

**ADDIS ABABA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**

**EVALUATION OF ETHIOPIA'S BILATERAL AND POTENTIAL  
EXPORTS IN THE EMERGING COUNTRIES:  
A GRAVITY MODEL APPROACH**

**BY ZELEKE AYALEW**

**JUNE, 2012**

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**A project Submitted to the School of Graduate Studies of  
Addis Ababa University in partial Fulfillment of the  
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(Applied trade policy and analysis).**

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This is to certify that the paper prepared by Zeleke Ayalew, entitled: Evaluation of Ethiopia's Bilateral and Potential Exports in the Emerging countries: A Gravity Model Approach, and submitted in partial fulfillment of the requirements for the Degree of Masters of arts in Economics (applied trade policy and analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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## *Abstract*

### ***Determinants of Ethiopia's Bilateral and Potential Exports in the Emerging Countries: A Gravity Model Approach***

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*Addis Ababa University, 2012*

*Exports are the drivers of economic growth in Ethiopia. Given their importance in the economy, it is necessary to analyze factors that are determining export flows between Ethiopia and its trading partners. A gravity model is very important in the analysis of bilateral trade flows, and has proven to be a useful tool in determining trade or export potential of a country. The purpose of this study is to investigate factors that determine exports of Ethiopia using a gravity model approach. The analysis indicates that increases in importer's GDP and Ethiopian's GDP cause exports to increase, while distance is associated with a decrease in exports. Real exchange rates do not have an impact on export. Ethiopia doesn't export more to countries where it shares a common border. The study shows that there is unexploited export potential to among others, China, India and Brazil. These results are important for trade policy formulation in order ensure that Ethiopia's export potential is exploited in order to enhance economic growth.*

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## ACRONYMS

ASEAN	Association of the South East Asian Nations
COMESA	Common Market for Eastern and Southern Africa
D8 COUNTRIES	Developing 8 countries
EPA	Economic Partnership Agreement
EU	European Union
ESA	Eastern and Southern Africa
GMM	Generalized Momentum Method
GDP	Gross Domestic Products
GNP	Gross National Products
G2SLS	Generalized Two Stage Least Squares
HT	Hausman Test
IGAD	Inter-Governmental Authority for Development
IFS	International Financial Statistics
IMF	International Monetary Fund
NAFTA	Northern American Free Trade Areas
OLS	Ordinary Least Squares
PPP	Purchasing Power Parities
RTA	Regional Trading Arrangements
SAARC	South Asian Association for Regional Cooperation
UNDP	United Nation Development Program
WTO	World Trade Organization

## CHAPTER ONE

### 1.1 INTRODUCTION

International trade has increasingly become an underpinning determinant of economic prosperity in most countries of the world, and Ethiopia is no exception. Our external trading relations increasingly determine the growth and development of the country, and this influence will only increase with bilateral and regional trading agreements.

Considering the current trend of economy that are going to integration and globalization, bilateral trade can play an important role in the expanded presence of countries in international scenes. For developing countries that are not ready to sudden arrival into free trade, bilateral trade agreements and the regional convergence can be the most effective way to gradual opening of national economies and merge them into global economy. The trade gravity model is a powerful tool for explaining the bilateral trade flow and volume, which is widely applied to analyzing the inter-national bilateral trade volumes since the 1960s and estimating trade potentials, identifying the effects of trading partners, explaining the trade patterns and assessing the cost of a border trade (Lin and Wang, 2004; Liu and Jiang, 2002; Sheng and Liao, 2004).

Ethiopia is currently engaged in various trade negotiations aimed at creating new, secure relationships for its further integration within the international community at the regional, bi-regional and multilateral levels. At the regional level Ethiopia is a member of the Inter-Governmental Authority for Development (IGAD); the Sana'a Forum for Cooperation and the Common Market for Eastern and Southern Africa (COMESA). At the bi-regional level Ethiopia is currently negotiating an

Economic Partnership Agreement (EPA) with the European Union (EU) as part of the Eastern and Southern Africa (ESA) bloc. Finally, at the multilateral level Ethiopia is currently negotiating its accession to the World Trade Organization (WTO). While the extent of engagement in the various negotiations varies, increasingly all such negotiations require taking obligations and commitments beyond trade in goods, to include services and a number of trade-related areas. Source:UNDP,(2009).

Ethiopian Customs Authority reveals that the share of the major destinations of Ethiopian exports in terms of individual trading partners or countries for the year 2005 to have been the following: Germany (13.3%), China (9.1%), Japan (7.3%), Djibouti (5.9%), Saudi Arabia (6%), Italy (5%), and the US (4.7%). Indeed during the three years, i.e. from 2004-2006, Germany remained the single most important destination for the Ethiopian exports. In the same period, the second, the third and the fourth, etc places were alternatively taken by other countries. As such these places were occupied in 2006 by Japan, China, Saudi Arabia, Italy and Djibouti; in 2005 by China, Japan, Switzerland, and Saudi Arabia; and in 2004 by the US, Japan, Saudi Arabia and Italy. This means that from Europe, Germany and from Asia, China and Japan were the most important trading partners for Ethiopian exports. A notable fact regarding the destination of Ethiopian exports in recent years is that Djibouti's share went down from 28.05 percent of the total in 2001 to just 5.99 percent in 2005 while that of China's shot up from a meager 0.39 percent to 9.30 percent.

Ethiopian trade is highly dependent on the export of agricultural productivity. Coffee is the prime export product for Ethiopia. Coffee export accounts for approximately 65% of the foreign exchange for the country. As per 2005 data of customs authority of Ethiopia, coffee production engages almost 25% of the working population and contributes 10% to the national production data.

