, Kenyan exports had deteriorated tremendously. Exports as a percentage of GDP recorded a downward trend, with a performance of 29.5% at independence to 25% in the 1980s (see Figure 3). Merchandise as a percentage of GDP had for example declined from 19.6% in the 1970s to 16.9% over 1980-84 and to 13.6% over 1985-89 (Glendav and Ndi, 2000 as cited in Were, et al., 2002).

Figure 3. Exports as percentage of GDP



Kenya has however, gained reasonable success in penetrating regional markets. The exports to this market (manufactures) are in conformity with Kenya's industrial aspirations. The manufacturing sector makes an important contribution to the Kenyan economy and currently employs about 254,000 people, representing 13% of the economy's total employment (NESC, 2007).

1.2.1. Kenya's Export Strategy

The changed economic policy environment brought about a shift in economic orientation of the country from an inward looking one, reliant upon import substitution to an outward orientation with emphasis on export-led industrialization. Consequently, a number of export promotion programmes were initiated. These include Manufacturing Under Bond (MUB) in 1988 and Export Processing Zones (EPZs) in 1990. The government initiated other export incentive schemes such as: Green Channel, Export Guarantee and Credit Schemes, the revival of the Kenya Export Trade Authority (KETA), Export Promotion Council and the Export Promotion Programmes Office (EPPO) for tax rebates on imported inputs for exporters (Were et al., 2002), as a strategy to encourage diversified export-oriented manufacturing

- The EPZs are administered by the Exports Processing Zones Authority (EPZA) and provide companies located in the zones with a number of incentives such as a 10 year corporate tax holiday and a flat 25% corporate tax for 10 years; exemption from both stamp duty and VAT and facilitation on issues of work permits.
- The MUB, administered by the Investment Promotion Centre, exempts from Duty and VAT those exporters who import machinery and raw materials in manufacturing goods for export.
- EPPO is a duty drawback scheme, which is administered by the Treasury.

The government established Export Promotion Council (EPC) in 1992 in order to enhance diversification of exports markets and products and to facilitate identification and removal of obstacles to rapid development of the export sector. EPC co-ordinates and harmonizes export development activities in the country so as to ensure higher and sustained growth of the economy. The council's activities have so far focused on consolidation and expansion of market share in traditional markets, diversification to emerging markets and promotion of non-traditional markets including promotion of non-traditional exports in order to diversify and

expand the country's export base.

In general, Kenya has two distinct positions in her export initiative; to the EU, Asian markets and the rest of the developed world, it supplies food and agricultural products, while to the COMESA region and the neighboring countries, it is an industrial exporter.

1.3 PROBLEM STATEMENT

Trade has increasingly become an underpinning determinant of economic prosperity in most countries of the world and Kenya is no exception in this regard. The initial trade strategy that Kenya adopted, the ISI, was geared towards the domestic captive market, which was then more profitable than the export market. In their analysis of Kenya's export performance, Were, et al (2002) attributed this strategy to have partly accounted for the poor export performance of Kenya's manufacturing sector and also discouraged the strong drive towards export promotion. The last two decades have seen Kenya adopt an export oriented, outward looking approach to trade and this has shifted focus towards export oriented policies of international trade. This explains the motive of analyzing the impact of export exposition by Ndung'u (1986), and the causal relationship between exports and economic growth (Akara.1988. Kundhi, 1996).

What appears to be gaining currency in recent years from cross-country growth differences is that most of the countries pursuing growth successfully are also the ones that have taken most advantage of international trade (Martin. 2001). However, the international trade is not without policies, for example the recent international policy for open trade, the Uruguay Round Agreement of 1994. Even at the national level the choice of policies to manage interactions with the world economy is not simple and therefore, in order to formulate trade and industrial policies aimed at stimulating exports, it is important to understand which factors stimulate or deter entry of Kenyan exports into international market.

Primary products dominate the Kenya's export composition and this can partly explain the heavy focus of empirical work on the agricultural sector as compared to manufacturing sector. Due to the aggregated nature of the agricultural sector, Chepchumba (1993); Komu (2005); and Ikiara (1992) have further decomposed the sector into sub-sectors e.g. coffee, tea and the horticultural sub-sectors respectively. Whereas the work by Were, et al (2002) analyses Kenya's export performance, the empirical evaluation of Kenya's total exports is however disaggregated into three categories: tea coffee and other exports of goods and services.

Although literature on commodity export supply functions start from structural equations, their reduced form equations are generally price-focused and most studies on the exports of African countries tend to follow a relative prices approach. By narrowing the factors to price variables,

the influence of non-agricultural sector therefore tends to be ignored. Work by Were, et al. (2002) incorporated in addition to the standard trade model explanatory variables (income and real exchange rate), investment as a proportion of GDP (a proxy of capital formation) to capture the supply constraints.

Moran (1988) attempted to develop a structural model for developing countries' manufactured exports. It emerged from the study that specification of a complete structural model requires analysis of all the channels through which relative prices and income influence export behavior to avoid bias in the estimated coefficients due to the omission of relevant variables. Given the fact that export determination requires a multifaceted approach, this study takes a new dimension, that of New Trade Theories (NTT), the gravity model approach with an aim to identify the factors that explain the export behavior and the determinants of Kenyan exports and also attempt to empirically test the impact of "Trade resistance factors" (the geographical and policy factors, of transportation costs (proxied by distance), regional integration and export promotion (proxied by embassies and consulates), in addition to the three gravity model variables (income, population and distance). The study is hoped, will bridge the existing information gap with respect to evidence-guided policy design from which export enhancing policy recommendations can be drawn

1.4 OBJECTIVES OF THE STUDY

The overriding objective of this study is to estimate a model that can be used to analyze the determinants of Kenyan exports and the export behavior to identify- export competitiveness factors in foreign markets. In assessing the statistical significance of the explanatory variables, the study aims to achieve the following specific objectives;

- To analyze the determinants of Kenya's export trade
- To investigate who are Kenya's trading partners
- To investigate the export destinations that Kenya still have unrealized/unexploited export potential
- To offer policy recommendations based on the research findings

1.5 JUSTIFICATION OF THE STUDY

The primary concern of policy makers and macroeconomic analysts is what factors promote or inhibit the flow of Kenya's exports. The gravity model used in this study attempts to identify these factors, improving on the earlier work by Were, et al. (2002) by incorporating the geographical and policy factors (the cross-border effects). The significance of this study rests on the model's outstanding empirical performance in analyzing export flows between countries thus attempts to estimate Kenya's export function. Based on the methodology and data set used, the regression results can be used as policy guidance in the formulation of Kenya's trade policy frameworks since they give direct measures of the responsiveness of export flow to the trade potential variables of the estimated equation. The policy variables help to understand the impacts of the represented policies on export flows. In this context, an estimation of Kenya's export potential with the rest of the world is not only appropriate but also important.

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter attempts to describe briefly some of the literature pertaining to the ideas dealt with in the study. The sections are organized as follows: first is a brief review of theories of demand and supply factors that influence exports and different approaches conducted to explain export determination, while the second section reviews the relevant empirical studies on the gravity model, which is the model adopted for the purpose of this study.

