A Panel Data Analysis for Bilateral Trade of Ethiopia and East African Community countries: The Gravity Model Approach

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June, 2014

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A Thesis Submitted To the

Department of Economics

Presented in Partial Fulfillment for the Requirements for the Degree of

Master of Arts in Economics

Addis Ababa University

Addis Ababa, Ethiopia

June, 2014

Declaration

I, the undersigned, declare that this thesis 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 dully acknowledged.

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Acknowledgments

First and for most I would like to thank Almighty God which is impossible to finish this project without his help. Then I would like to give the greatest credit to my advisor Dr. Tassew Woldehanna for his unreserved professional Key guidance throughout my project work. Beyond the critical scholarly advice, his approach was kind and constructive that deserves profound appreciation. For a successful completion of the study, the role of my family especially my brother - Teddy was indispensable. I would like to extend my deepest gratitude to my best friends for their ample support. Finally, my heartfelt thanks go to my mom and Dad for their support and encouragement during my study.

ABSTRACT

This study tries to explore the trade relations between Ethiopia and East African community countries in general and specifically the Trade Integration for cooperation with the East African Community Partner countries. The study has a main objective of investigating the main determinants of Ethiopia's bilateral Trade and addresses the question of whether Ethiopia has untapped Bilateral Trade and export potentials with the East African community countries or not. It also Analyze existing Trade agreements and protocols and also explores the unexploited export potentials that the country that may have in the East Africa community countries using the an econometric analysis of augmented gravity model estimation by Generalized Least Square (GLS) estimation technique over the 9 years panel data (2004-2012) of the four bilateral Trade partners. The estimated coefficients then used to analyze the existing bilateral Trade and predict the potential that the country could have in the EAC countries. The paper identifies the significant factors of influence on bilateral trade flows, exports and imports by employing Gravity variables and some supplementary dummy variables to determine the estimated equations of the gravity model. Accordingly, GDP, per capita GDP difference, Nominal Exchange Rate, Inflation and Distance between the Trading Countries from Ethiopia found to have the assigned magnitude and significant impact on Ethiopia's bilateral Trade. The export potentials of the country are estimated using the estimated coefficients of the gravity model. Accordingly, Ethiopia has the highest unexploited potential in EAC and significant amount in the determining variables by the size of the bilateral economic, Nominal Exchange Rate, Trade Policy of the country and Distance between the Trading Countries and Ethiopia. Empirical studies on Regional Economic Integration process in Africa exhibit sluggish progress and there by limited level of bilateral trade. So the paper explores regional trade integration of the countries involved in Ethiopia and the EAC countries may support bilateral Trade Growth of the state Economies.

Keywords: Augmented Gravity model, Export Potentials, Gravity variables, East Africa Community, Trade Integration

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Acronyms

CET	Common External Tariff
CGE	Computer General Equilibrium
CM	Common Market
COMTRADE	Commodity Trade
CPI	Consumer Price Index
CU	Custom Union
EAC	East African Community
ECA	Economic Commission for Africa
FTA	Free Trade Area
GDP	Gross Domestic Product
G2SLS	Generalized Two Stage Lease Square
GMM	Generalized Method of Moments
IGAD	Intergovernmental Authority on Drought and Development,
ITC	Index of Trade Conformity
IMF	International Monetary Fund
LDCs	Least Developed Countries
NER	Nominal Exchange Rate
NTT	New Trade Theories
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
PPI	Producer Price Index
PTA	Preferential Trade Area
PTA	Preferential Trade Agreement
REC	Regional Economic Communities
RER	Real Exchange Rate
RTA	Regional Trade Agreement
SADC	South African Development Cooperation
USD	United States Dollar
VIF	Variance Intensity Factor

Chapter One

Introduction

1 .1 Background of the study

Economic Integration is the elimination of economic frontiers between two or more economies. An economic frontier represents a demarcation, often the geographical boundaries of a state, into which the flow of goods, labor and capital is restricted. Economic Integration involves the removal of obstacles to trans-boundary economic activities which occur in the fields of trade, movement of labor, the flow of capital and services. (Jacques Pelkmans, 2009).

There are Economic Integration Modalities which are identified in various stages in the process of Economic Integration. Economic Integration consists of five stages. These stages are, a Free Trade Area, a Customs Union, a Common Market, an Economic Union, and complete Economic Integration. These stages have their own specified features.

The ultimate aim of Economic Integration is to increase trade across the world. There are many other advantages associated with Economic Integration like Trade Creation for countries that follow Economic Integration have extremely wide assortment of goods and services from which they can choose. Introduction of Economic Integration helps in acquiring goods and services at much low costs. This is because the removals of trade barriers reduce or remove the tariffs entirely. Reduced duties and lowered prices save a lot of spare money with countries which can be used for buying more products and services. (Special Focus: Deepening Integration in the East African Community, 2012)

Business Opportunities for employment will be available in Economic Integration help to liberalize and encourage trade. This results in market expansion due to which high amount of capital is invested in a country's economy. This creates higher opportunities for employment of people from all over the world. Thus they move from one country to another in search of jobs or for earning higher payments.

Then Economic Integration is extremely beneficial for financial markets as it eases firm to borrow finances at low rate of interest. This is because capital liquidity of larger capital market

increases and the resultant diversification effect reduces the risks associated with high investment. And also Economic Integration helps to increase the amount of money in Foreign Direct Investment (FDI). Once firms start FDI through new operations or by merger takeover and acquisition, it becomes an International Enterprise which will increase the Export sector.

There is also a benefit of Political Integration at large if Countries entering Economic Integration form groups and have greater political influence as compared to influence created by a single nation. Integration is a vital strategy for addressing the effects of political instability and human conflicts that might affect a region. A group of nation can have significantly greater political influence than each nation would have individually. This integration is an essential strategy to address the effects of conflicts and political instability that may affect the region.

Through Economic Integration may be conducive to the real economic convergence among member countries via opening up of domestic markets to foreign competition, as a result of dismantling bureaucratic and strategic barriers to entry and removing existing constraints to free movement of capital, labor and other resources.

Besides, Economic Integration with Liberalization of Trade and Increased factor mobility between member countries would contribute to break existing local monopolies and bringing the hitherto imperfectly competitive market structures closer to perfectly competitive. Markets that are more competitive in turn are likely to provide efficiency gains in terms of improved resource allocation and lower production costs, as well as increased and more diversified output.

Regional Integration in Sub-Saharan Africa is not a recent phenomenon. At least two unions, the Southern African Custom Union and the East African Community have existed since 1910 and 1919: respectively. Regional Integration Arrangements initially became fashionable in the 1960s, following the formation of the European Economic Community in 1957 and the European Free Trade in 1960. These were pursued by a large number of Regional Integration Agreements in the developing world as well.

1.2 Statement of the problem

The relevance of Regional Integration is very relentless issue in Africa, specifically in view of political and economic backwardness. Africa is confronted with deep rooted level of poverty, minimal share of world trade, and low pace of development in human capital and infrastructure, As well as Africa faces excess of challenges from external pressure. So, ensuring that Regional Economic Integration succeeds in Africa is vital, not only because of the prospective and challenges mentioned , but also because the polices that are required to ensure its fruitfulness are the same as those needed if Africa is to benefit from the process of Globalization and Integration in to the World Economy.

The introduction of trade integration in Africa was for the purpose of accelerating economic integration. Therefore Regional Economic Communities (RECs) are recognized as the cornerstones and building blocs for the mission. So to Bridge the development nexus: Inter-Country Economic and Trade Integrations are the inevitable for the global competitive arena. RECs ensure harmonization in the financial institutions and trade organizations towards an integrated group. Indeed these Economic Integrations are also the key actors in ensuring more than economic and trade areas of development.

Studies on RTAs, though exclusive of EAC dynamics have also not paid attention to the effects or impacts of these trading Arrangements on the economies, a core area that this study tackles. The methodologies and econometric processes adopted by these kinds of studies have even most times been spurious. The data was not as disaggregated as the one this study utilized. In this regard, the unanswered questions include: Are the EAC trade liberalization efforts bearing fruit for the bloc and East Africa Region, and changing the structure of its intra-bloc sectorial trade especially in Capital and Consumer Goods trade? Is the volume of its intra-bloc trade is improving and how is this decomposed by country?

Regional inter-country trade arrangements have become a popular vehicle for the promotion of trade and growth. This is particularly so in Africa where a number of overlapping arrangements have come into existence. In East Africa the previously defunct East Africa Customs Union (EACU) has been resurrected to improve trade between Kenya, Tanzania and Uganda to

facilitate the development of the East African Community (EAC) and to smooth the economic relationships between the partner countries transitional trade arrangements have been put in place.