In international trade Ethiopia has poor performance for instance import of Ethiopia as a percent of GDP constituted 24 and 32 while exports accounts only for 12% and 13% in 2000 and 2007 respectively. (World development indicators data base, (2008). Moreover, Ethiopia is a very small country in international trade system with its export and import share of total merchandise trade is only about 0.01 and 0.04 respectively

Being dependent on primary commodities, largest percentages of the country's export are connected with few countries as destiny for the exported products.

In the year 2009, Ethiopia's import volume grossed over US\$6 billion. Ethiopia trade imports include food, machinery, transport equipments, fuel, cereals, vehicles and textiles. China is the largest import partner for Ethiopia. It accounts for over 16% of the total import volumes, based on 2009 data. Saudi Arabia, India, Italy and Japan also have significant share in Ethiopia imports. Owing to heavy import of petroleum products, Ethiopia does not enjoy favorable balance of trade. Source: Economies Watch, (2011)

## **1.2. STATEMENT OF THE PROBLEM**

According to WTO trade profile of 2007, about 70.4 % of Ethiopian exports are destined in the EU and other four none- EU countries. (Digest of Ethiopian national policies strategies and progress, 2008), here it's essential to raise the question why Ethiopian exports are concentrated in few markets and what factors determine Ethiopian bilateral trade. Moreover Ethiopia is a signatory to number of multilateral and regional trade agreements, which present challenge and opportunities.

Many researchers do believe and recommend the need to conduct the major determinates of Ethiopia's exports using different econometric techniques, however only very few studies have been done using gravity model and most of the studies are based on GMM and OLS. Being gravity model is a recent phenomena, fast growing, and Applying in international trade analysis. The present study is based on gravity model

This research tries to explore the major Ethiopian bilateral exports and address the question of whether Ethiopia has untapped export opportunities with the emerging economies (china, India and Brazil).

Most of the empirical literature on gravity model uses total bilateral trade flow as dependant variable. However some empirical studies such as blasetal (2007), rahmanetal use total export flow as dependant variable. This study also uses export as dependant variable.

### **1.3. OBJECTIVE OF THE STUDY**

#### **1.3.1. General objectives**

The general objective of the study has been identify the main determinates of Ethiopians bilateral export and address the question of whether Ethiopia has untapped export potentials with the emerging economies (China, India and Brazil)

#### **1.3.2. Specific objective**

With this line the specific objectives are:

- 1 Identifying the main determinants of Ethiopia's bilateral exports
- 2 Address whether Ethiopia has untapped export potential with the emerging economies ( BRICS: China, India and Brazil) or not
- 3 To suggest possible ways to increase exports to emerging economies.
- 4 Showing for exporter's weather they export products to the emerging economies or not.

### **1.4. SCOPE OF THE STUDY**

The scope of the study is limited to the analysis of main determinants of Ethiopia's bilateral exports and address the question of whether Ethiopia has untapped export potential with the emerging economies like china, India and Brazil for the period of 1999 – 2011. The researcher uses a sample of 15 countries for this study. These are Kenya ,Sudan and Egypt from Africa, Japan , china, India and Yemen are from Asia , United kingdom , Italy ,The Netherlands ,France and Germany from Europe, United States Of America, Canada and

Brazil from the America continent have selected. Countries are selected based on their importance as trading partners and availability of data in the sample period.

In attempting to identify the trade potential that Ethiopia may have in emerging economies; china, India and Brazil, have selected. These three countries have been included in the sample. Selected based on the growing trend of the country being the greet trade center as well as they are emerging economies and the Ethiopian government have given greet attention to the emerging economies.

### **1.5. SIGNIFICANCE OF THE STUDY**

The outcome of the study helps to understand major determinants of Ethiopia's bilateral exports and the untapped export potentials in the emerging economies. Moreover, it is also use as a reference for other researchers who want to make their study on this topic.

Policy makers can use for reference and they can take to draw policy implication.

### **1.6. LIMITATION OF THE STUDY**

The study encountered the following limitations:

- ✓ Limitation of organized data in one place.
- ✓ It is not possible to get research paper that done on this issue.
- ✓ The researcher faced material and money shortage.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 THEORETICAL LITERATURE REVIEWS

The gravity model was first applied to international trade in the early 1960s. Among others, Tinbergen (1962) and Pöyhönen (1963) were the first to apply the gravity model to international trade. In the latter half of the twentieth century, the gravity model has been used to explain migration and other social flows in terms of gravitational forces of human interaction. Like in physical science, the bigger and closer the units are to each other, the stronger the attraction. The comparison with gravity derives from gross domestic product (GDP) being a proxy for economic mass and distance a proxy for resistance.

The gravity model performed well in analyzing the international trade flows in the early 1960s but strong theoretical foundations were not produced until the end of the 1970s. This led to many studies to modify the original Newtonian gravity equation. From the works of Anderson (1979) and Bergstrand (1985, 1989) it became clear that the gravity equation is a good representation irrespective of the structure of product markets. Bergstrand (1985, 1989) included population size while Oguledo and Macphée (1994) included price variables.

The best-known theoretical rationale for the idea that bilateral trade depends on the product of GDPs comes from work by Helpman (1987) and Helpman and Krugman (1985).

The gravity model applied in economics focuses on the economic conditions and geographical distances. According to this model, the more strong economies of two

regions and/or the less geographical distances between economies, the more trade flows, migrations of labor and information flows between these regions. In the framework of this model, we can enter the obstacles and persuasions (in the form of quantitative and qualitative variables) into model and investigate the effects of them on bilateral trade (Harris & Matyas, 1998).