2.1 THEORETICAL LITERATURE

There exists no unified theory on determinants of export. Instead, the theoretical literature is choked with an array of hypotheses drawing heavily on theories of demand and supply to explain export supply from country *i* and export demand in country *j*. Goldstein and Khan (1978) observed that empirical studies of international trade flows have generally concentrated on the formulation and estimation of demand relationships for exports (and imports). King (1997) observed that a great deal of attention has been paid to the estimation of time series models of foreign trade flows especially those relating to the volume of trade in imperfectly substitutable goods between one country and the rest of the world and the models employed have evolved from relatively simple demand equations through to more complex simultaneous-equations and two-regime approaches. The study identified four types of models which most researchers apply to assess the export performance of countries, linking the countries' exports to the rest of the world; export demand models, export determination models, simultaneous-equation models and two-regime models.

Majority of empirical studies of foreign trade flows have, however, been undertaken in the context of imperfectly substitutable goods where the characteristics of such goods differ according to country of origin (King, 1997). The imperfect substitute models are in two broad types; the class that contains the world trade models, which attempt to encapsulate total world trade in a single, multiple-equation model where each individual equation seeks to estimate the value of a particular country's exports to all other nations, and the other type of export model

examines the determinants of the volume of exports between a single country and either another country or the rest of the world.

In explaining trade flows, the new trade theories (NTT) have also been widely used in determining trade flows between countries. The gravity model explains the partner composition of trade, and therefore takes into account more traditional economic reasons for international trade (Thursbv and Thursby, 1987).

2.1.1 Single-Equation Export Demand Models

This is the simplest export model of which its utilization in empirical studies dates back in the 1930s. Essentially, it is a single-equation¹ model that concentrates on the demand side determinants of exports whilst treating the supply side by the assumption of infinite price elasticity. The supply side therefore is assumed to exhibit an idle productive capacity and the demand side exhibits increasing returns to scale. This model's popularity has declined considerably overtime due to increasing concern that the model's treatment of the supply-side factors is inadequate because the implicit assumption of infinite elasticities of export supply is unrealistic. The model is estimated using the ordinary least squares (OLS) and is likely to be a mixture of either simultaneity bias or omitted-variable bias. Goldstein and Khan (1978) argued that the assumption of infinite price elasticity carries far less intuitive appeal when applied to the supply of exports of an individual country.

2.1.2. Export Determination Models

This model can most easily be described as a combination of an export demand and an export supply model brought together in a single, reduced-form type equation which would then be estimated using the ordinary least squares (OLS). Studies using this approach have thus tended to concentrate on resolving the omitted-variable shortcoming of the basic export demand model by taking into consideration the supply side. However, the simultaneity bias is assumed away on the grounds that the markets involved are oligopolistic. Domestic (internal) demand pressure

¹ $X_t = \beta_0 + \beta_1 R_t + \beta_2 YF_t + \epsilon_t$ where X_t is real exports in period t , R_t is a measure of competitiveness (usually the ratio of export prices PX_t to those of foreign competitors, PF_t both expressed in a common currency) and YF_t is a measure of foreign economic activity (usually real income), King (1997) pp83.

(DDP) and/or profitability are argued to be the explanatory- variables that describe the supply side of the model. The profitability variable however, was rejected in a study by Muscatelli, et al. (1995) while modelling the exports of Asian newly industrialized economies (NIEs) due to the absence of a significant domestic market for exports in these countries. While the DDP variable may be useful in explaining movements in exports prices, King (1997) however, suggested that it would not be necessary to include it in a model of export volumes because its influence would have already been captured by price competitiveness or profitability.

2.1.3 Simultaneous Equation Models

The studies employing these models have emphasized the avoidance of simultaneity bias, which may arise as a result of interdependence between current export volumes and prices, a major reason for rejecting the simple export demand model. This model uses one of a range of simultaneous equation techniques instead of OLS for estimation purposes. Majority of studies have constructed structural models comprising of a separate export demand and supply equations (Thursby and Thursbv. 1987), which when equated (on the assumption of demand equals supply) result in a simple equilibrium² version of this approach (Goldstein and Khan, 1978).

The variants of the simultaneous-equations approach in which exporters are treated as all price takers or price setters (but not both) makes it suitable to be used to model exports of developing countries since these countries are considered small open economies (SOEs) in the international trade arena hence price takers, and also due to its explicit recognition of both the demand and supply bottlenecks. A study conducted by Riedel (1988) however, rejected the argument of appropriateness of the supply-price approach of the model whereby quantity exported adjusts to conditions of excess demand and the export price adjusts to conditions of excess supply on account that the approach may not be suitable to model the exports of SOEs because their exporters are normally regarded as being price takers.

² $\log X_t^d = a_0 + a_1 \log(PX/PXW)_t + a_2 \log YW_t$; where X^d = quantity of exports demanded; PX = price of exports; PXW = weighted average of the export prices of the country's trading partners.
 $\log X_t^s = b_0 + b_1 \log(PX/P) + b_2 Y_t^*$; where X^s = quantity of exports supplied; P = domestic price index; Y^* = logarithm of an index of domestic capacity.
 Assuming $X^d = X^s = X$, (Goldstein and Khan, 1978) pp276-7.

2.1.4 Two-Regime Models

This group can be distinguished from the other three models in that they allow for the possibility that exporters are either not simply a collection of homogeneous firms and/or the environment in which they operate may exhibit change from time to time. The approach allows both types of firms (the price takers and price setters) to coexist over the estimation period (King, 2000). In this model it is assumed that the individual exporter faces two distinct constraints when selling abroad, the quantity demanded by foreigners (x_d) and the quantity which the firm is willing and able to supply (x_s) and at least one of these will be binding at any point in time. Thus, the individual firm's actual exports, x , are represented as follows:

$$x_t = \min(x_d, x_s)$$

The total industry exports (X) will simply be a weighted average of export demand and export supply where the weights reflect the relative importance of demand- versus supply-constrained behavior in each period:

$$X_t = (1 - \alpha) XD_t + \alpha XS_t$$

And which gives the long-run equilibrium" expression of the model (King, 2000).

From the above theoretical models, it is evident that these studies provide rather no attention to the geographical, policy and cultural factors to export determination. This study therefore augments these factors to explicitly model the Kenyan exports using the gravity model.

2.2 The Gravity Theory

Gravity model has a long history in international and regional economics. The model has been widely used in the applied literature to evaluate trade flows, the impact of regional agreements, the impact of a monetary union, the impact of Foreign Direct investments (FDI) on trade flows, to simulate the trade potential and assess the export potential, Kandogan (2007), Eita and Jordaan (2007) and Samad. et al. (2009). It has also been used to explain social flows, primarily migration in terms of the "gravitational forces of human integration"

$$X_t = \alpha_0 + \alpha_1 R_t + \alpha_2 YF_t$$

$X_t = \alpha_0 + \alpha_1 PR_t + \alpha_2 K_t$ where PR_t = profitability of exporting; and K_t represents the exporters total productive capacity or potential output. The rest are as defined in footnote 2.

The gravity model was first applied to international trade field by Tinbergen (1962) and Poyhonen (1963) in the early 1960s (Wall, 1999). They conducted the first econometric analyses of bilateral trade flows based on gravity-type equations, but they only provided empirical evidence without supplying any theoretical justification. Following their analyses, for a period of almost 20 years, the gravity model, in spite of its perceived empirical success, did not receive much attention from economists due to its weak theoretical foundation (Chan-Hvun. 2001).