1.3 Objective of the study

The Objective of this study is to investigate the effects of Regional Trade Agreements on Multilateral level to the East African community countries and Ethiopia. The study focuses on the trade aspect of Regional Economic Integration, and will be on going to examine Trade Creation, Trade Diversion effects of Regional Economic Integration. It assesses the level of intra-regional trade in the region using disaggregated level of data by employing the quantitative research approach and also pays attention to both traditional and modern theory of Regional Economic Integration as well as the effects of Regional Trade Integration.

1.3.1 General Objective of the study

The General Objective of the study assesses how empirical findings of regional economic integration will support the analytical methods used in this study. It will also over view Economic, Trade and Institutional aspects of Ethiopia and EAC member states. Looking at an overview of experiences on Regional Integration progress in Africa is also part of the study.

This is followed by empirical methodology in the paper. In this regard, this study looks at model specification, description of the data and variables used for the analysis of the model under the study. The study tests and utilizes the new theoretical improvements in the gravity model, dealing with the treatment of trade strength between Ethiopia and partners. And on the methodological ground and empirical frontier, it expounds on the use of gravity modeling for Ethiopia and the trading countries that has not been empirically explored well.

1.3.2 Specific objective of the study

The following specific objectives will be planned to be mitigated when the study is conducted.

- To refine Opportunities, Challenges and Constraints of Trade Integration in Ethiopia and the trading EAC countries.

- To Identify and Assesses existing empirical findings on effects of Regional Economic Integration to support the analytical methods used in this study.
- Over view the Economic, Trade and Institutional aspects of EAC member states and Ethiopia, by Looking an overall experience of regional Integration progress.

1.4 Research Questions

From the details of the study the following specific key questions and issues are raised:

- What are the main Etiquettes and Protocols of Trade Integration in Ethiopia and EAC?
- What are the Opportunities, Constraints, and Challenges on Trade Integration in Ethiopia and EAC?
- How much of the Economic performance are shared and contributed by the member Inter-country Trade Integration?
- What are the fundamental economic variables and theories behind Regional Trade Integration for Ethiopia and EAC countries?

Further the study will raise questions on: the adopted trade liberalization policy explain bloc trade or not, What are the determinants and estimates of the EAC trade at both the regional and at country levels including Ethiopia; To what extent has the EAC trade liberalization efforts affected its intra-bloc trading patterns; How much are the gains from Regional Trade Integration and through which mechanisms do these gains materialized. And it has been questioning the Costs and Benefits of Regional Trade Integration in different trade bloc? And how Regional Trade Integration in Ethiopia-EAC does perform?

1.5 Significance of the study

Several studies have been done regarding Regional Integration Schemes in Africa specifically in the COMESA trading sub-region of EAC. Literatures and past studies focus on the success stories with a specific member country. But this study will provide benefits to organizations, mega business enterprise and policy maker in addition to the Partial fulfillment of Master's Degree. Researchers who are interested to undertake a research in the future in the area of Trade Integration and arrangements in East Africa; specially Ethiopia-EAC bilateral trade can be used as an input to undertake further research in the area .It will also provide and willing to contribute

some Econometric applications on Trade, Intra- Regional Integration and Economic Factors which are mechanizing the International and National Macro Economic Trends of the country.

1.6 Scope (Delimitation) of the study

Regional Integration covers a wide range of integration forms, which encompasses Trade Integration, Monetary and even Political Integration. As the title of this work indicates, the study focuses only on Trade Integration by centering on the experiences of Trade Integration in the EAC and Ethiopia.

The research study took into account of 5 countries including Ethiopia. Only EAC member countries and Ethiopia are taken into account. This research study examines on major themes of Macro-Economic and Trade Policies, and Intra EAC-Ethiopia trade relations. The study adopts a gravity model estimation procedure with disaggregated data to analyze the effects. The data for the study runs from 2004 to 2012 for all selected variables and bilateral relations between Ethiopia and EAC member states. A panel regression is estimated using generalized least squares method for the period under consideration. This period is adopted due to the availability of a complete dataset for all countries for all the period.

1.7 Methodology of the Study

Trade sector is continuously playing an important role in the Ethiopian economy. The trade-GDP ratio, the export-GDP ratio and the import-GDP ratio have increased, respectively in sample study years. Ethiopia's total trade, total exports and total imports were. In case of trade with our sample countries, this increase is one of the highest from the East African countries.

Trade flows between the countries are determined by the economic mass of each country generally expressed as GDP in most applications of the model and geographical distance between the countries. The theoretical model posits that larger economic mass that is GDP in the trading countries implies greater potential for bilateral trade, exports and imports by implying a capacity for exports and importers where as with Geographical distance on the other hand reduces the potential for trade.

Classical gravity models generally use cross-section data to estimate trade effects and trade relationships for a particular time period, for example one year. In reality, however, cross-section data observed over several time periods (panel data methodology) result in more useful information than cross-section data alone. The advantages of this method are: first, panels can capture the relevant relationships among variables over time; second, panels can monitor unobservable trading-partner-pairs' individual effects. If individual effects are correlated with the error term, so OLS estimates omitting the individual effects became biased. Therefore, we have used panel data methodology for our empirical gravity model of trade.

The generalized gravity model of trade states that the volume of trade / exports / imports between pairs of countries, is a function of their incomes (GNPs or GDPs), their populations, their distance (proxy of transportation costs) and a set of dummy variables either facilitating or restricting trade between pairs of countries. So model will be specified using gravitational model approach that will be employed to analyze the secondary panel data. The Gravity Model is one of the greater success stories in new empirical economics. It has established itself as a serious empirical tool for exploring regional trade partners.

1.8 Limitation of the Study

Many studies assessing the successes and failures of Regional Trade Integration schemes have investigated the benefits accruing from regional trade integration in terms of trade creation and trade diversion. They have also examined the causal relationship between tariff elimination and the change in intra-regional trade, as well as the impact of trade change on the economies of member countries. Studies evaluating relationships of this nature have used the Computer General Equilibrium (CGE). Given limited technical knowledge and the lack of required data, the paper investigates the Trade Integration on Ethiopia and EAC members though their Economic Integrity and Strength that was flourishing in the recent Era. So the study did not include inter bloc trade rather on intra-EAC bloc trade with Ethiopia by the limited data set.

1.9 Organization of the study

This thesis paper hinges upon the above issues and moreover, the rest of this paper is structured as follows:

Chapter 2 reviews the relevant theoretical and empirical literature on trade theories and past literature findings. The core of the discussion is centered on International Trade Theories; Stages in Economic Integration and General Trade Integration Anatomy; Historic evolution and Prelude to the Establishment of the EAC and Trade relation to Ethiopia and Empirical Findings are seen.

In chapter 3, overview of EAC-Ethiopia's Economic, Trade and Institutional Structure; Intra-Regional Trade of EAC, Integration Plans and Instruments, EAC Custom Union and General Trade Trends of Ethiopia and EAC countries, and Main Products traded by Ethiopia -EAC Countries are seen.

Chapter 4 provides the analytical framework, empirical methodology and model specification for estimation is adopted, the data will be collected, processed, analyzed and managed with the assistance of designed trade model.

In chapter 5, presentation of model estimation, findings and their discussion will be done. And finally, in chapter 6 the study summary, conclusion and recommendation are provided and drawn based on the findings.

Chapter Two

Literature Review of the Study

1. Theoretical Literature Review

2.1.1 International Trade Theories

International Trade Theories provide explanations for the pattern of International Trade and the distribution of the gains from trade. The theory convinces most economists of the benefits of liberal trade. Why do nations trade? What did they do? Is trade a good thing? The theory of International Trade provides answers. The answers are both convincing and stylish, hence the vast majority of economists agree about the desirability of trade. Theories of International Trade extend before 15th century and the age of mercantilism. The International trade theories are further divided as traditional and modern trade theories.

2.1.1.1 Traditional Trade Theories

1. Mercantilism (William Petty, Thomas and Antoine Montchrétien Model)

Mercantilism is a philosophy from about 300 years ago. The base of this theory was the "commercial revolution", the transition from local economies to national economies, from feudalism to capitalism, from a rudimentary trade to a larger international trade. Mercantilism was the economic system of the major trading nations during the 16th, 17th, and 18th century, based on the premise that national wealth and power were best served by increasing exports and collecting precious metals in return.

It superseded the medieval feudal organization in Western Europe; their policy was to export in the countries that they controlled and not to import (to have a positive Balance of Trade). The state exercised much control over economic life, chiefly through corporations and trading companies. The theory states that the world only contained a fixed amount of wealth and that to increase a country wealth; one country had to take some wealth from another, either through having a higher import/export ratio. So, this tendency, to export more and import less and to receive in exchange gold (the deficit is paid in gold) is called Mercantilism.

2. The Absolute Advantage (Adam Smith Model)

In the 18th century, mercantilist policies became an obstacle for the economic progress. Adam Smith (father of liberalism and economical science) brought the argument in his book "The Wealth of Nations", published in 1776, that the mercantilist policies favor producers and disadvantaged the interests of consumers.