While the core gravity equation has been used for empirical analysis since the econometric studies of trade by Tinbergen (1962) and Poyhonen (1963), the theoretical foundations to the model are of more recent origin. The most classic and early application of the model to international trade was perhaps by Linnemann (1966).

Trade theorists have found the model to be consistent with theories of trade based upon models of imperfect competition and with the Heckscher – Ohlin model. Frankel (1997) credits Helpman and Krugman (1985) for the standard gravity model. The derivation of a proportionate relationship between trade flows and country size, as given by Helpman do not include a role for distance. There are several reasons, though, for the inclusion of distance as an explanatory variable. Some of these explanations are as follows:

- ✓ -Distance is a proxy for transport costs;
- ✓ -Distance is an indicator of the time elapsed during shipment. For perishable goods the probability of surviving intact is a decreasing function of time in transit;
- ✓ Synchronization costs: when factories combine multiple inputs, the timing of these needs to be synchronized so as to prevent emergence of bottlenecks. Synchronization costs increase with increasing distance;

- ✓ Transaction costs: distance may be correlated with the costs of searching for trading opportunities and the establishment of trust between potential trading partners; and
- ✓ -Cultural distance: It is possible that greater geographical distance is correlated with larger cultural differences. Cultural differences can impede trade in many ways such as inhibiting communication, clashes in negotiating styles etc.

Bergstrand's (1985) version of the imperfect substitute's theory incorporated a role for shipping costs, proxied in practice by distance. More recently, Deardorff (1995) has derived the gravity model from Heckscher-Ohlin theory. Deardorff shows that the gravity model can be derived from two extreme cases of the classical framework of the Heckscher- Ohlin model. The first case is frictionless trade, in which the absence of all impediments to trade in homogenous products causes producers and consumers to be indifferent among trading partners. Resolving this indifference randomly expected trade flows to correspond exactly to the simple frictionless gravity equation if preferences are identical and homothetic or if demands are uncorrelated with supply and they depart from that equation systematically when there are such correlations. The second case is that different countries produce distinct goods, as in the H-O model with complete specialization. Expression for bilateral trade are derived, first with Cobb-Douglas preferences and then with constant elasticity of substitution (CES) preferences. Distance is included in the second of the two models.

Trade theories based upon imperfect competition and the Heckscher-Ohlin model justify the inclusion of the core variables – income and distance. Most studies

have, however, included additional variables to control for differences in geographic factors, historical ties and at times economic factors like the overall trade policy and exchange rate risk.

The gravity model of international trade has a remarkably consistent history of success as an empirical tool. The elasticities of trade with respect to both income and distance are consistently high, signed correctly and statistically significant in an equation that explains a reasonable proportion of the cross-country variation in trade. It is to be noted however, that, in analyzing trade between country A and B, the gravity model makes no provision for third party effects ,i.e. the model does not take into account the conditions and opportunities that prevail between A and C and B and C.

## **2.2 EMPIRICAL LITERATURE REVIEWS**

Gravity model has acceptance in various applied studies. From those used to analyze bilateral trade flows between countries, to measure main determinants of international trade, cultural and institutional determinants of bilateral trade flows, identify potential trade and measures the impact of regional trade agreements. Some of the applications of the model are discussed below.

Gert-Jam M.linders, (2004) applied the gravity model to analyze cultural and institutional determinants of bilateral trade of the intangible costs of international trade by extending the basic gravity equation with measures of cultural and institutional distance, and institutional quality. Analyzing a sample of bilateral trade flows between 92 countries in 1999, they found that institutional distance has a negative effect on bilateral trade, presumably because the transaction costs of

trade between partners from dissimilar institutional settings are high. In contrast, cultural distance has a positive effect on bilateral trade. A potential explanation for this finding is that firms prefer trade to host-country production in culturally distant countries. Finally, they found that the institutional quality of both the importer and exporter increases the amount of bilateral trade.

Mohammad M.Rahman (2000) applies the generalized gravity model to analyze the Bangladesh's import trade with its 35 major trading partners using panel data estimation technique. His study shows that Bangladesh's imports are determined by the inflation rates, per capita income differentials and openness of the countries involved in trade. Also the country's imports are found to be influenced to a great extent by the border between India and Bangladesh. The country specific effects show that the influence of neighboring countries is more than that of distant countries on Bangladesh's imports.

Batra (2004) endeavored to estimate the trade potential for India using the gravity model approach. This study has used an augmented gravity model to first analyze bi-lateral trade flows between India and all its trading partners and the coefficients thus obtained were then used to predict the trade potential for India. The gravity model has been estimated using the Ordinary Least Squares (OLS) estimation technique with cross-section data for the year 2000. The dependent variable was total merchandise trade (exports plus imports in US dollars), in log form, between pairs of countries. The estimation results showed that the gravity equation fits the data well, explaining about 70 percent of the variation in bi-lateral trade across the sample of countries. It also delivers precise and plausible income and distance elasticities and estimates for other geographical, cultural and historical characteristics. Specifically, the income elasticity comes to 0.87, while the distance

elasticity is -1.11. Both of these elasticities are significant at the 1 percent significance level. As far as trade potential was concerned, the results showed that the magnitude of India's trade potential was the highest with the Asia-Pacific region followed by Western Europe and North America. With regards to individual countries, China, United Kingdom, Italy and France revealed maximum potential for expansion of trade with India. Among specific country grouping/trade arrangements, India's trade potential was revealed to be the highest with Pakistan in South Asian Association for Regional Cooperation (SAARC) and with the Philippines and Cambodia in the Association of the South East Asian Nations (ASEAN).