The representation of trade flows provided in works such as that of Anderson (1979); Anderson and Van Wincoop (2003); Krugman and Helpman (1985); Bergstrand (1989) and Deardorff (1995) greatly contributed to the establishment of a theoretical foundation for the gravity model by showing that the gravity equation can be derived from a number of different international trade models. The model is now enormously popular for analysis of a wide range of trade questions inter alia, who trades with whom, the spatial patterns of trade flows, and the unexploited trade potential, hence the gravity models have become one of the most popular empirical tools used for modeling bilateral trade flows. Ram and Prasad (2006) concluded that among the many studies using the gravity framework, a high percentage shares the research task of predicting trade potentials.

The gravity model derived its name from its passing similarity to Newtonian physics. The model was originally founded on Newton's physical theory which states that two bodies attract each other in proportion to their masses and inversely by the square of the distance between them⁴. The inclusion of distance in the model is to account for transport costs, which intuitively increase with distance. In a study by Wall (1999) the gravitational force is compared to large economic entities such as countries or cities which exert pulling power on people or their products.

The gravity model explains about the partner composition of trade, and therefore takes into account more traditional economic reasons for international trade. The model in its general form states that exports from country i to country j (the export destination country), are explained positively by their economic mass (proxied by income and population), and negatively to

⁴ * Symbolically, $F = GM_iM_2/(dist_{ij})^2$ where F= force of gravity which in trade is replaced with value of bilateral trade; the masses M_i and M_2 with the trading partners' GDP and G is the gravitational constant (Baldwin and Taglioni, 2006) pp2.

economic distance, and a set of dummies incorporating some kind of institutional characteristics common to specific flows (Eita and Jordaan. 2007). The model specifies the value of trade between two countries as a positive function of incomes of the countries and a negative function of the distance between them (Thursby and Thursby, 1987).

This type of export model is based on the assumption that trade volume is generated by mass or economic size in the importing country, which is proxied by GDP (the gravitational force), and is inhibited by distance (friction). The model explains the flow of trade between a pair of countries as being proportional to their economic "mass" (national income) and inversely proportional to the distance between them. The traditional explanations of trade such as the Heckscher-Ohlin (H-O) trade model assumed that trade takes place in a perfectly competitive and frictionless world, and without transport costs (Salvatore, 1998). The gravity model is among models that have only recently recognized the role of transport costs as a determinant in international trade.

Geographical and other factors have an important bearing on trade flows and with the increasing importance of geographical factors in international trade theory, the gravity model started to attract a reawakening interest in the 1980s and the foundations were subsequently developed by among others, Anderson (1979) and Bergstrand (1985), who derived gravity models from models of monopolistic competition (Wall 2001). Chan-Hyun (2001) viewed the application of the gravity model to international trade theory at explaining the bilateral trade flows and patterns between two economies by regarding each of them as an organic body that attracts the other in proportion to their economic size (GDP) and inversely to their distance. The basic assumption of the gravity model therefore, states that the bilateral trade flows are positively related to the product of the two countries' GDPs and negatively related to the distance between them.

From the work of Gorter (1963), Tinbergen's econometric study analysis supported the conclusion that in general "normal", "Theoretical" or "ideal" trade flow between two countries is proportional to the gross national product and inversely proportional to the distance between them. Kindleberger (1968) expressed distance as either a cost to be incurred or an input practically equivalent to a factor of production in which case the input is the distance with a

negative sign, and that distance costs do more than serve as a cause of some trade and a barrier to others.

Bergstrand (1989) model includes a variable of income per capita representing the capital intensity of the exporter country and of the importer country, reflecting a relative factor endowment in terms of GDP per capita. For this author this variable is an indicator of demand sophistication. Bergstrand proposed the most complete version of the gravity model using for instance, variables like GDP, GDP per capita distance and monetary variables. Linnemann (1966) included population as an additional measure of country size, employing what we will call the augmented gravity model. But Bergstrand argued that it is also common to instead specify the augmented model using per capita income, which captures the same effects.

Before presenting the reviewed empirical studies, it is important to understand the essential features of the gravity model. The standard variables of the gravity model are; The GDP of the exporting country which measures productive capacity, while that of the importing country measures absorptive capacity. These two variables are expected to be positively related to trade. Physical distance and country adjacency dummies are proxies for transportation costs.

Among the other variables affecting trade, the most frequently used have been population which is usually used as a measure of country size, and since larger countries have more diversified production and tend to be more self-sufficient, it is normally expected to be negatively related to trade. A set of dummy variables for; 1) trade arrangement dummies for the integration systems in which countries participate 2) common language, 3) border for neighboring countries and 4) island etc. However, the choice of the explanatory variables to be included in any work depends on the objective of the study to be undertaken and the availability of data among other factors.

2.3 EMPIRICAL REVIEW

2.3.1 The empirical survey of the Gravity model

The equation used is similar in all studies and the survey follows from the work by Thursby and Thursby (1987) with the following general specification:

$$X_{ij} = a_0 (Y_i)^{a_1} (Y_j)^{a_2} (N_i)^{a_3} (N_j)^{a_4} (D_{ij})^{a_5} (A_{ij})^{a_6} (P_{ij})^{a_7} U_{ij}$$

where X_{ij} is the value of the trade flow from country i to country j ; Y_i and Y_j are the values of nominal GDP in i and j , N_i and N_j are the size of population in both countries; D_{ij} is the physical distance from the economic centre of country i to that of country j ; A_{ij} is any other factor either aiding or hindering trade among i and j ; P_{ij} is trade preferences among the countries. and U_{ij} is a log-normally distributed error term with $E(\ln U_{ij}) = 0$.

These variables have worked well in the reviewed studies. Due to its log-linear structure, the coefficients of the gravity-model are in terms of elasticities or ratios of percentage changes. Reinert (2009) expressed these "unitless" measures to be comparable across countries and goods and that they give direct measures of responsiveness of export flow to trade potential variables. The coefficients of policy variables help us to understand the impacts of the represented policies on export flows. Estimates of border effects are important in investigating some issues on economic geography, while the distance variable can give a measure of the degree of integration in the world economy.

In the case of studies that have augmented the basic gravity model to analyze the export/trade enhancing impact of preferential trading arrangements, these studies predict the additional bilateral trade that would be a consequence of economic integration. Below are some empirical studies and their findings

The results from the work of Thursby and Thursby (1987) to examine the effect of exchange rate variability using a sample of 17 countries over the period 1974-1982 supported the gravity model with the coefficients of the gravity variables, distance (D_{ij}) and Adjacency (A_{ij}) all being significant and with the expected signs. Additionally, the exchange rate term (R_{ij}) was negative and significant. The preferential dummy appeared to be more important for European Free Trade Arrangement (EFTA) countries than for those in the European Economic Community (EEC).

Study by Oguledo and Macphee (1994) estimated a reformulated gravity model derived from a linear expenditure system on trade flows from 162 countries for 1976 and found that preferential trade arrangements and price variables were statistically significant effects of trade flows and confirms that other factors commonly used in gravity models, such as GDP, population and distance are significant influences on trade flows.