Adam Smith's Theory starts with the idea that export is profitable if you can import goods that could satisfy better the necessities of consumers instead of producing them on the internal market. The essence of Adam Smith theory is that the rule that leads the exchanges from any market, internal or external, is to determine the value of goods by measuring the labour incorporated in them. In order to demonstrate its theory, Adam Smith analyzed for the beginning country A using one factor of production, the productivity of labour, evaluated in the necessary of hours needed to produce a unit of measure of the products X and Y.

He used *Specialization in production and Advantage* is reasonable to the product for which they have absolute advantage. After specialization, exchanging products, both countries can trade through Absolute Advantage. The opportunity cost is the number of measure units of product Y to which the economy has to give up in order to produce one supplementary unit of product X.

3. Absolute Advantage Fallacy

Comparative Advantage differences between nations are explained by exogenous differences in national characteristics. Labor differs in its productivity internationally and different goods have different labor requirements, so comparative labor productivity advantage was Ricardo's predictor of trade patterns. The factor proportions theory added relative factor endowment differences to the exogenous explanation of comparative advantage (Jones, 1987).

Trade Theory also encompasses endogenous differences between countries. One focus is on economies of scale. The wider market due to trade induces a cost advantage in an industry in one of the countries. Another theory is based on monopolistic competition, whereby the wider markets due to trade increase product variety as buyers seek the special characteristics of foreign brands. Differentiated products trade flows both ways within product categories. Trade costs also

shape the pattern of trade. The economic theory of gravity explains the complex bilateral trade patterns among countries. Actual trade is much lower than gravity predicts in a frictionless world, providing evidence of trade costs much larger than those due to policy or transportation. (Davis and Weinstein, 2002)

4. The Comparative Advantage (David Ricardo model)

David Ricardo theory demonstrates that countries can gain from trade even if on one of them is less productive than another to all goods that it produce, each country should specialize in the production for which it has less opportunity cost.

2.1.1.2 New Trade Theories (NTT)

New Trade Theories are collection of economic models in international trade which focuses on the role of increasing returns to scale and network effects, which were developed in the late 1970s and early 1980s. New trade theorists relaxed the assumption of constant returns to scale, and some argue that using protectionist measures to build up a huge industrial base in certain industries will then allow those sectors to dominate the world market. Less quantitative forms of a similar "infant industry" argument against totally free trade have been advanced by trade theorists since 1848. (Core Theory, 2010) From the New Trade theories, the founding four pillar models are stated as below:

1. Resources and Trade (The Eli Heckscher and Bertil Ohlin Model)

The Heckscher-Ohlin Theory explains why countries trade goods and services with each other by the emphasis being on the difference of resources between two countries. This model shows that the comparative advantage is actually influenced by the interaction between the resources countries have (relative abundance of production factors) and production technology (which influences the relative intensity by which the different production factors are being utilized during the production cycle.

The model starts with the presumption that country A produces two products: food (X) and textiles (Y). These two kinds of production need two different inputs, territory (T) and labour (L), which are available in limited quantities. In the same time, food production (X) requires

more land, so it can be said it is territory intensive and textile (Y) production requires more labour, being in this way labour intensive.

The Heckscher-Ohlin model explains the implications on trade between two countries A and B has, if the countries produce the same products: food (X) and textiles (Y). A country having a bigger offer in a resource than in another is relative abundant in that resource and tends to produce more products that use that resource. Countries are more efficient in producing goods for which they have a relative abundant resource.

According to the Heckscher-Ohlin theory, trade makes it possible for each country to specialize. Each country exports the product the country is most suited to produce in exchange for products it is less suited to produce. In our case, country A is relative abundant in territory (T) and will specialize in producing food (X) and country B is relative abundant in labour (L) so it will specialize in producing textiles (Y). In this case, trade may benefit both countries involved.

2. Specific Factors and Income Distribution (Paul Samuelson - Ronald Jones Model)

There are at least two reasons why trade has an important influence upon the income distribution: resources can't be transferred immediately and without costs from one industry to another. And industries use different factors and a change in the production mix a country offers will reduce the demand for some of the production factors whereas for others it will increase it. Paul Samuelson and Ronald Jones, two American economists, elaborated a trade model based on specific factors.

A country having capital abundance and less land tends to produce more manufactured products than food products, whatever the price, while a country with a territory abundance tends to produce more food. If the other elements are constant, an increase in capital will mean an increase in marginal productivity from the manufactured sector, while a rise in the offer of territory will increase the production of food in the detriment of manufacturers. When the two countries decide to trade, they create an integrated global economy whose manufacture and food production is equal with the sum of the two countries' productions. If a country doesn't trade, the production for a good equals the consumption. The gains from trade are bigger in the export sector of every country and smaller in the sector competed by imports.

3. The Standard Model of Trade (Paul Krugman – Maurice Obsfeld Model)

The theory was initially associated with Paul Krugman in the late 1970s; Krugman wrote that International economics a generation earlier had completely ignored *returns to scale.* "The idea that trade might reflect an overlay of increasing-returns specialization on comparative advantage was not there at all: instead, the ruling idea was that increasing returns would simply alter the pattern of comparative advantage."

The standard model of trade implies the existence of the relative global supply curve resulting from the production possibilities and the relative global demand curve resulting from the different preferences for a certain good. The exchange rate (the rapport between the export prices and the import prices) is determined by the intersection between the two curves, the relative global supply curve and the relative global demand curve. If the other elements remain constant, the exchange rate improvement for a country implies a substantial rise in the welfare of that country.

4. The Competitive Advantage (Michael Porter's Model)

Michael Porter identified four stages of development in the evolution of a country: Development based on factors, Development based on investments, Development based on innovation and Development based on prosperity. The theory is based on a system of determinants, called by the author "diamond" the capacity of internal factors and the specific of the domestic market.

2.1.2 Stages in Economic Integration and General Trade Integration Anatomy

2.1.2.1 Stages in Economic Integration

Regional Integration has basic forms that Economic Integration can taken place. There are economic integration stages to conceptualize trade integration among countries. Amongst them the first and least complicated consists of the creation of a Free Trade Area in which tariffs and quantitative restrictions are eliminated, and then there is elimination of restrictions on the free movement of factors of production. There is elimination of restrictions on the free movement of factors of production among the member states, after that not only trade restrictions but also restrictions on factor movements are abolished. After framework on some degree of

harmonization of national economic policies will gear, total economic integration presupposes the unification of monetary, fiscal, social, and counter-cyclical policies are attained.

Free Trade Area is in which tariffs and quantitative restrictions are eliminated, on trade between participating countries, although each nation retains its tariff structure as against non-participants. In a free-trade area, tariffs and quantitative restrictions between the participating countries are abolished, but each country retains its own tariffs against non-members. Establishing a customs union involves, besides the suppression of discrimination in the field of commodity movements within the union, the equalization of tariffs in trade with non-member countries. The benefit from the creation of a free trade area is effective if tariff on trade which reduces imports on welfare Consumer surplus.

Custom Union includes free trade in commodities among participating states. There is elimination of restrictions on the free movement of factors of production (i.e., labor and capital) among the member states. Benefits of a customs union are Effects of static and dynamic. Static effects have two groups: Trade creation with Production effect and Consumption effect (also known as trade expansion) and Trade diversion. The other is Dynamic effects which Increases productivity and thus potential growth rates due to: More specialization with the CU, Greater competition with the CU, Capacity to explore economies of scale and thus compete with 3rd world countries. Secondly, a customs union adds to the free trade area the equalization of tariffs by participating states against imports from non members by the implementation of a Common External Tariff (CET).

A Common Market higher form of Economic Integration is attained in, where not only trade restrictions but also restrictions on factor movements are abolished. An economic union, as distinct from a common market, combines the suppression of restrictions on commodity and factor movements with some degree of harmonization of national economic policies in order to remove discrimination due to the disparities in these policies. Finally, total economic integration presupposes the unification of monetary, fiscal, social, and countercyclical policies and requires the setting-up of a supra-national authority whose decisions are binding on member states.

Fourthly, *Economic Union* adds to the common market framework some degree of harmonization of national economic policies in order to remove discrimination that was due to previous disparities among Participating states in these policies for the creation of a Central Bank with some supranational powers.

Finally, *Total Economic Integration* presupposes the unification of monetary, fiscal, social, and counter-cyclical policies and requires the establishment of a supranational authority whose decisions are binding for the member states" that is in essence the establishment of a political federation.

2.1.2.2 General Trade Integration Anatomy

1. Historic Trend of Trade and Economic Integrations in the World

International trade cooperation has generally become wider and more inclusive – with more countries entering into binding agreements, and with more rules being consolidated in the increasingly "global" architecture of the World Trade Organization (WTO). Then , trade agreements have generally become "deeper", as well as "wider", by reaching into new policy areas such as services trade, foreign investment, intellectual property and government procurement – a reflection of the deepening integration of the world economy, and the growing "globalization" of policies that were once considered domestic.