In a study by Rahman (2003), attempts were made to provide a theoretical justification for using the gravity model in the analysis of bilateral trade and apply the generalized gravity model to analyze Bangladesh's trade with its major trading partners using panel data estimation technique. The paper estimated gravity models of trade (sum of exports and imports), exports and imports. The results showed that Bangladesh's trade is positively determined by the size of the economies, per capita GNP differential of the countries involved and openness of the trading countries. Furthermore, it was shown that the major determinants of Bangladesh's exports are: the exchange rate, partner countries' total import demand and openness of the Bangladesh economy. All three factors affect Bangladesh's exports positively. The exchange rate, on the other hand, has no effect on Bangladesh's import; rather it was depicted that imports are determined by inflation rates, per capita income differentials and openness of the countries involved in trade. Transportation cost was found to be a significant factor in influencing Bangladesh's trade negatively. Also, Bangladesh's imports were found to be influenced to a great extent by the border between India and Bangladesh. The

country specific effects showed that Bangladesh would do better by trading more with its neighboring countries. Multilateral resistance factors affect Bangladesh's trade and exports positively.

Christie (2002) estimated a classical gravity model for trade on aggregate trade volumes between OECD and transition countries. The results were then used to analyze and make projections on trade flows into and out of Southeast European countries following scenarios on potential GDP levels and possible membership of institutions. Alternative variables were also used, namely transport times instead of geographical distance, and GDP in PPP instead of nominal. It was seen that replacing distance with transport times does not lead to great improvements in the model's performance. The use of GDP at PPP was presented mainly to try to deal with specific situations where local prices prevail. The striking feature that emerged in Southeast Europe was of flows of extreme values, in some cases far below, but in others far above, what classical gravity model estimates show. The main conclusion of this paper was that Southeast Europe can no longer be viewed as a region from the point of view of aggregate trade flows.

Kalbasi (2001) considered the volume and direction of trade of Iran and 76 other countries' using the gravity model. The major issue in this analysis was to explore why some countries are over or under-traded relative to the predicted trade flows of the model. The study tried 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. These were done by analyzing the results of different equations predicting trade flows.

Zahra Nikbakht, Leili Nikbakht (2008) tries to investigate the bilateral trade among D8 (Developing eight) Islamic countries group, using the generalized gravity model, the researcher used data on the eight countries of D8 members, Iran, Turkey, Pakistan, Bangladesh, Malaysia, Egypt and Nigeria, obtained from International Financial Statistics (IFS), and published by the International Monetary Fund (IMF) from 1985 to 2007.

The results on gross domestic products (GDP) of host and guest countries and geographical distances are consistent to gravity theory. Furthermore, the variables denoting of differences in economic structures and economic openness have a positive relationship to bilateral transactions flows.

Yenteshwar Ram and Biman Prasad (2006) tried to estimate Fiji's trade potential using the gravity model approach. They used an augmented gravity model to first analyze world trade flows and the coefficients thus obtained are then used to predict trade potential for Fiji. The gravity model has been estimated using the OLS technique with cross-section data for the year 2005. The dependent variable is total merchandise trade (exports plus imports in US dollars), in log form, between pairs of countries. Their estimation results showed that the gravity equation fits the data well and delivers precise and plausible income and distance elasticities and estimates for other geographical, cultural and historical characteristics. The results indicate that the magnitude of Fiji's trade potential is highest with the Asia-Pacific region followed by Western Europe and North America. Countries like Australia, New Zealand and Thailand reveal maximum potential for expansion of trade with Fiji. Among specific country groupings/trade arrangements, Fiji's trade potential is revealed to be the highest with Samoa in PICTA, Papua New Guinea in MSG, Australia in SPARTECA-TCF and with the United Kingdom in the EPA.

Yishak T. Taye (2009) identified and empirically analyzed determinants of export performance of Ethiopia. It begins with a novel decomposition of the growth in countries' exports into the contribution from internal supply-side and external market access conditions.

Building on the results of this decomposition, it moves on to an econometric analysis of the determinants of export performance. A gravity model is employed with panel data using 30 Ethiopia's trading partners for the period 1995–2007. The model is estimated with the Generalized Two Stages Least Squares (G2SLS) method. Endogeneity of FDI and GDP to exports, heteroskedasticity and serial correlation for AR (1) are controlled.

The results suggested that supply side conditions are major factors for Ethiopia's export performance. The results showed that good institutional quality and internal transport infrastructure appear to be major determinants, whereas the real exchange rate and FDI have no statistically significant effect on Ethiopia's export performance. Furthermore, the growth of domestic national income affects Ethiopian exports positively.

Foreign market access conditions also play a significant role. The results indicate that import barriers imposed by Ethiopia's trading partners do play an important role in determining the volume of Ethiopian exports. Moreover, export performance is positively related to Ethiopia's trading partners' national income, and distance, which is a proxy for transport costs, affects Ethiopian exports negatively.

Carlos Carrillo and Carmen A Li (2002) apply the gravity model to examine the effects of the Andean Community and Mercosur on both intra-regional and intra-industrial trade in the period 1980-1997. After accounting for size and distance effects, the Andean Community preferential trade agreements had a significant effect on both the differentiated and reference products, in particular capital intensive goods. In contrast, Mercosur preferential trade agreements only had a positive effect on the capital intensive subcategory of the reference products.