Ram and Prasad (2000) in predicting Fiji's global trade potential in a cross-section data for 2005 using OLS estimation technique in an augmented gravity model reported that distance and income provided most of the explanatory power in the regressions. GNP and distance were found to be highly significant implying that the higher GNP product (of a given country pairing), the higher is the bilateral trade between them and vice versa. The positive and statistically significant coefficient of common border dummy estimated about 90% engagement in trade between 2 countries sharing a common border than 2 countries that do not. Common language also increased trade by economically and statistically significant amounts. Similarly, the dummy variable for intra-regional trade for common membership of the regional trade arrangements (RTA) reported positive results with the coefficient explaining 95% of bilateral trade, over and above that explained by the rest of the variables in the model.

In attempting to explore bilateral trade among all the 76 countries, bilateral trade among 19 industrial countries, bilateral trade among 57 developing countries, industrial countries' exports to developing countries and finally developing countries' exports to industrial countries, the empirical findings of Kalbasi (2001) reported the expected signs for the coefficients of the GDP, population and distance. The GDP variables of both the exporter and importer were positively significant. Population variables possessed negative coefficients hence negative effects on export flows among the developing countries. In short, a developing country's export supply is positively related to its GDP and negatively related to its population size. A large absolute value of the distance coefficient was obtained, reflecting that transportation and communication among most developing countries are generally more costly thus act as significant barriers to trade. The study additionally included a common border dummy, which also showed a positive influence on exports.

In the analysis of Korea's trade patterns, Chan-Hyun (2001) found the GDP and distance variables highly statistically significant. The bilateral trade flows were estimated to increase in proportion to the trading partners' GDP and decrease in proportion to the distance involved. Per capita GDP however, was found to be an insignificant factor; hence Korea's trade patterns follow a GDP pattern. Regional trading arrangement on Korea's bilateral trade flows turned out to be a facilitating factor for increasing bilateral trade flows for example, the Asian-Pacific Economic Cooperation (APEC) variable was highly significant with positive coefficient, meaning that if Korea's trading partner belonged to APEC, the bilateral trade flows with that country would be 3 times higher than with non-APEC country

Martinez-Zarzoso (2003) conducted a year by year regression to evaluate the determinants of bilateral exports for 47 countries, and the effects of preferential arrangement between several economic blocs for the period 1980-1999. The groups considered were; European Union (EU) 15, North American Free Trade Area (NAFTA) 3, Centro-American Common Market (CACM) 6, Caribbean Community (CARICOM) 10, and Cuba MAGREB (Algeria, Morocco, Tunisia, and Libya), MASHREK (Egypt, Israel, Jordan Lebanon, and Syria) and other Mediterranean countries (Turkey, Cyprus and Malta). For the EU exports, both the importer and exporter GDP were significant hence influenced bilateral trade flows positively. The exporter income elasticity remained fairly constant and statistically significant. The importer income elasticity however, decreased considerably in magnitude indicating increasing inelasticity of bilateral trade with respect to the income of the importing country.

The population coefficients of the exporting country were negative indicating that large countries are endowed with more resources thus self-sufficiency. Similarly, that of the importing country were also negative until 1994, then positive and significant, meaning that country size is directly related to trade and that larger countries have a greater capacity to absorb. The coefficients of the distance variable had the expected negative sign and were highly significant.

The integration dummies gave mixed results; for intra-EU, the coefficients for the EU were positive for all years but only statistically significant from 1985 onwards and increased yearly in magnitude, while for NAFTA, the integration dummies were positive and highly significant from 1995 onwards. However, results showed that some integration dummies e.g. MAGREB and MASHREK were insignificant and some negatively signed indicating the ineffectiveness of these

two groups. The language dummy variable presented a positive sign and almost always significant showing the great importance in cultural similarities in bilateral trade.

Study by Rahman (2003) estimated gravity model of trade (sum of exports and imports), the gravity model of export and the gravity model of import to analyze Bangladesh's trade with its major trading partners using the panel data estimation technique. The results showed that the major determinants of Bangladesh's exports are the exchange rate, partner countries' total import demand and openness of the Bangladesh economy. All these three factors affect Bangladesh's exports positively. Multilateral resistance factors were also found to affect Bangladesh's trade and exports positively. The positive coefficient of the exchange rate implies that Bangladesh's exports depend on its currency devaluation.

Rose (2005) earned out a study to examine whether the presence of foreign missions in the importing country is systematically linked to a country's exports. The results of the bilateral gravity model of trade (embassies as export promotion) found a positive link, holding other factors constant. The study gave evidence that creation of an embassy has a substantially larger impact on exports.

Eita and Jordaan (2007) earned out a study to estimate the determinants of South Africa's exports of wood products and analyzed the unexploited trade potential in the sector for the period 1997-2004 for 68 South Africa's main trading partners (in the wood sector) using a gravity model approach. The results revealed that the importer's GDP and South Africa's population has a positive effect on the exports, with its coefficient being significant and positive, while South Africa's GDP has a negative impact on the exports of wood products. The negative effect of South Africa's GDP on export products could be explained by the high current growth of the construction sector in recent years.

Importer's population has a negative impact on the exports of wood products suggesting the trading partners become self sufficient as their population grow. Distance however had a negative and insignificant effect on the exports of wood products. The results on trading arrangement membership reported similar outcome as that of Zarzoso (2003) in that not all regional trade arrangements were found to be influential on the increase of exports of wood

products. For example, membership of NAFTA and EU reflected a negative impact on exports while that of South African Development Committee (SADC), an increase in exports of wood products. South Africa exports more to countries where the official language is English which suggests that sharing same language promotes South Africa's exports of wood products. Additionally, there was evidence of unexploited trade potential at least from the year 2002 to 2004 between South Africa and its over fifteen trading partner countries.

Abdul Samad et al (2009) analyzed the factors influencing the exports of medium density fibreboard (MDF) using a panel data collected on MDF exports over 10 years (1996-2005) and across 28 countries all over the world. The panel OLS results reported that changes in export quantities of MDF are significantly determined by export price and the exchange rate. The study used the average world GDP and which it found was not significant

2.4 OVERVIEW OF THE LITERATURE REVIEW

A great deal of attention has been paid to the estimation of time series models of foreign trade flows. From the single-equation export demand to the two-regime models, it is clear from the empirical evidence, that most of these studies are undertaken in the developed countries, with exception of a few that concentrate on developing and African countries. The gravity model is employed in the estimation of the export model and from the review of the literature, the significance of exchange rate, distance between the trading countries, their population and GDP, common border, common language and regional integration and trading arrangements as determinants of exports is evident. For instance, distance has a negative impact on exports value; similarly, population variable gives mixed result depending on the development level of the country under analysis. For a developing country, this has a negative impact, and otherwise for their industrialized counterparts. Common language between countries sharing the same language has lower transaction costs to trade and tend to have historically more established trade ties (Deardorff, 1995, Matthee and Nuade, 2007), possibly related also to colonial history. This study will add to the existing literature especially in the context of modeling Kenya's export by introducing the geographical and cultural factors as determinants of Kenyan exports.