While the historical trend has been towards more openness and deeper rules in international trade agreements – and away from protectionist blocs – progress has not been in a straight line, and there have been major set-backs and reversals along the way. Although it is difficult to generalize, the pressure to slip backwards into more inward-looking and defensive trade arrangements has been strongest during periods of economic contraction, financial instability and geopolitical insecurity.

The recent explosion of bilateral and regional agreements has once again moved the debate about the causes and effects of PTAs both positive and negative to the fore. Some argue that it signals a weakening of international commitment to multilateralism, and foreshadows a return to more fragmented world trade. Others suggest that it is part of the pattern seen since the Second World

War where bilateral and regional agreements provide an avenue for “faster” and “deeper” rule-making than the broader WTO – spurring subsequent progress in the multilateral system, and offering a coherent, rather than conflicting, approach to managing more integrated world trade.

To view the history of the world trading system as a stark choice between regionalism and multilateralism or between preferential and non-preferential agreements – is too simplistic. For most of modern history, trade agreements were more or less limited in geographic scope – usually taking the form of colonies spheres of influence, associated with empires, or bilateral commercial treaties, mainly among European powers. Only with the creation of the GATT in 1947 did the idea of a wider, multilateral agreement move to the forefront of international trade relations; and even then the scope of the initial GATT system was modest, involving just 23 countries in a multilateral agreement, and only gradually evolving to the near “universal” membership of the modern WTO.

The first wave of regionalism occurred in the late 1950s and 1960s. At its center, was Europe's push for continental integration – starting with the sectorial European Coal and Steel Community in 1951, leading to the broader European Economic Community (EEC) in 1957, and building outwards to current or past colonial possessions through a complex network of preferential, but non-reciprocal trade arrangements (Winters, 1993). This evolving European Community helped spark the creation of the rival European Free Trade Association (EFTA) in 1957 among countries that had chosen to stay outside the Community.

The EEC was also taken as a model by groups of developing countries in Africa, the Caribbean, Central and South America which rushed to form their own regional and sub-regional unions during this period. However, most of these arrangements – including even the most promising, the East African Community and the Central American common market – had collapsed or drifted into abeyance by the end of the 1970s (De Melo and Panagariya, 1993).

2. Economic Integration Schemes in Africa

Regional Integration initiatives in Africa date back to the establishment of the South African Customs Union (SACU) in 1910. In Africa , initiatives were launched to revitalize existing

regional groupings and to form new ones – such as the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of West African States (ECOWAS) and the Southern African Development Community (SADC) – with the objective of accelerating industrialization, diversifying economies, developing regional infrastructure, encouraging the adoption of common negotiating positions, and promoting peace and security on the continent. (Hwang, 2007)

The African paradigm is that of linear market integration, following stepwise integration of goods, labor and capital markets, and eventually Monetary and Fiscal Integration. The starting point is usually a Free Trade Area, followed by a Customs Union, a Common Market, and then the integration of Monetary and Fiscal matters to establish an Economic Union. The achievement of a political union features as the ultimate objective in many African RIAs.

The issue of Economic Integration in Africa will be explored in two parts. Part 1 discusses the rationale and need for such integration, the history of economic integration in Africa, various initiatives and their current state. It also evaluates the efficacy of economic integration initiatives in Africa. The paper argues that a linear model of economic integration, i.e. from Free Trade Area (FTA) to Economic Union, is inadequate to address Africa's needs, and an alternate, inclusive and holistic model is required. Part two will explore what could such an approach be Regional Economic Integration has been at the forefront of economic and political discourses in Africa.

The LPA was an initiative of the Organization of African Unity (OAU), adopted by heads of state in April 1980, and keenly supported by the United Nations Economic Commission for Africa (UNECA). A decade later in 1991, the Abuja Treaty provided strong support for the African integration agenda. The Treaty emphasized African solidarity, self-reliance and an endogenous development strategy, through industrialization. The proposed framework for African Integration and Continental Industrialization was the division of the continent into Regional Integration areas that would constitute a united African economy, the African Economic Community.

The Southern African Customs Union (SACU), often acknowledged as the oldest functioning customs union in the world, has a very specific history beginning from 1910. It was not established as a result of a decision by sovereign states, but is the outcome of a decision by a colonial power (Britain) to establish a customs union consisting of the Union of South Africa (now the Republic of South Africa), Basutoland (now Lesotho), Swaziland and Bechuanaland (now Botswana).

The Southern African Development Community (SADC) was established as a development coordinating conference (SADCC) in 1980 and transformed into a development community in 1992. It is an inter-governmental organization whose goal is to promote sustainable and equitable economic growth and socio-economic development through efficient productive systems, deeper co-operation and integration, good governance and durable peace and security among fifteen Southern African Member States.

In West Africa, the most comprehensive regional initiative is the *Economic Community of West African States (ECOWAS)*, created in 1975. Nigeria, accounting for more than half of the region's population and an equally significant proportion of its GDP, has been one of the driving forces behind ECOWAS. It has made only limited progress in terms of trade integration. There remain significant tariff and non-tariff barriers in the region in the region.

The ECOWAS Treaty, which created the Economic Community of West African States, was intended to promote cooperation and integration within West Africa and to eventually establish an economic and monetary union. To accelerate economic integration, the revised treaty outlined the necessary steps for the establishment of a common market and a shared currency. Some of the steps of this outline, as stated in the revised treaty, call for the study and research of monetary and financial development, the promotion of activities ensuring convertibility of currencies, and the establishment of a common currency zone.

The West African Economic and Monetary Union also known as UEMOA is an organization of eight West African states. It was established to promote economic integration among countries that share the franc as a common currency. UEMOA is a customs union and currency union between the members of ECOWAS. Its objectives include the greater economic competitiveness

through open markets, rationalization and harmonization of the legal environment, the convergence of macro-economic policies and indicators, the creation of a common market, the coordination of sectorial policies and the harmonization of fiscal policies.

Common Market for Eastern and Southern Africa (COMESA) as a trade bloc of 22 countries currently: with embracing two major economic sub-integration Blocs within it (SADC and EAC). The counties attain a fully integrated and unified region in which Goods, services, capital and persons will move freely. There is a reduction of tariff and non-trade tariff barriers to intra-COMESA trade with ultimately led to the formation of a free trade area (FTA), with the emergence of trade liberalization.

The Sub-regional Integration on trade for COMESA countries will have achievements on agricultural trade, food security, production efficiency & productivity, effectiveness of distribution, specialization on specified commodities, for the programs of poverty alleviation, aid effectiveness, stimulation of industrial growth and spurring economic development within the country and in aggregate. The trade ties will give spillovers effect for the strong economic communities and for the integration of economic community of Africa as a whole.

East African Community (EAC) as part of the trade integration of COMESA, The community is the most recent Regional Integration Arrangement (RIA) after it clashed to function in the 1970s.The treaty establishing the current EAC was signed on November 31, 1990 and came in to force on July 7, 2001 & ratified by the republics of Kenya, Uganda and Tanzania. By far the EAC was established in 2000 by Kenya, Tanzania, and Uganda. Then Burundi and Rwanda joined in 2007.

In order to provide a complete continental picture, the status of regional integration in North Africa is briefly set out. All the North African countries except for Egypt but including Mauritania established the *Arab Maghreb Union (AMU)* in 1989. Due to continuing political divergences, mainly between Algeria and Morocco, the achievements and progress of AMU has been limited. More recently another grouping, the Community of Sahel-Saharan States (CENSAD), actively promoted by Libya, has been created. It comprises a large number of countries from North Africa and the Sahel, and even parts of *COMESA countries*.

IGAD, originally named the Intergovernmental Authority on Drought and Development, was created in 1980 mainly to promote food security and to combat desertification in the Horn of Africa. The founding members were Djibouti, Ethiopia, Kenya, Somalia, the Sudan and Uganda. Apart from functional cooperation in the food security and environmental areas, IGAD has played a useful role as a forum for mediation in internal conflicts within its member states. In the mid-1990s an agenda oriented towards more general development cooperation was adopted and the 'D' standing for drought was dropped.

3. Prelude to the Establishment of the EAC

The EAC is one of the leading regional economic organizations in sub-Saharan Africa and has made great strides in recent years toward integrating the economies of its member states. It has established a free trade area and a customs union and is working toward a common market. The East African Community (EAC) is an inter-governmental organization comprising five countries in East Africa: Burundi, Kenya, Rwanda, Tanzania and Uganda. The organization was originally founded in 1967, collapsed in 1977, and was officially revived on July 7, 2000. In 2008, after negotiations with the Southern Africa Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA), the EAC agreed to an expanded free trade area including the member states of all three. The EAC is an integral part of the African Economic Community.