Stephen Redding and Anthony J. Venables (2002) investigated the determinants of countries' export performance looking in particular at the role of international product market linkages. They begin with a novel decomposition of the growth in countries' exports into the contribution from increases in external demand and from improved internal supply-side conditions. Building on the results of this decomposition, they move on to an econometric analysis of the determinants of export performance. Results include the finding that poor external geography, poor internal geography, and poor institutional quality contribute in approximately equal measure to explaining Sub-Saharan Africa's poor export performance.

Joel Hinaunye Eita (2007) Exports are the drivers of economic growth in Namibia. Given their importance in the economy, it is necessary to analyse factors that are determining export flows between Namibia and its trading partners. A gravity model is very important in the analysis of bilateral trade flows, and has proven to be a useful tool in determining trade or export potential of a country. The purpose of this study is to investigate factors that determine exports of Namibia using a gravity model approach. The analysis indicated that increases in importer's GDP and Namibia's GDP cause exports to increase, while distance and importer's GDP per capita are associated with a decrease in exports. Namibia's GDP per capita and

real exchange rates do not have an impact on export. Namibia exports more to countries where it shares a common border and SADC as well as to the European Union. The study showed that there is unexploited export potential to, among others, Australia, Belgium, Kenya, Mauritius, Netherlands, Portugal, South Africa, Switzerland and the United Kingdom. These results are important for trade policy formulation in order ensure that Namibia's export potential is exploited in order to enhance economic growth and generates employment.

Nuno Carlos Leitao (2010) examined the determinants of bilateral trade between United States and NAFTA, European Union, and AŞEAN countries in the period 1995-2008, using panel data. In their study they revisited the recent contribution as in Egger (2000, 2002), Baltagi et al. (2003) and Serlenga and Shin (2007), Faustino and Leitão (2008), and Kabir and Salim(2010).

The findings indicate that United States' trade flows follow the Linder hypothesis, while the bilateral trade is associated with Heckscher-Ohlin- Samuelson theorem. Results showd that geographical distance is negative and significant; i.e., trade increases if the transportation costs decrease. They also introduced the economic dimension, productivity and common border; these proxies confirm the positive effects in bilateral trade. And results confirmed the hypothesis that foreign direct investment is positively correlated with trade.

Joshua J. Lewer and Hendrik Van den Berg (2007) gravity model of international trade is a useful and popular regression model for testing hypothesized influences on trade flows between pairs of countries. Immigration is likely to respond to gravitational forces and distance in a similar fashion. Their study showed that a gravity model of immigration can be used to test the marginal influence of

additional variables on immigration. They used Gravity regressions using panel data on total legal immigration to each of 16 destination countries from all source countries throughout the world for the ten years 1991–2000.

Brigitte Unger (2009) analyzed money laundering by 'gravity model', they assumed that the percentage of its criminal proceeds that a country sends to another country, depend on this latter country's attractiveness for laundering, the GDP per capita of this country and on the geographical, social and cultural distance between these countries. A strict anti money laundering policy, very high corruption and a lot of political conflicts will deter launderers, while big financial markets and high bank secrecy will attract them. The higher the GDP per capita of a country, the richer it is, the more money for laundering it will attract, because money can easier be hidden in a large and wealthy economy than on a poor island. If countries are very distant from each other in the sense that they do not trade much with each other, do not speak same language, and have no historical colonial experience with each others, less money will be sent to them for laundering purpose.

T.N. Srinivasan and Vani Archana (2009) study contributes two strands of literature on empirical models of trade flows and trade policy. The first and the older strand is that of gravity models of bilateral trade flows going back to Hans Linneman (1966) and Tinbergen (1962) and its recent applications, particularly by Adams et al (2003) and De Rosa (2007) in analyzing the impact of Preferential Trade Agreements (PTAs). Their focus is on applying the gravity model to analyze India's trade flows (exports and imports) with its trading partners around the world and to examine the impact of various preferential trade areas in which India or its trading partner or both are members. Clearly this is of interest, since, from 1991 India is aggressively negotiating and concluding preferential trade areas of which

South Asian preferential trade (and later free trade) agreement is the most prominent. They find that India is not well served by its pursuit of preferential trade areas and should instead push for multilateral trade liberalization by contributing to conclusion of the Doha round of negotiations with an agreement beneficial to all world trade organization members.

The second and the more recent strand is the analysis of trade flows using data on exports of individual firms. It is well known that in all countries of the world relatively few firms participate in world trade, thus suggesting that characteristics of a firm (such as its size and productivity) are relevant besides country level barriers on trade matter for participation in world trade. This strand is rapidly growing. The study attempts at modeling and estimating the decision of Indian firms on their participation using firm level data. Their paper reports preliminary results. They also collected primary data from a sample survey of firms to explore this issue deeper.

Laura serelnga and yeongcheolshin (2004) follow recent developments of panel data studies surrounding the use of common time effects, and advance an alternative estimation framework in which they explicitly allow for the existence of observed and/or unobserved common time-specific factors and individual responses to those common factors are heterogeneous across country pairs.