⁵ 'See King (1997), Appendix pp:17-9

CHAPTER THREE

3.0 METHODOLOGY

3.1 INTRODUCTION

The gravity model equation is similar in all studies. The model has a lineage that goes back to Tinbergen (1962) and Poyhonen (1963), who specified the gravity model equation as follows:

$$Trade_{ij} = a \cdot (GNP_i)^{\beta_1} \cdot (GNP_j)^{\beta_2} \cdot (Dist_{ij})^{\beta_3}$$

Where $Trade_{ij}$ is the value of the bi-lateral trade between country i and j , GNP_i and GNP_j are country i and j 's respective national incomes. $Dist_{ij}$ is a measure of the bi-lateral distance between the two countries, a and β_s are parameters and a priori (β_1 is positive and β_2 is negative).

Taking the logarithms of the gravity model equation as in (1), we obtain the linear form of the model and the corresponding estimable equation as follows

$$\log(Trade_{ij}) = a + \beta_1 \log(GNP_i) + \beta_2 \log(GNP_j) - \beta_3 \log(Dist_{ij}) + u_{ij} \quad (2)$$

where a , β_1 and β_2 are the coefficients to be estimated. The error term (u_{ij}) captures any other random events that may affect bi-lateral trade between the two countries and has a mean zero and constant variance. Equation (2) is the core gravity model equation where bi-lateral trade is predicted to be a positive function of income and a negative function of distance. The notion of distance does not only relate to the geographical distance (i.e. transportation costs), but also to other factors affecting transaction costs.

3.2 THEORETICAL AND CONCEPTUAL FRAMEWORK

3.2.1 Model Specification

The estimating equation follows the simplest form of gravity model, the basic model and implies that exports X (from Kenya i to a set of some countries j ($j=1, \dots, N$; $N=25$)) are determined by the GDP and population of both Kenya and the importing country, the geographical component (distance) and specific bilateral features between Kenya and her individual trading partner. In addition to the basic model, an augmented gravity model equation will be estimated. The model is augmented in the sense that several conditioning variables that account for other factors that

may affect bilateral trade have been included over and above the natural logarithms of income and distance. The basic and the augmented equations are formulated as stated in equation 3,

The Basic gravity model

$$X_{ij} = \rho_0 Y_i^{\rho_1} Y_j^{\rho_2} N_i^{\rho_3} N_j^{\rho_4} D_{ij}^{\rho_5} A_{ij}^{\rho_6} \epsilon_{ij} \dots \dots \dots (3)$$

where,

i denotes the exporter and j the importer,

X - is the export of goods,

Y_i and Y_j are the GDP of the exporting and importing country respectively.

N_i and N_j being the population of the exporting and importing country respectively.

D - is the distance in Kilometers between the economic centers.

A represents any other factor that influences exports from Kenya to the export destination country (the relative prices proxied by real exchange rate, regional and trade arrangements, economic partnerships, bilateral relationships etc), while ϵ_{ij} - is the stochastic disturbance term assumed to be well behaved.

Logarithmic expression of the Basic model

$$\ln(X_{ij}) = \rho_0 + \rho_1 \ln(Y_i) + \rho_2 \ln(Y_j) + \rho_3 \ln(N_i) + \rho_4 \ln(N_j) + \rho_5 \ln(D_{ij}) + \rho_6 \ln(A_{ij}) + \epsilon_{ij} \dots \dots \dots (4)$$

The A component augments the basic gravity model with those factors which account for some influence on export level.

The Augmented gravity model

$$\ln(X_{ij}) = \rho_0 + \rho_1 \ln(Y_i) + \rho_2 \ln(Y_j) + \rho_3 \ln(N_i) + \rho_4 \ln(N_j) + \rho_5 \ln(D_{ij}) + \rho_6 (\text{COMESA}) + \rho_7 (\text{EMBCON}) + \epsilon_{ij} \dots \dots \dots (5)$$

where,

COMESA- is a binary variable that is unity if both i and j belong to the same preferential trade area.

EMBCON- takes the value of 1 if Kenya has an Embassy/Consulate in country j , and zero otherwise;

EU - is a dummy variable that is unity if the trading partner is a member of the European Union and zero otherwise

The equation decomposition brings in the dummy variables for COMESA member countries and the EU in order to test the impact of regional agreements on the bilateral exports. The coefficients of the dummy variables are expected to be positive.

High level of GDP indicates a high level of production in the exporting country, which increases the availability of exports, and which represents a potential supply of exports. Similarly, the importer's GDP represents potential demand for imports. With a high level of GDP (income) in the importing country, the expectation is increased import value. The GDP coefficients of both the importer and exporter therefore are expected to be positive.

The coefficient for distance is expected to have a negative sign. This is because it is assumed in the model to be a measure of transportation cost. The population variable can influence exports in two ways and therefore the coefficients for population in both i and j are ambiguous (Eita and Jordaan, 2007). A large population indicates a large domestic market that can lead to a decline in cross-border trade and higher degree of self-sufficiency and less need to trade. Large population also encourages division of labor and this means that there will be economies of scale in production, and opportunities to trade with a variety of goods. For the exporting country, a large population can increase or decrease trade depending on whether the country exports more when it is large or whether the large country exports less than when small. For the importing country, a large population can also increase or decrease trade for the same reasons. Oguledo and MacPhee (1994) and Eita and Jordaan (2007) in their studies specified that the effects of population for both the exporting and importing countries can not be assigned *a priori*.

Three candidate variables are potentially relevant in this context. Firstly, dummy variables for entry and participation in a Free Trade Area (FTA) because the aim of such agreements being precisely to stimulate trade among the constituent countries. Moreover, trade related arrangements according to studies earned out, can generate a significant increase in trade. Secondly, the EU dummy is preferably chosen because it is the second dominant export destination. The EU accounts for over

20% of total exports. The third is the dummy variables for embassy/consulate since the presence of an embassy/consulate in the export destination country is believed to lead to increased export as they act as export promotion centers in those countries. Rose (2005) found that the presence of a mission is indeed positively correlated to exports.

3.2.2 Data Description

OLS estimation technique was applied to the panel data. The data type was chosen because of its several advantages over cross-sectional or time-series data sets as it adds another dimension to empirical analyses. Gujarati (2007) lists these advantages. Among them are; panel data models are able to capture both cross-section and time-series variation of the dependent variable. Secondly, the models can also measure observable and unobservable effects that variables have on the dependent variables, and thirdly, by combining time series of cross-section observations, panel data give "more informative data, more variability, less collinearity among variables, more degrees of freedom, and more efficiency". The advantages notwithstanding, panel data sets are however, not without shortcomings. Panel data tend to suffer both heterogeneity and selectivity bias. Panel data is also limited in the sense that they tend to have design and data collection problems and distortions of measurement errors (Gujarati, 2007).

Panel data involves different models that can be estimated. These are; pooled model, the fixed effects model (FEM) and the random effects model (REM). A random effects model tends to be more appropriate when estimating the export flow from a randomly drawn sample from a considerably large population, while fixed effects model would be a better model when estimating the flows of exports from an ex-ante predetermined selection of countries (Eita and Jordaan, 2007). Since this study deals with export flows between Kenya and her 25 major trading partners, the fixed effects would be a more appropriate model.

The main drawback of the fixed effects is that variables that do not change over time i.e. time invariant cannot be estimated directly because inherent transformation wipes out such variables. This problem however, can be remedied by estimating these variables in a second step (Martinez-zarzoso and Lehmann, 2003) by running another regression with the individual effects (IE) as the dependent variable. In our framework, the IE model was specified as;

$$IE_{j,t} = \alpha_0 + \alpha_1 KO_{j,t} + \alpha_2 XJY_{j,t} + \alpha_3 INCOMESA_{j,t} + \alpha_4 A_3(EU)_{j,t} + \alpha_5 3L(EMBCON)_{j,t} + \epsilon_{j,t} \quad (6)$$

Where $IE_{j,t}$ is individual effects and the other variables are as defined before.