The East African Community (EAC), comprising Kenya, Uganda and Tanzania, can trace its origins as far back as the early decades of the 20th century. Britain, as the ruler of the colonies of Kenya and Uganda and the protectorate of Tanganyika, established a customs union comprising the three countries, together with a common currency, and an organ for the management of common services for ports, railways, and air transport. Disparities with respect to perceived benefits and other differences contributed to a gradual loosening of their common bonds, and these outward pulls grew stronger following independence in the early 1960s. The three countries attempted to address these differences.

In addition to a decision to re-establish the East African Community by the end of 1999, other issues raised at the EAC Summit of January 1999 included the signing of a Memorandum of Understanding on Foreign Policy Co-ordination; Zero tariff rates to be adopted by 1 July 1999

and the implementation of COMESA's 80% tariff reduction objective at the same time; setting up of a mechanism to deal with terrorism in the region; and postponement in admitting Rwanda and Burundi to the EAC.

The East African Community is a potential precursor to the establishment of the East African Federation, a proposed federation of its five members into a single state. In 2010, the EAC launched its own common market for goods, labor and capital within the region, with the goal of a common currency by 2012 and full political federation in 2015.

The geographical region encompassed by the EAC covers an area of 1.8 million square kilometers, with a combined population of about 132 million (July 2009). All three countries share a number of similarities, resulting from their common location, climate, and history. Notably, Uganda is landlocked, relying on access to seaports in Kenya (Mombasa) and Tanzania (Dar-es-Salaam). They are members of the World Trade Organization (WTO) and belong to other RTAs—Kenya and Uganda are members of COMESA, and Tanzania is a member of SADC.

4. EAC Customs Union

Uniform laws to enhance both regional and external trade background the East African Community (EAC) Customs Union Protocol came into effect throughout the EAC territory in July 2009 having been ratified by Partner States Kenya, Tanzania and Uganda in 2004 and later by Rwanda and Burundi in 2008. The creation of the EAC Customs Union is the first stage in the four step EAC regional integration process. When fully implemented, the customs union will consolidate East Africa into a single trading bloc with uniform policies, resulting in a larger economy. By working together to actualize the customs union, Partner States will deepen EAC cooperation, allowing their citizens to reap the benefits of accelerated economic growth and social development.

Partner states agree to enhance trade by eliminating internal tariffs and non-tariff barriers in order to form a large single market and investment area. Through its regional and country programs, Trademark East Africa (TMEA) supports the EAC Secretariat and its organs, as well as partner states to turn the EAC Customs Union into a reality. TMEA support ranges from technical capacity building for the EAC Secretariat to partnership with Ministries of East African

Community, government agencies and cross-border organizations that promote regional integration and trade.

The Trade Protocol provides for the elimination of all existing non-tariff barriers (NTBs) and refraining from introducing new ones. However, in practice it does appear that non-tariff measures are widespread, increasing and are a real obstacle to intra-regional trade expansion. Some EAC members' states continue to introduce non-tariff measures such as a periodic ban on imports, imposition of additional import levies and other forms of import controls used as Protection Devices.

Within the Customs Union: customs duties and other charges of equivalent effect imposed on imports shall be eliminated save and, non-tariff barriers to trade among the Partner States shall be removed; a common external tariff in respect of all goods imported into the Partner States from foreign countries shall be established and maintained.

In accordance with the provisions of Article 75 of the Treaty, this Protocol, inter alia, provides for the following arrangements: the application of the principle of asymmetry; the elimination of internal tariffs and other charges of equivalent effect; the elimination of non-tariff barriers; establishment of a common external tariff; Rules of origin- For purposes of this Protocol, goods shall be accepted as eligible for Community tariff treatment if they originate in the Partner States and Goods shall be considered to originate in the Partner States if they meet the criteria set out in the Rules of Origin adopted under this Article; anti-dumping measures; subsidies and countervailing duties; security and other restrictions to trade; and also, competition; duty drawback, refund and remission of duties and taxes; customs co-operation; re-exportation of goods; simplification and harmonization of trade documentation and procedures; exemption regimes; harmonized commodity description and coding system; and free ports.

All three countries view regional integration as an essential plank of their development strategy and an important ingredient in stimulating increased trade and investment. Policymakers are expecting the creation of the EAC customs union to facilitate higher trade and investment flows

between member states and through increased competition to improve the efficiency and competitiveness of the exports sectors in the individual countries.

5. Bilateral Trade of Ethiopia and EAC: Integration Plans and Instruments

The EAC today has good progress, Out of the four planned stages of EAC integration – Customs Union, Common Market, Monetary Union and Political Federation – the first two stages are currently in effect. The Customs Union protocol established a duty-free trade between the partner states (with the successful reduction of intra-regional tariffs), common customs procedures between the partner states and a common external tariff whereby an identical rate of tariff is imposed on goods imported from foreign countries. The next stage – the Common Market protocol - established a single market allowing the free movement of goods, capital and labour within the region.

In the Ethiopia Side, currently the country involved in a number of international trade negotiations which will have a far reaching impact on the Ethiopian economy. Negotiations take place both at the multilateral level (Ethiopia's accession to the World Trade Organization) and inter-regionally (Economic Partnership Agreement with the European Union). Regionally, studies are under way on the establishment of economic integration among members of the Inter-Governmental Authority for Development and Finally, a decision will have to be taken regarding Ethiopia's potential joining the Common Market of Eastern and Southern Africa's (COMESA) Free Trade Area – which might be superseded by a Tripartite FTA combining the 26 members of COMESA, the Southern African Development Community (SADC) and the East African Community (EAC).

The Ethiopian economy of the ongoing and planned international trade negotiations in which Ethiopia is involved and aims at helping develop a coherent strategy for all of Ethiopia's current and international trade negotiations. It raises awareness among the Ethiopian business community about the various international trade negotiations in which Ethiopia is involved and thus contributes to devising a positive and proactive agenda by forging consensus and commitment among private sector representatives and building a strategic partnership between public and private sector leaders in order to leverage regional and multilateral negotiations.

As indicated in the New Economic Policy the new directions involve: Paving the way for domestic private capital to involve in wholesale trade, the state will limit itself to issue and enforce laws and policies to regulate private wholesale trade practices. The state may engage itself in the wholesale trade of basic goods of mass consumption to stabilize prices. The state will pull out from the retail trade activity and create the necessary conditions for private capital and cooperatives to freely engage themselves in such activities. In the retail trade activity, the major concern of the state will be to issue appropriate regulation and directives and enforce them.

Ethiopia has made a number of preferential trade agreements with many countries. Under the various Generalized System of Preference (GSP) schemes, Ethiopia is one of the beneficiaries of preferential trade access for a wide spectrum of commodities from a number of developed countries, including, among others, Australia, Canada, the European Union (EU), Japan, Norway, and the United States of America (USA). The two most important duty free market access opportunities that Ethiopia currently enjoys are the EBA and AGOA schemes. Except Kenya, which is not categorized as a least developed economy, all other neighboring countries in East Africa are beneficiaries of the EBA, and many other GSP schemes.

Moreover, Ethiopia is currently negotiating to join the multilateral trading system. Except Ethiopia, members of the EAC have already joined the WTO. Also these countries have jointly signed an interim agreement on EPA with the EU. Ethiopia has the opportunity to and the challenge of coming up with a consistent negotiating agenda with respect to EPA, which has to weigh the gains and pains of EPA with that of membership to the multilateral trading system.

Ethiopia has given greater attention to external trade policies than any other prevailing economic policy. Accordingly, a number of incentives have been put in place. Duties on all exports are now removed; a financial credit support system (Export Guarantee Credit Scheme) to the export sector for pre and post shipments is structured; an export trade duty incentive scheme: duty draw back scheme, voucher scheme, and bonded manufacturing warehouse scheme are made.

The tariff regime of Ethiopia has substantially reduced tariff rates across the board. Currently, quantitative import restrictions are applied only to used clothes, harmful drugs and armaments for security reasons. Both tariff levels and dispersions have been reduced substantially. Specific tariffs have been converted into ad valorem equivalents. There are no preferential tariff offers. The tariff structure involves an average rate of 16.8 percent, and a maximum of 35 percent. While 4 percent of the tariff lines are duty free there is no any protective rate for so called sensitive products. The tariff structure also reveals that both for agricultural and nonagricultural products, just over 50 percent of the tariff lines fall below the 10 percent duty rate, while the balance fall under the 15 to 35 percent duty rate. As it stands, the tariff lines, for both agricultural and non-agricultural products, are nevertheless evenly distributed across the tariff rates with a margin towards the lower end of the tariff bracket.