They applied gravity model with two stage least square estimation technique along with the conventional approaches to a comprehensive analysis of the gravity equation of bilateral trade amongst the 15 European countries over 1960-2001. Empirical results clearly demonstrate that their proposed approach fits the data reasonably well and its estimations results are sensible in a number of different dimensions. In particular, their proposed (extended) HausmanTest (HT) estimation provides much more sensible results than the conventional approach based on the

fixed time dummies, especially in terms of the impacts of individual specific variables such as distance, common border and language dummies. They further noticed that their proposed HausmanTest (HT) estimation results produce more sensible predictions on the impacts of differences in factor endowments and of the common currency dummy on intra-European trade flows than the conventional approach with and without fixed time dummies. This observation may indicate the importance of properly accommodating a certain degree of cross section dependence through unobserved heterogeneous time effects; otherwise the resulting estimates would be severely biased. A couple of extensions will be desirable. First, it would be worth investigating the effect of globalization on transport costs more explicitly. For instance, transport and communication revolutions should lead to a dispersion of economic activity. Although this dispersion did not occur with the reduction in transportation costs during the first wave of the globalization in the 20th century, the second wave of globalization associated with recent information and communication technologies revolution should lead to an integrated equilibrium view of the 'death of the distance'. Hence, it would be interesting to study the effect of an 'augmented' trade-barrier function which make transport costs both dependent on and independent of distance in addition to the standard trade-barrier function that only comprehend variables like distance, common language and common border dummies as employed in their study. Secondly, analyze the gravity models of international trade over different time periods. For instance, the impacts of intra- and inter-industry trades will be different over different time periods, and thus they expect that the role of certain explanatory variables such as European monetary union (EMU) changes accordingly. Of the particular importance will be to reexamine the issue concerning the impacts of the Euro on the bilateral intra-EU trade once the data over the longer time periods will be available, they argue that the insignificantly

estimated impact of the European monetary union(EMU) dummy might be due to the shortage of observations.

D. Greenaway and C. Milner (2002) ,Gravity models have been extensively used to evaluate the trade effects of regional trading arrangements, (RTAs), from 1993 to 2002. Questions addressed by researchers include, is there a regional bias to trade and are there identifiable trade effects attributable to RTAs? Their study reviewed the evidence extant from this literature and evaluated the modeling and methodological issues confronted when applying gravity modeling to the analysis of regionalism. Their paper argued that the approach has a distinctive role to play in evaluating trade effects and its application has been enhanced by both the refinement of theoretical underpinnings and development of econometric technique.

## CHAPTER THREE

### 3. METHODOLOGY OF THE STUDY

#### 3.1. DATA SOURCES

The type of data that required in this study includes import , export ,GDP per capita , population , exchange rate ( ER ) and consumer price index ( CPI ) of Ethiopia and the 15 trading partners and the distance of trading partners from Ethiopia .

The data will extracted only from secondary sources including books, CD – Rooms of the national bank of Ethiopia (NBE), central statistical authority (CSA), ministry of trade (MOT), Ethiopian costumes authority and from internet sources.

#### 3.2. MODEL SPECIFICATION

The gravity model is organized from the Newtonian gravitational force law. Tinbergen (1962) and polyhowen (1963) had applied the Newtonian gravitational force law to find trade relationship among countries. The basic concept of the model states that the volume of trade between two countries is proportional to their respective economic masses and inversely proportional to the distance between them, Which is explained as follows (ram and prased, 2006)

$$Trade_{ij} = \alpha \frac{M_i M_j}{Distnce_{ij}} \dots\dots\dots(1)$$

Where:  $M_i$  and  $M_j$  are economic masses of country i and j while  $Distnce_{ij}$  is represents the distance between country i and country j. For empirical estimation,

normally the gravity model has been used in linear form while the coefficients represent elasticities of bilateral trade to be estimated parameters (BUTT, 2008). Taking this fact in account and applying the basic concept of the gravity model gives us the following linear form of the equation:

$$\ln Trade_{ij} = \alpha + \beta_1 \ln M_i + \beta_2 \ln M_j - \beta_3 \ln DIS_{ij} + \varepsilon_{ij} \dots \dots \dots (2)$$

where  $Trade_{ij}$  is the trade flow between countries that may take total trade flow , average total trade flow or only export or import flow of a country and  $M_i$  and  $M_j$  are economic mass of the two countries which can be represented by economic variables such as GDP , GNP , per capita GDP , per capita GNP and population , and the variable  $DIS_{ij}$  stands for distance between trading countries as a proxy for transportation cost .

The model which the researcher going to use is generally augmented by country - pair specific and time specific dummies to control for omitted ( unobservable variables ) that are cross sectional specific but remain constant over time and common shocks affecting all countries in the sample respectively . Cheng and wall (2005), cited by Rahman et al (2006), noted that the incorporation of country -pair specific fixed effect is the best way to control for heterogeneity in gravity model.

For this study, the form of the gravity model which the researcher going to use takes the following form,

$$\ln X_{ijt} = \beta_0 + \alpha_t + \beta_1 \ln GDPpc_{it} + \beta_2 \ln GDPpc_{jt} + \beta_3 \ln POP_{it} + \beta_3 \ln POP_{jt} + \beta_4 \ln RER_{it} + \beta_5 \ln DIS_{ij} + \beta_6 GSP_{ijt} + \beta_7 ADJ_{it} + \theta_{ij} + \varepsilon_{it} \dots \dots \dots (3)$$

Where

$X_{ijt}$  is the export flow from country  $i$  to country  $j$  at time period  $t$ .

$\theta_{ij}$  the country pair fixed effects

$\alpha_t$  the year ( time ) specific effects

$GDP_{PCj}$  the GDP per capita of exporter country at time period  $t$  measured in term of dollars.

$GDP_{PCi}$  the per capita of importing country  $j$  at time period  $t$  measured in term of dollars.

$POP_{it}$  the population of country  $i$  time period  $t$ .

$POP_{jt}$  the population of country  $j$  time period  $t$ .

$RER_{ijt}$  the real exchange rate between exporting and importing country at time period  $t$ .

$DIS_{ij}$  the distance between exporting country  $i$  and importing country  $j$  measured in kilometers.