3.2.3 Data Sources

- The dataset of the study is based on a unique series collected from CBS and KNBS (various issues) for export flow (value in Kshs '000) from Kenya to the 25 trading partners (see Appendix, Figure 1) from 1964-2008
- The distance term measure is the great circle distance between Nairobi-Kenya and export destinations' economic centers; the distance in kilometers between Nairobi-Kenya and the trading partner under consideration. This information comes from <http://www.avendo.com/distance>. Obviously this measure has a caveat that it implicitly assumes that;
 - o Overland transport costs are comparable to overseas transport costs, and;
 - o That the capital city is the only economic center of a country. This assumption however, is more appropriate for a small country (Bussiere and Schnatz, 2006) but particularly unsuited for geographically large countries with several economic centers e.g. China and the United States. (For this reason, the variable for China will be adjusted using a weighted average of the distance between Hong Kong and China's mainland).
- Figures on GDP and population are obtained from World Development Index (WDI).

CHAPTER FOUR

4.0 EMPIRICAL RESULTS

This chapter presents the empirical results of the study. The first section gives the descriptive statistics while the next section discusses the results.

4.1. Descriptive statistics

4.1.1 Panel Unit Root Test

This paper analysed the univariate characteristics of the variables. This test is the first step in the panel cointegration based estimation technique (Geda et al. 2009). If all variables in the model are stationary, then the OLS estimation technique can be applied to estimate the relationship between the variables.

There are three main panel unit root tests suggested by different authors; the Levin Lin Chu test (LLC), Im Pesaran and Shin test (IPS) and Hadn test. This study applies the first two tests, the LLC and IPS tests. These tests assume that the autoregressive parameters are common across cross-section (Eita and Jordaan. 2007), with null hypothesis of a unit root. The results are presented below.

Table 1. Unit Root Test Results

Variable	Test		
	LLC	IPS	Decision
Exports	-8.764 (0.002)***	-2.070 (0.001)***	Stationary
Importer's GDP	-10.081(0.000)***	-2.583 (0.000)***	Stationary
Importer's Population	-2.879 (0.0699)*	-0.973	Stationary

Note : •—/••/• denote rejection of the null hypothesis at 1%, 5% and 10% significance level. In parentheses are probabilities.

The LLC test results show that all the three variables are stationary while in the IPS results, the importer's population is not stationary. Since the verdict of stationarity can be drawn from either of the tests, we will adopt the LLC test results to assume stationarity of the variables. When the regression variables are stationary, cointegration test therefore is not necessary. OLS estimation technique will be applied in the model estimation.

4.1.2. Estimation Selection

The augmented gravity- model in equation 5) was estimated by taking all the explanatory variables except the distance and the dummy variables. Kenya's GDP and population variables were found to be irrelevant hence were dropped from the regression model. The descriptive statistics of the model are presented in Table 2.

Table 2. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
logexptij	1125	12.14455	2.200347	6.579251	17.44994
logimpgdp	1125	24.77026	2.515243	18.64382	30.27719
logimppop	1125	16.95784	1.583268	13.86901	21.00995
logdistij	1125	8.396777	.8654558	6.230482	9.482579
comesa	1125	.0897436	.2714139	0	1
eu	1125	.142222	.3494333	0	1
embcon	1125	.5297778	.4993345	0	1

As was mentioned earlier, there are different models that can be estimated in the panel data. These models are pooled, fixed effects (FEM) and random effects (REM) models. The results of these regressions are tabulated below.

Table 3. Pooled, Fixed Effects and Random Effects Regression Results

Dependent Variable: Exports

variable	pooled	fixed	random
logimpgdp	.93085175***	1.2533143***	1.2631316***
logimppop	-.06990807*	1.9433284***	.54219393***
logdistij	-2.0340639***		-3.2421749***
comesa	2.3030242***		1.7588596***
eu	1.0586365***		.65682847***
embcon	.67358697***		.16633405*
N	1125	1125	1125
r2	.7167013	.88302108	.8632
r2_a	.71518092	.88025109	

note: ***/**/* denote significance at 1%, 5% and 10% level.

Pooled model is specifically important because it is used as a baseline for comparison in testing for fixed effects. A significance test is done with an F-test. Should there be significant improvement in R-squared, then there are statistically significant country effects. As can be seen from the tabulated results above, the R-squared has improved by 23%, meaning that there are significant country effects

4.1 J Test for Heteroskedasticity

In the face of Heteroskedasticity, autocorrelation or outliers to contend with, robust estimation may be performed. This was performed in order to obtain robust panel standard errors.

4.1.4 Hausman Test

The research question in the test is whether there are significant correlation between the unobserved and country-specific random effects and the regressors. Table 3 shows the results of the Hausman test statistics. The null hypothesis was rejected in favor of fixed effects meaning that country-specific effects are correlated with regressors, and the random effects model would be inconsistently estimated. In a second test, Breusch and Pagan Lagrangian multiplier test for random effects, the null was again rejected in favor of the alternative. The study therefore adopts the fixed effects model as the model of choice.

4.1.5 Regression with the Fixed Effects Model

A joint test to see if all the dummies for all countries are equal to zero was performed and the null was rejected. Fixed effects therefore are needed.

A second step regression (of equation 6), with the distance and the dummy variables as the explanatory variables and the individual effects as the dependent variable was conducted. These results are presented in Table 4.

Table 4. Dependent Variable: Individual effects

<u>Variable</u>	<u>Coefficient</u>	<u>t-statistics</u>
Distance	-0.19698612	(-2.88)**
COMESA	2.5177117	(13.23)***
EU	2.4379383	(26.00)***
EMB/CON	2.1602824	(23.93)***
R-Squared	0.4962	
<u>Adjusted R-Squared</u>	<u>0.4944</u>	

Note : ***/**/* denote level of significance at 1%, 5% and 10%.

4.2 Discussion of the Results

After estimating the augmented gravity model equation 5), our desired estimated gravity model for Kenya's exports is;

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln(Y_j) + \beta_2 \ln(N_j) \quad (5a)$$

Where β_0 in the regression model;

$\ln(X_{ij})$ is denoted by Logexpt_{ij} .

$\ln(Y_j)$ denoted by $\text{Logimp}_{j\text{gdp}}$ (the importer's GDP) and.

$\ln(N_j)$ denoted by $\text{Logimp}_{\text{pop}}$ (the importer's population).

The regression results in Table 3 column 2 report the coefficients and the level of significance of the explanatory variables namely the importer's GDP and population. These two variables provide most of the explanatory power in the regression. The coefficients of these variables bear positive signs, consistent with the theoretical expectations. The positive coefficient for importer's GDP implies that as the income levels of the importing country increases, so does the country's demand for imports. These estimates suggest that Kenya's exports increase by 1.25% as the importer's GDP increases by 1%.

The importer's population is also statistically significant. The coefficient value is 1.94, suggesting that 1% increase in the importer's population increases Kenya's exports by 1.94%. To the importing country, this could imply that as its population grows, the demand for imports

also goes up in order to sustain the needs of the growing population. The increased demand thus leads to increase in Kenya's exports.