EAC maintains lower average rate and high duty free rates 36.6 % of tariff lines. But it imposes as high as 100 percent protective rates on some products. Also the EAC imposes relatively high duty rates on most agricultural commodities and low rate on non agricultural products. In general agricultural commodities are less traded than manufactures. And agriculture being relatively Ethiopia's only natural resource endowment, hence export, heavy tariffs in Kenya on agricultural commodities implies relatively low trade with these economies, though this requires further investigation of the specific commodities and corresponding rates.

2.2 Empirical Literature Review

The above section presents a brief overview of the theory on regional trade integration, which helps to understand how regional trading agreements work and through which mechanisms they provide benefits to member countries. At this sub section: the focus is to review the existing empirical evidences on the effects of Regional Economic Integration, especially on EAC Custom Union.

Thus, for analytic purposes, it is useful to classify the researchers' findings on the topic according to the type of methodology they approach to examine the impacts of forming regional economic integration on trade flows, via descriptive approach, simulation approach (Computable General Equilibrium), or econometric approach (gravity model and others) as well as the nature

of data they employ, namely cross section, time series, panel based on aggregate or sartorial level. Next, empirical works of selected researchers on the topic are reviewed in line with the above classifications.

Descriptive Approach

A descriptive approach is also a methodology pursued in the literature to examine the effects of regional economic integration on trade patters (for example, Anderson and Norheim, 1993; Yeats, 1998; Dell Aquila et al, 1999). These studies use different indicators to measure the regional concentration of trade. A descriptive approach implicitly assumes that the share of trade happening with the partner nation would not have changed in the absence of the agreement. This method depends on a static frame work and the results are dependent on the level of aggregation. Furthermore, a descriptive approach misses the ability to analyze Trade creation and Trade Diversion effects of RTAs. (Jayasinghe. K and Sarker. F: 2004)

CGE Model

The simulation approach uses a static Computable General Equilibrium (CGE) model or a dynamic inter –temporal general equilibrium model. The model specifies economic structures and behaviors of agents in detail and using the frame work simulate the economic effects of existing or proposed regional blocs. Simulation based on the general equilibrium models usually find substantial potential gains from trade liberalization between members of RTA.

One weakness or imperfection of CGE studies is that their results are very sensitive to the assumptions, parameters, and data used in the model, and have to be interpreted accordingly. Besides, they do not allow an investigation of the questions we are concerned with here. Krueger (1999) also mention that CGE studies have been prospective rather than retrospective. In CGE model, the sectorial aggregation also does not permit analysis of specific markets. As of Mckitrick (1998), policy information is usually outdated, and base line scenarios are far from facts and based on the older data. CGE methods are also very data demanding and tending not to be applied with high levels of data disaggregation. (Milner .K and Sledziewska, M; 2005:P7)

Gravity Model

The '"gravity model of trade"' in international economics similar to other gravity models in social science predicts trade flows based on the economic sizes (often GDP) and distance between two units The model was used by Jan Tinbergen in 1962.The basic model has been tested using econometrics. The model often includes income level (GDP per capita), price levels, language tariff, contiguity and colonial history variables. The model has also been used in international relations to evaluate the impact of treaties and alliances on trade. The gravity model has also been used to test the effectives of trade agreements and organizations such as EAC, NAFTA and the WTO.

The model has been an empirical success but the theoretical justifications for the model are the subject of some dispute. The gravity model estimates the pattern of international trade while the model's basic form consists of factors that have more to do with geography and spatiality. the gravity model has been used to test hypotheses rooted in purer economic theories of trade as well One such theory predicts that trade will be based on comparative advantage One of the common comparative advantage theories is the Hecksher-Ohlin hypothesis.

This theory would predict that trade patterns would be based on relative factor advantages Those countries with a relative abundance of one factor would be expected to produce goods that require a relatively large amount of that factor in their production, while a generally accepted theory of trade comparative advantage has suffered empirical problems. Investigations in to real world trading patterns have produced a number of results that do not match the expectations of comparative advantage theories notably a study by Wassily Leontief found.

Regional dummy variables (inter and extra) have been used in gravity models approaches to try to capture separate trade creation and diversion effects. The estimated coefficients on the dummy variables may capture a range of policy and other including misspecification effects rather than the regional trade policy effect under investigation. It is also the case that gravity modeling is invariably used to model total trade flows or at least broad aggregates of trade.

In African context, there are huge empirical works that analyze the impacts of regional integration. Among these, Alemayehu and Haile (2002), on their study for COMESA, show that bilateral trade flows among the regional groupings could be explained by standard variables as demonstrated by the results of the conventional gravity model, while regional groupings have had insignificant effect on the flow of bilateral trade. Further, they suggest that the performance of regional blocs is mainly constrained by problems of variation in initial condition, compensation issues, real political commitment, over lapping membership, policy harmonization and poor private sector participation.

Empirical Findings on EAC constitute an increasingly significant feature of the world trade system. East Africa in particular is not an exception to this phenomenon. Estimates show that more than half of total world trade occurs through regional trade agreements and that world trade under RIAs grew from 43 % to 60 % of the total between 2001 and 2005. (OECD, 2005)

Rwanda, Tanzania and Uganda, with per capita income somewhat behind the regional average, would have to grow at 10 percent per year, in order to meet that goal, individually EAC partner states now export more within the EAC region than to any other region. Total goods and services exports from EAC partner states more than tripled over the last decade from US$ 6 billion in 2002 to US$ 19.5 billion in 2010. In 2010, goods exports comprised of US$ 12 million and service exports US$ 7.5 million. The share of total EAC exports traded within the region increased from US$ 1.8 billion in 2008, to US$ 2.2 billion in 2010; surpassing Europe as the region's main trading block.(Official report of EAC, 2011)

The trend in EAC exports is reflected in the compound annual growth rates (CAGR), where intra-EAC exports exceed those of EAC exports to the rest of the world .Kenya, Tanzania, and Uganda (the founding members of the EAC) are the main sources of such intra-regional Export growth. Over the next few years, Rwanda and Burundi are expected to increase their exports to EAC countries (albeit from relatively low levels), and both countries are expected to see export growth exceed import growth from 2015 onwards (East Africa Corridor Diagnostic Study, 2011). The study reviewed the evolution of international Trade by embracing the Regional Trade integrations and arrangements, Theoretical foundations, trade models and trends of International Trade of Ethiopia and EAC countries. The review hinged on the theoretical underpinnings and

also the empirical evolution. International Trade Theories of Traditional and New presumption were reviewed, Stages in Economic Integration and General Trade Integration Anatomy of each Process for Economic Integration were demonstrated, Historic Trend of Trade and Economic Integrations in Africa and East Africa were dealt; The Prelude to the Establishment of the EAC and bilateral Trade of Ethiopia and EAC were seen.

From the Review Literature, International trade and Trade Theories had longer ages beginning from the period of mercantilism till these Dynamic nexus ages. On this process: regional and Economic Integration have crucial roles in International Trade. Triumphantly each of the RTA will have certain stages, trade agreements and Plans to have trade integration among economies. Currently in Africa there are more than 16 Regional Agreements functioning in the continent for developmental cooperation. As EAC is one of the leading regional economic organizations in Africa, it launched a common market for goods; labor and capital within the region even go forward for the goal of a common currency. Even arrangements of elimination of internal tariffs; non-tariff barriers; establishment of a common external tariff with application of Rules of origin; customs co-operation; simplification and harmonization of trade were far reached. Ethiopia as one of the East Africa Economies it has made a number of preferential trade agreements under various generalized system of preference to enroll the international Trade on bilateral and multilateral basis including EAC and COMESA.

Different Empirical Trade Approaches were propounded, thus from the models: gravity model was found to have strong theoretical foundations and empirical use was quite vast, and it was the major model used to analyze the bilateral trade in Regional Trade Agreements. The model had a strong explanatory power for trade, was economically and statistically significant. This provides the researcher the impetus to adopt it to study the case for Ethiopia and EAC Bilateral Trade. From the theoretical and empirical developments in previous sections, it has gained supremacy due to the fact that it has a predictable role as a tool used in estimating effects of a variety of phenomena in economics and especially in international trade.

3. Overview of Ethiopia-EAC Economic, Trade and Institutional Structure

In this chapter, this study seeks to provide an overview of economic, Trade and institutional aspects of Ethiopia and EAC member states. Here, it pays attention in assessing of intra-trade structure and trade protocol of the region.