$GSP_{ijt}$  binary dummy taking the value of the country  $j$  often generalized system of preference scheme (GSP ) and exporting country in the member of the beneficiary of the scheme, zero otherwise .

$ADJ_{it}$  binary dummy taking the value of one if pair countries in concern are adjacent (share common border), zero otherwise.

$\varepsilon_{it}$  White noise disturbance term.

### 3.3 Estimation Technique

Econometric techniques will be used to address the objective of the paper for this study. Specifically the augmented gravity model will be estimated by G2SLS estimation technique.

Madala (2002) states that it is preferable to use truncated regression model when we have no data on either the dependent variable or explanatory variable for some countries and a simple tobit if we have full observations on explanatory variables but some missed observations of the dependent variable for some countries. However, the researcher collected the data samples of the selected countries in the sample period and has complete data. Hence, use neither simple Tobit nor truncated regression. Rather in order to identify the major determinants of Ethiopia's bilateral export, the specified augmented gravity model is estimated by generalized two stage least squares to (G2SLS) estimation method. The Hausman specification test also confirms the model to be random effect; failing to reject the null hypothesis.

Table1; Generalized Two Stage Least Square (G2SLS) IV Regression Result:  
Dependent Variable log of Ethiopia's total export to its trading partners.

Explanatory variables	coefficient	t-ratio	p-value
Constant	-4.421242	-1.56	0.621
LnGDPpc <sub>it</sub>	1.499925	4.86	0.003
LnGDPpc <sub>jt</sub>	0.865714	4.72	0.000
LnPOP <sub>it</sub>	0.427224	0.36	0.784
LnPOP <sub>jt</sub>	0.4010242	2.65	0.018
LnRER <sub>ijt</sub>	0.7621341	1.28	0.242
LnDIS <sub>ij</sub>	-0.9421218	2.72	0.009
GSP <sub>ij</sub>	-0.4212312	1.48	0.152
ADJ <sub>ijt</sub>	0.00116	2.41	0.031

R-sq:within= 0.2527  
Between = 0.8687  
Overall = 0.5251  
Wald chi2 (8) 97.45  
Number of Observations 180  
Prob> chi<sup>2</sup>0.0000  
Sigma'u 0.42  
Sigma'e 1.09  
Rho 0.13 (fraction of variance due to U ; )

From the above table, the coefficient on the GDP per capita of both exporting and importing countries are positive and statistically highly significant, indicating that all other things remains constant, a one per cent increase in GDP per capita of exporting and importing countries, increases bilateral trade by approximately 1.5 and 0.86 percent respectively.

The estimated coefficient on distance has negative sign and is statistically significant. It implies that, other things remain constant, trade between a pair countries falls by 0.95% for every 1 per cent increase in distance between them and vice versa

The estimated coefficient of adjacency between countries is positive and statistically significant implying that Ethiopia exports increase to neighboring countries that share common border with it. Real exchange rate (RER), though have the expected positive sign which is to mean depreciation of country's RER improves bilateral trade and vice versa, it is found statistically insignificant showing that it has little impact on bilateral trade between Ethiopia and importing countries

The estimation result also shows that the population of the exporter country has positive but statistically insignificant impact on the country's exports. On the other hand, importer population has a positive as well as statistically significant impact on the country's exports implying that bigger countries import more than smaller countries and smaller countries import is smaller.

On the other hand, the sign of generalized system of preference has positive sign and it is near to zero which means the generalized system of preference doesn't affect bilateral trade either positively or negatively.

Between Ethiopia and its trading partners, the above estimated coefficients of the gravity model are also used to predict the country's export potentials that it may have in emerging economies.

To solve the problem of over or under estimating the country's export potentials that may arise due to the fluctuations of the country's exports from year to year, we have averaged five years exports of the country and then the predicted exports are compared with these averaged actual exports.

The actual, predicted and the potential of export that Ethiopia may have in the selected three emerging economies are presented in table 2 bellow.

Table 2: Actual and Potential Bilateral Exports of Ethiopia in the selected Middle Eastern counties from the Estimated Gravity Model.

Exporting Country	Importing Country	Actual Export	Predicted Exports	Export Potentials
Ethiopia	CHINA	232,736,666.00	296,840,725.00	63,975,297.00
Ethiopia	INDIA	21,704,561.00	48,629,221.00	26,924,660.00
Ethiopia	BRAZIL	39,360.00	42,420.00	3060.00

From the above table China is the highest untapped potentials for Ethiopia's exports. This indicates that Ethiopia has not yet exploited its exports market in china, which is significantly large amount. The result shows that Ethiopia can

expand its export more by about 64 million US dollar to china. On the other hand Ethiopia can expand its export more by about 27 million us dollar to India. The export potentials of Ethiopia with Brazil is insignificant. On the aggregate level, the gravity model identifies the amount of untapped export potentials that the country could have in the respective countries. However, in order to exploit these sizeable amounts of untapped export potential another analysis is essential. Hence, in the following section the study employs Index of trade Conformity (ITC) to identify commodities that could highly contribute to increase the country's export potentials in the selected countries.

### **3.4 Index of trade conformity (ITC)**

Linnemann and Beers (1988), explained that the ITC can be used to measure the extent of overall similarities between a country's (j) export structure and a trade partner country's (K) import structure by commodity.

The former implies the potential that country J's export to country k can be increased. In turn the latter implies the potential that country j's imports from country k can be increased (Nam, 2004).