An increase in the importer's income and population are significant to Kenya's exports. The significance of these variables are also reported in such studies by Oguledo and Macphee (1994), Kalbasi (2001), Chan-Hyun (2001), Martinez-zarzoso (2003) and Eita and Jordaan (2007).

The fixed effects explain 88% of the variations of Kenya's export to foreign markets. These estimated fixed effects are reported in Table 3 A in the appendix. With regard to country-specific effects, the results show that these effects are strongly significant except for Denmark, Pakistan, Norway and The Netherlands. Table 3A (appendix) reports these estimated fixed effects. China, India, USA, Japan etc have the lowest propensity to Kenya's exports while Spain followed by Burundi, Uganda, Zambia, Malawi, Ireland etc possess the highest propensity

The distance variable is significant at 5% and bears the anticipated negative sign as shown in Table 4. Distance therefore has an inverse relationship with exports. Distance was factored in as a proxy for transportation costs. The relationship implies that the further away from Nairobi the importer is located, the higher the transportation costs, and therefore less exports to that particular country. The coefficient value of -0.197 indicates that when the distance between Kenya and her trading partner increases by 1%, the value of exports to this destination decreases by approximately 0.2%.

The dummy variables reported positive signs and statistical significance even at 1%. The COMESA variable was found to be significant at 1%. Kenya's exports are 12.4 times higher when the bilateral trade is between a COMESA member state than a non-COMESA member ($EXP\ 2.5177 = 12.4$). Common market is therefore important. Similarly, the EU dummy was also found to be statistically significant at 1%. The coefficient value is 2.4379 implying that exporting to EU member state is 11.4 times higher than non-EU member ($EXP\ 2.4379 = 11.4$). These findings are in conformity with the study by Oguledo and Macphee (1994) which suggested that trade arrangements have statistically significant effects on trade flows.

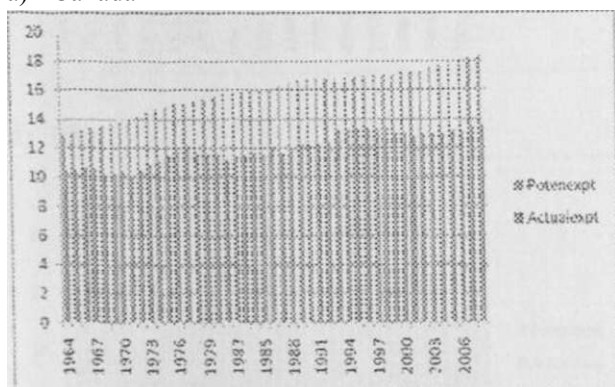
The estimated coefficient for embassy/consulate is 2.1602 implying that exporting to a country where Kenya has an embassy or consulate is 8.67 times higher because of an embassy/consulate ($EXP\ 2.1602 = 8.67$). This suggests that presence of an embassy/consulate in the importing country promotes Kenya's exports in that country. This is consistent with a study by Rose (2005) that presence of foreign missions in the importing countries is systematically linked to a country's exports.

Export Potential

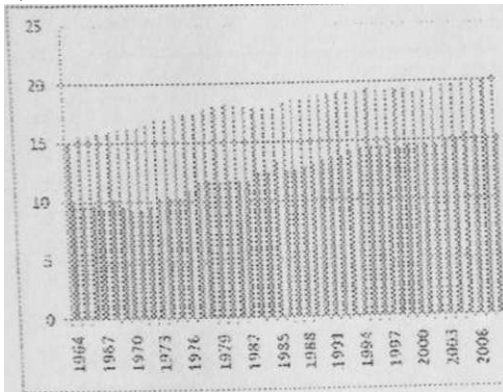
After estimating the fixed effects model, the within sample potential is solved and which is then compared to the actual exports in order to determine if Kenya still has unrealized export potential. Figure 4 shows that Kenya still has unrealized export potential to Canada, France, Greece, Italy, Malaysia, Pakistan, Spain and the United Kingdom.

Figure 4. Actual and Potential Kenya's Exports (in Kshs'000)

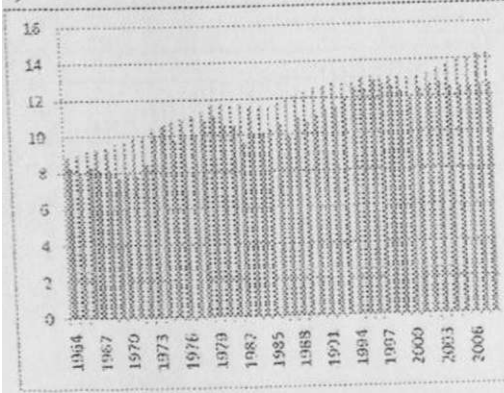
a) Canada



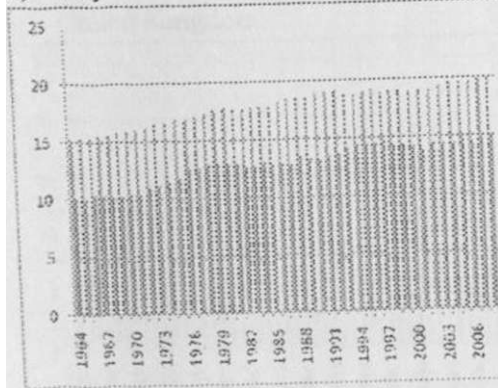
b) France



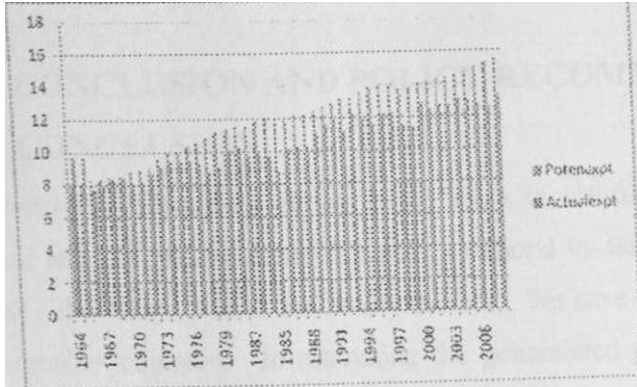
c) Greece



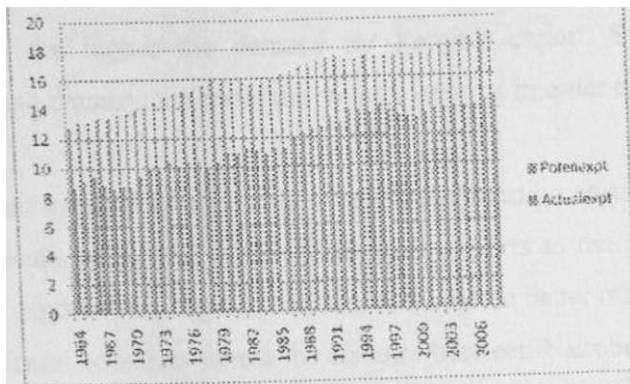
d) Italy



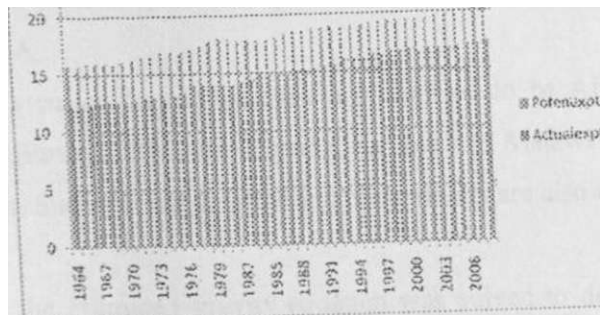
e) Malaysia



f) Spain



g) United Kingdom



Where,

Potenexpt - is the potential exports

Actualsexpt - is the actual exports.