3.1 Economic Indicators of Ethiopia-EAC Member Nations

From the beginning, the East African region comprises homogenous countries both in terms of economic and political dimensions. Put it differently, there is significant gaps of development. And there economic structure is attached as below:

Table1: Real GDP of Ethiopia and EAC Members countries in Billion US Dollars

Country/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ethiopia	9.07	9.82	9.97	9.76	11.08	12.39	13.73	15.31	16.96	18.45	20.32	21.94	23.46
Kenya	15.66	16.25	16.34	16.81	17.67	18.72	19.90	21.29	21.63	22.19	23.36	24.39	25.51
Uganda	7.09	7.46	8.11	8.63	9.22	9.80	10.86	11.77	12.80	13.73	14.44	14.96	15.66
Tanzania	10.06	10.66	11.43	12.21	13.17	14.14	15.09	16.17	17.38	18.42	19.71	20.96	22.24
Burundi	0.71	0.73	0.76	0.75	0.79	0.80	0.84	0.87	0.91	0.94	0.97	1.01	1.06
Rwanda	1.79	1.94	2.15	2.20	2.36	2.58	2.82	2.97	3.31	3.44	3.70	4.00	4.27

Source: ITC on UNCOMTRADE Statistics, 2013

As table 1 exhibit, the Real GDP of Ethiopia, Kenya and Tanzania are relatively giant than the rest of the other countries. As we see the Ethiopian economic size, it increases steadily from 2000 till 2005, and after that it showed up a better progress. It can be figured in the after 2010 value, Currently in East Africa it become the second bigger economy in real terms. The Economy of Kenya and Tanzanian are relatively higher than the Ethiopia Real GDP. The Kenya economy moves with steady level till 2006 and rises better at 2007 and again re-rises with steady level. Relatively Tanzania Real GDP moves with a constant rate compared to the two counties.

Table2: Annual Growth Rate of Ethiopia and EAC Members Countries

Country/Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Burundi	-0.86	2.06	4.45	-1.22	4.83	0.90	5.12	3.60	4.50	3.50	3.90	4.18	4.38
Ethiopia	6.07	8.30	1.51	-2.16	13.5	11.8	10.8	11.4	10.79	8.79	10.1	8.00	6.90

Kenya	0.60	3.78	0.55	2.93	5.10	5.91	6.32	7.01	1.55	2.59	5.30	4.40	4.60
Rwanda	8.10	8.50	11.0	2.20	7.40	9.30	9.20	5.50	11.20	4.10	7.50	8.13	6.82
Tanzania	4.93	6.00	7.16	6.89	7.83	7.37	6.74	7.15	7.44	6.02	6.98	6.34	6.11
Uganda	3.14	5.18	8.73	6.47	6.81	6.33	10.7	8.41	8.71	7.25	5.18	3.60	4.70

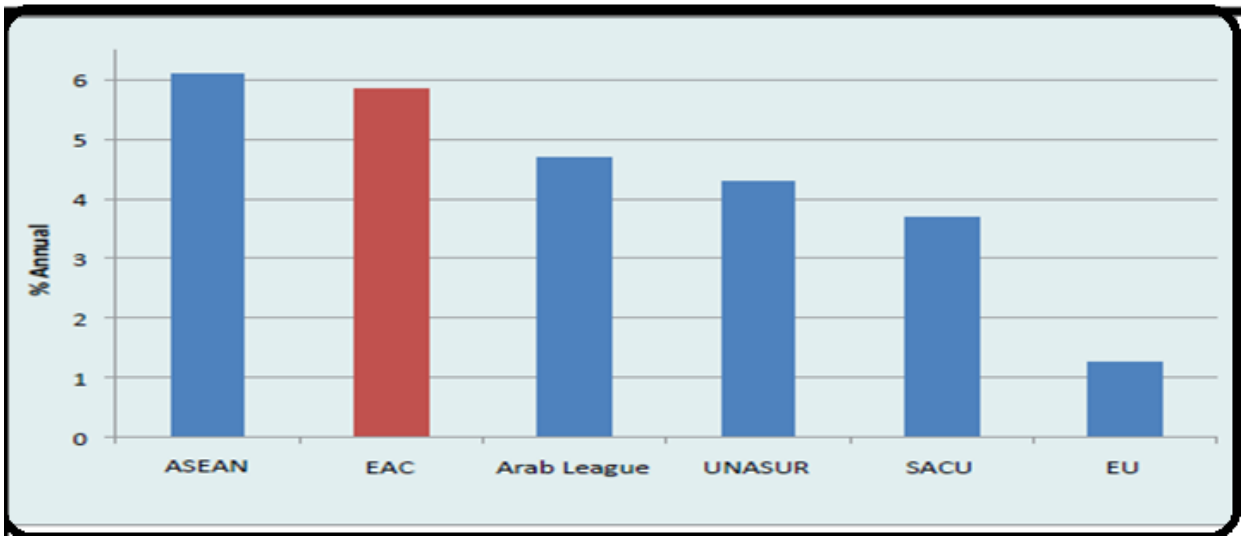
Source: ITC on UNCOMTRADE Statistics, 2013

The EAC is one of the fastest growing economic communities in the world. It has grown faster than all other economic communities in the last decade, except for ASEAN, which grew at 6.1 percent. As part of East Africa, Ethiopia after 2004, it showed a miraculous Annual Growth than any East African country till 2012 for the consecutive years. The EAC grew at an average of 5.8 percent per year for 2001-2009. (Figure 1) and over the last decade, each EAC country more than doubled its own GDP.

The EAC also experienced unprecedented population growth – the region grew by 25 percent from 110 million people in 2002, to 138 million people in 2010. The region's high population growth has been close to 3 percent per year over the last two decades, compared to the Sub-Saharan Africa's average of 2.6 percent. Although each EAC country grew in the last decade, growth was unevenly distributed. Tanzania, Uganda and Rwanda grew at an average of over 7 percent per year between 2002 and 2010, compared to Kenya and Burundi which grew at 3 and 4 percent respectively.

Kenya is the largest economy with a GDP of approximately US$ 32 billion in 2010, followed by Ethiopia, Tanzania, Uganda and Rwanda, and finally Burundi with a GDP of only US$ 1.6 billion in 2010. Between 2002 and 2010, GDP per capita increased at an average of 112 percent across the region, and now ranges from over US$ 800 in Kenya, to under US$ 200 in Burundi. To reach middle income status (GDP per capita of US$ 1,000) by 2020 the ambition of most EAC countries the region would have to grow at an average of 8.5 percent per year, for the rest of the decade.

Figure 1: Average GDP growth in the EAC



Source: WDI 2012 Data, taken from Deepening Kenya's Integration in the EAC, 2012, P.20

The three former EAC member states had a combined GDP of $31.4 billion in 2003. Kenya is the largest of the three economies with a GDP of $14.1 billion in 2003, a population of31.9 million, and a per capita GDP of $445; Tanzania's GDP is $10.3billion, its population is 35.9 million, and per capita GDP is $286.6; Uganda's GDP is $7.0 billion, its population is 25 million, and per capita GDP is $280.8. All three countries share a number of similarities, resulting from their common location, climate, and history. Notably, Uganda is landlocked, relying on access to sea ports in Kenya (Mombasa) and Tanzania (Dar-es-Salaam). They are members of the World Trade Organization (WTO) and belong to other RTAs—Kenya and Uganda are members of COMESA, and Tanzania is a member of SADC.

All three countries view regional integration as an essential plank of their development strategy and an important ingredient in stimulating increased trade and investment. Policymakers are expecting the creation of the EAC customs union to facilitate higher trade and investment flows between member states and through increased competition to improve the efficiency and competitiveness of the exports sectors in the individual countries. In addition, with the introduction of the EAC common external tariff (CET) lowering tariffs.

3.2 General Trade Trends of Ethiopia and EAC countries

Trade Flows as noted earlier, Ethiopia's trade balance has always been heavily in the negative. What is more the structure of both exports and imports are highly skewed to EU. The EU is Ethiopia's favorable export market. Accordingly, for over half a decade on average, over one third of the total export was destined to this market, followed by Asia (18 percent) and the Middle East (16 percent). But considering the dynamics, the shares of Asia and the Middle East are fast increasing at the expense of the EU. Considering individual markets, Germany is by far the major destination markets for Ethiopia's export, followed by Japan, Saudi Arabia, Italy and China.

The structure of imports, however, differs from that of exports. In this regard, Asia has a share of one-third of Ethiopia's import; EU over one-fourth; and the Middle East about one-fifth. In the context of individual countries, China and Saudi Arabia together accounted for nearly one-third of total import (for about 15 percent each), followed by United States and India.

A handful of mainly raw agricultural products make up for the bulk of exports, including coffee, oilseeds, edible vegetables and vegetable products, hides and skins and to a smaller extent gold. These account for over 80 percent of the total export. Similarly, few largely manufactured products including petroleum oil and oil products, machinery and equipment, electrical appliances, vehicles and cereals account for over half of the total import.

African countries are not Ethiopia's major trading partners, though there has been some improvement recently. Over the last five years Ethiopia's export to Africa figured about 14 percent of total. Of course, this is quite a significant share. However, this is due to some opportunistic activities by business individuals in Djibouti and Somalia that are engaged in re-exporting (mainly edible vegetables and vegetable products) from Ethiopia to the Middle East as they incur lower cost than Ethiopia for port services. Take away Djibouti and Somalia, what is left for other African's share is a small proportion – 4.8 percent of total merchandize exports. As for imports, Africa share is only 5 percent of total.