Understanding the importance of this index and as a complimentary with estimated potential using the estimated gravity model, the study has applied it to Ethiopia and tried to identify potential that Ethiopia's export can be increased in countries such as china, India and Brazil. Since trade structure as the share of each commodity in the aggregated trade of an economy may fluctuate year by year, we have used and analyzed the import and export data of three emerging economies with 5 year 2007 to 2011. We can get some what stable trade

structure by averaging the trade share of each commodity for some years (Nam, 2004).

In doing so, the study concentrated in identifying export potential that Ethiopia could have in the selected countries rather than identifying trade potential between china and India and brazil and vice versa.

As it is shown in table three bellow, Ethiopia has relatively large ITC measures between its export structure and import structure of Brazil and India while it is relatively low with china.

Table 3: ITC measures between Ethiopia, and the selected emerging economies.

<b>Destination</b> <b>Origin</b>	<b>China</b>	<b>India</b>	<b>Brazil</b>	<b>Ethiopia</b>
Ethiopia	0.214	0.268	0.413	n.a
China	n.c	n.c	n.c	0.673
India	n.c	n.c	n.c	0.313
Brazil	n.c	n.c	n.c	0.414

Where: n.c and n.a stand for 'not calculated' 'not available' respectively

This implies that Ethiopia has relatively larger potential to increase its exports to all china, Brazil and India. Fascinatingly, this result also confirms the findings of the above gravity model. For the reason that the country can largely exploit its

export potential, only if it has large potential to increase its exports in that country. Otherwise, plenty amount of export potentials may remain unexploited. This is the reason why we found relatively larger ITC measure for India(0.268),brazil (0.417) and china (0.214), which are amount of unexploited export potential in the above gravity model.

Furthermore, the reason for the finding of large amount of unexploited export potential in china from the estimated gravity model can also be explained by the low ITC measure between Ethiopia and china. This implies that the country has low potential to increase its export to china (0.214) and china intern has relative low potential to increase its import from Ethiopia. Though the potential that Ethiopia can increase its export to china seems relatively small.

### **3.5 Export/Import Coverage**

Is a measurement of trade balance. It shows whether or not a country's imports are fully paid for by exports in a given year. In general, economists expect that the trade balance will be zero in the long run, thus imports are financed by exports, but it may vary considerably over shorter periods.

Export/Import Coverage shows the ratio of total exports to total imports and The values for this index range from 0 when there are no exports to  $+\infty$  when there are no imports. A ratio of 1 signal full coverage of imports with exports (Mia Mikic and John Gilbert, traded statistics (2007), this index is used to calculate the ratio of total exports to total imports as follow:

Table 4. Export/Import Coverage of Ethiopia/in million dollars

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Export of Ethiopia	0.46	0.48	0.59	0.85	0.99	1.16	1.38	1.45	1.89	2.00
Total import of Ethiopia	1.7	1.86	2.59	3.64	4.38	5.14	6.84	8.15	8.32	10.16
Export/import coverage of Ethiopia	0.27	0.25	0.23	0.23	0.22	0.22	0.20	1.77	0.23	0.22

From the above table, the export/import coverage is less than one and this shows Ethiopia's exports haven't covered the imports from other trading partners. All are less than 0.3 and which means less than 30 percent of Ethiopian imports are covered by its exports. This also shows Ethiopia is under trade deficit.

## CHAPTER 4. CONCLUSION AND RECOMENDATION

### 4.1. Conclusion

International trade is one of the most expedient economic factors in pushing economies to transition and integration. The main determinants of Ethiopian's bilateral trade in addition to the potential exports that the country may have in emerging economies are identified in this paper.

By using the specified Gravity model of bilateral trade flow with 13 years (1999-2011) data of the 15 major Ethiopian trading partners, the researcher found that, the GDP per capita of both exporting and importing and the population of importing countries significantly and positively affect Ethiopians bilateral export. Whereas, the population of the exporting countries and Real Exchange Rate between trading countries, have the expected positive sign but have been found to have insignificant impact on the country's export. On the other hand, the distance between the exporting and importing countries is found to be the significant variable that negatively affects the volume of trade between countries. The dummy variable for GSP (EBA) presents positive sign but is close to zero and statistically insignificant; suggesting that belonging to EBA's preferential arrangement has no impact in fostering Ethiopia's exports.

In attempting to try to address the question whether Ethiopia has export potential in the selected emerging economies, we have employed the estimated gravity equation supplemented by a more disaggregated analysis using Index of Trade Conformity. The ITC index calculated and compared between Ethiopia on one side and china, India and Brazil on the other side.

The Findings of the gravity equation reveal that Ethiopia has the highest unexploited export potentials with china. On the other hand, the ITC measures for trade complimentarily in terms of Ethiopia's export and trading partners import are found relatively high with India (0.264) and Brazil. (0.413) and low with china (0.214). This implies that Ethiopia has better potential to increase its exports highly to Brazil and India.

## **4.2. RECOMENDATION**

Policy makers should designing trade policies that aimed at increasing Ethiopia's bilateral export and they should pay due attention to variables that are large in magnitude and statistically significant.

Second, the government should focus on products that have good quality and quantity with high export potential.

Third, any kinds of bureaucracy that discourages export should be eliminated and all possible means of trade facilitating mechanisms between countries should be maintained in order to fully exploit the untapped export potential of the country.

Fourth, the government should give better information to the exporters about export products and to which country could exported.

As a final point, the country also requires undertaking a detailed research and able to identify and prioritize the countries as well as types of products on which it has better export potential. In addition, to reach at better conclusion and design valuable and practical trade policies, a detail as well as broad based further research should be under taken. Further development of the gravity approach to explore Ethiopia's international trade flows and predict changes in trade patterns is need.

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## DECLARATION

I, the undersigned, declare that this is my original work & has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

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