CHAPTER FIVE

5.0 CONCLUSION AND POLICY RECOMMENDATIONS

5.1 CONCLUSION

The overriding objectives of this study were to identify- the factors that explain the export behavior and the determinants of Kenya's exports by taking into account "the trade resistance factors" (the geographical and policy factors). We have established the theoretical justification of the gravity equation. In estimating the generalized gravity model of Kenya's exports, our results show that Kenya's export volume is determined by the economic size (income) and population of the trading partner/importing country. The higher the GDP of the importing country the higher the demand for Kenya's export. Similarly, as population grows in the importing country, the more the country imports in order to sustain her expanding population.

Distance variable is important in that transportation costs influence Kenya's exports negatively. The results show that Kenya's potential exports to the neighboring countries fall short of the actual exports. This implies that Kenya would be better off exporting to her neighboring countries. Le African countries where the distance between Nairobi and the respective economic centers is not as large.

Countries with big GDP and populations tend to import less from Kenya compared to those economies whose GDP and population are not as big. Big populations i.e. population of more than 100 million tend to import less from Kenya. These countries include China, India, Japan and USA.

Kenya's major trading partners are reported to be African countries. The analysis presented Spain, Burundi, Rwanda, Uganda, Zambia and Malawi to form the biggest markets for Kenya's exports. Sudan, Ireland, Israel and Netherlands are also major Kenya's export importers.

When the estimated gravity equation was solved to determine Kenya's trading partners and if Kenya still has unrealized/unexploited export potential, it was found that Kenya has greater unrealized export potential to Canada, France, Italy and Spain and less unexploited potential to UK, Malaysia and Greece.

5.2 POLICY RECOMMENDATIONS

Policy implications of the results obtained show that geographical factors influence Kenya's **exports negatively**. As the distance between Kenya and the export destination country gets large, **so does the** transportation costs. In this sense, it would only be profitable if Kenya has absolute **advantage in** exporting to such countries such that the gains outweigh these transportation costs. **Exporting to** neighboring countries however, would be more profitable since these costs are **minimal**. Kenya should therefore take advantage of the geographical proximity in order to **increase exports and** export more to **COMESA** member countries.

In a case where Kenya's exports have absolute advantage in the foreign market, then there is need to emphasize on value addition on these exportables since Kenya's exports highly depend on foreign demand (the importer's GDP and population as factors that influence exports).

Since Kenya's export pattern is depicted by country-specific effects, these effects need to be sufficiently and adequately taken into account while setting out trade policies with regards to **exports**.

Kenya embassies and consulates abroad should act as export promotion centers with a redirected focus to economic matters in order to strengthen trade ties and hence export promotion.

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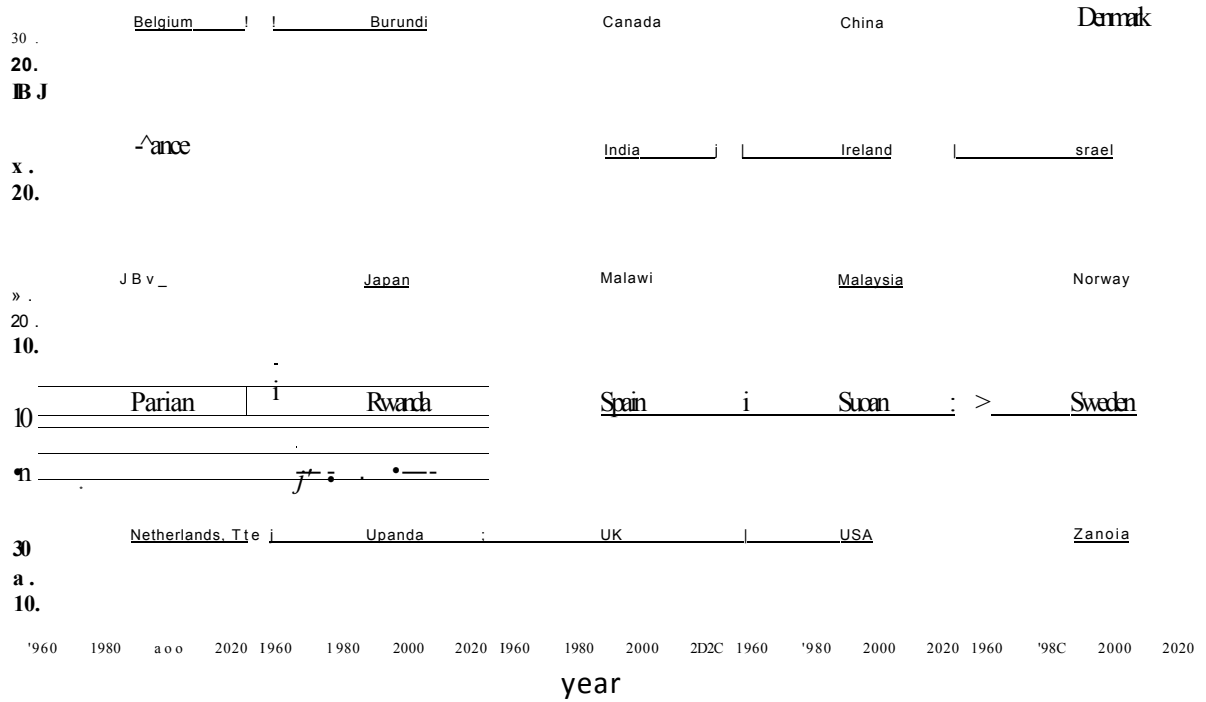
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APPENDIX

Figure 1. Kenya's Exports trend with the importing country's GDP and population



logexptij logimpjgdp
 logimppop

Graphs by id

Where;
 Logexptij natural logarithm of exports from Kenya to export destination country j
 Logimpjgdp natural logarithm of the importer's GDP
 Logimppop natural logarithm of the importer's population

Table 3A Countries included in the estimation and their fixed effects

BURUNDI	6.757232***
CANADA	-4.004246***
CHINA	-11.61***
DENMARK	-.2843114
FRANCE	-5.750522***
GREECE	-1.198469***
INDIA	-9.758663***
IRELAND	2.492386***
ISRAEL	1.661348***
ITALY	-5.126216***
JAPAN	-8.209229***
MALAWI	3.96236***
MALAYSIA	-1.466816***
PAKISTAN	-.2291181
NORWAY	-.2784207
RWANDA	-2.383729***
SPAIN	6.902107***
SUDAN	-4.562415***
SWEDEN	1.20528***
THE	
NETHERLANDS	-.0571605
UGANDA	5.431143***
UNITED	
KINGDOM	-3.358117***
USA	-9.720949***
ZAMBIA	4.232355***