Ethiopian economy is currently among the top performing economies in Africa. Indeed, the economy continues to register high growth rates. For more than half a decade, real GDP has grown significantly on annual average of over 11 percent (NBE, 2009/10). In this regard, we suspect that the contribution of trade was considerable. Surprisingly, trade was about 40% of GDP in the years 2005 and 2006 (see table 2). Its share however seems unstable and fluctuating overtime. In a broader sense, this fluctuation might be due to the smallness (price taking nature) of the country at the international market emanating from supply rigidity, less variety and vulnerability (to external shocks) of export products.

Table 3: Trends of Ethiopia's Trade (2002 – 2011)

Year	Value of Trade (USD Millions)			Growth of Trade (%)		Trade in GDP (%)
	Export	Import	Total	Export	Import	
2002	480	1593	2073	26.58		
2003	512.7	2685.9	3198.6	6.81	68.61	37.19
2004	614.7	2873.8	3488.5	19.89	7.00	34.54
2005	926.2	4094.8	5021	50.68	42.49	40.82
2006	1043.0	5207.3	6250.3	12.61	27.17	41.12
2007	1277.1	5808.7	7085.8	22.45	11.55	36.15
2008	1601.8	8680.3	10282.2	25.42	49.44	38.65
2009	1618.2	7973.9	9592.0	1.02	-8.14	29.79
2010	2329.8	8601.8	10931.6	43.98	7.87	36.81
2011	2614.9	8896.3	11511.2	12.24	3.42	37.74

Sources: ITC on UNCOMTRADE Statistics, 2013

From 2006 to 2011, Ethiopia's exports increased on average by 21 percent each year and amounted to 2.6 bln US$ (see the above table). Imports showed a similar development with an average growth rate of 10.6 percent each year to reach 8.9 bln US$. The trade deficit became to 6.28 bln US$ in 2011 compared to 6.27 bln US$ in 2010. In 2011, Ethiopia's trade was diversified across partners; 14 -16 major partners accounted for 80 percent of exports (imports) respectively.

In recent years, Ethiopia has been engaging in different bilateral, regional and multilateral trade negotiation. Due to unilateral tariff reform measures taken, Ethiopia has reduced the tariffs rate over time. Ethiopia made highest tariff rate was 230% before 90's but now the highest tariff rate is 35%.

From East African neighbors Kenya accounts for 99 percent of Ethiopia's total export while the Uganda have an insignificant share 1 percent in the fiscal year 2000. The total export was really higher relative to the next 3 consecutive fiscal years. The average export share rate to Burundi become higher at 2002 with 52% at 2000 and Tanzania contribute 13% of the total share.

Surprisingly, 100% of all Ethiopia's export was gone to Kenya at 2003.and till 2009 the export share towards Kenya is higher relative to the other East African Community countries. At 2011 the total export reach 37.5 million dollars, from this Grand almost 70 % (USD 26.4 million was exported to Uganda) and the rest was sent to Kenya, Rwanda and Burundi respectively. When we see the Aggregate of Trade for the decade, the highest share of trade was made to the Neighboring Kenya and the lowest share of trade was made with Burundi till 2003 and with Tanzania After 2003.

Table 4: Total Export of Ethiopia to Destination Countries with FOB Value (USD)

Total Export Of Ethiopia	Destination Countries with FOB Value(USD)					Export share to each Partner country (%)					Total Exports in USD
	Kenya	Burundi	Rwanda	Tanzania	Uganda	Kenya	Burundi	Rwanda	Tanzania	Uganda	
2000	1,949,733	0	0	463	23,402	99	0	0	0	1	1,973,598
2001	649,053	0	267	467	1,067	100	0	0	0	0	650,854
2002	23,625	37,425	23	9,728	1,307	33	52	0	13	2	72,109
2003	816,180	0	0	355	0	100	0	0	0	0	816,534
2004	1,465,580	0	0	1,072,393	173,896	54	0	0	40	6	2,711,869
2005	2,968,367	0	161,399	0	41,140	94	0	5	0	1	3,170,905
2006	2,926,498	0	85,575	0	190,217	91	0	3	0	6	3,202,290
2007	4,511,239	27,011	0	0	14,786	99	1	0	0	0	4,553,036
2008	3,727,093	18,940	7,270	0	418,088	89	0	0	0	10	4,171,392
2000	1,949,733	0	0	463	23,402	99	0	0	0	1	1,973,598
2001	649,053	0	267	467	1,067	100	0	0	0	0	650,854
2002	23,625	37,425	23	9,728	1,307	33	52	0	13	2	72,109

Source: ERCA Official Export Data, 2012

Percent of its total import value from EAC neighboring countries are much higher than exports. Hence, in general, trade integration between Ethiopia, on the one hand, and the EAC, on the other, is quite rudimentary, but there is a higher rate of Imports from the EAC Countries. Ethiopia's import from the bilateral trading counties is lower relative to the other partners of the country in COMESA and SADC counties like South Africa and Sudan.

Initially, at fiscal year 2000, the country's import from EAC was 21 million USD, with a higher share of import from Kenya. And at 2001, the total import slumps to13.51 million USD. after that the import total increase till 2004. At 2006, the total import increase to 45.3 million USD due to the increase of import from the landlocked country Burundi with the rules of origin without including re-Processed products. And finally the total imports increases and reach to 34.3 million USD in the 2011 fiscal year.

The increase in Ethiopia-EAC imports is attributed to a high demand for consumer and producer goods. These included processed cotton, soap, fruits, soya tobacco and animal fats & oils. Mainly, imports from Kenya included petroleum products, cement, cigarettes beer made from malt, stationary equipments, and paper and its products, iron and steel, plastics and pharmaceutical products.

Table 5: Ethiopia Import from Partner Country by CIF-Value (USD)

Ethiopia Import/Year	Partner Country by CIF-Value(USD)					Total Import in USD
	Kenya	Burundi	Uganda	Rwanda	Tanzania	
2000	20508416.6	282.9	88258.55	144516.39	206264.85	20947739.31
2001	12503162.2	NA	71953.86	13028.29	885275.45	13473419.81
2002	17141644	NA	47256.56	1309.19	293525.86	17483735.65
2003	20155290	98.91	1129171.4	72290.25	757810.75	22114661.31
2004	21707763.8	3487.71	1894413.67	2040.29	1882218.25	25489923.68
2005	24022433.2	NA	88258.55	NA	35285.31	24145977.03
2006	40765050.1	4327950.24	71953.86	197993.49	NA	45362947.73
2007	34996246.4	806.79	47256.56	28246	NA	35072555.71
2008	29644546.5	NA	803918.93	18634.35	NA	30467099.75
2009	30634655.9	14013.63	567305.83	158986.39	NA	31374961.7
2010	31671953	11923.48	940630.04	23383.66	NA	32647890.18
2011	33996356.5	NA	345054.93	NA	NA	34341411.47

Source: ERCA Official Export Data; 2012

Intra-regional trade in the EAC regions has been on rapid relative growth in the past decade. In the EAC, total intra-regional exports increased from around US$500 million in 2000 to more than US$2.36 billion in 2010, an increase of almost four folds. During the same period, EAC's total exports to the world grew at a slightly slower pace, increasing from US$2.67 billion to US $11.35 billion. As a result, the share of intra-EAC exports in the region's total exports actually increased from 18.7% in 2000 to 20.8% in 2010, possibly suggesting that regional integration in the EAC has had a positive effect on intra-EAC exports. On the import side, the EAC countries generally maintained large trade deficits as its total imports were more than twice as much as its total exports in value terms during the 2000-2010 periods. As a result, share of intra-EAC imports in the region's total imports remained quite small (only about 6.4% in 2009).

Most EAC countries generally export very limited ranges of products to other countries in the same region at the beginning of the period considered. This is evident by the very high shares of the top-5 export items at high level in these countries. However, intra-regional exports have become more diversified along the product space in recent years for all the EAC countries. For instance, in 2010, export shares of top-5 products from Burundi, Uganda and Tanzania decreased significantly from the 2000 levels by 18 to 40 percentage points. Kenya continued to have the most diversified export baskets with the share of its top-5 exports dropping from 28.2% to 22.7%.

Over the past decade, lower tariffs within the East African Community (EAC) have boosted regional trade, offering the five member countries a route to faster growth. According to the IMF's latest projections, growth in the EAC region is expected to reach 5.9 percent in 2012 a noticeably faster growth rate than in the rest of sub-Saharan Africa.

In 2008, total intra-EAC trade increased by 37.6 percent reaching a record value of US$ 2,715.4 million compared to the previous year. During the period under review, Tanzania recorded high intra-EAC trade flows which more than doubled from US$279.5 million in 2007 to US$ 735.8 million in 2008. But this reflects automation of data compilation processes at the entry point bordering with other EAC Partner States. Overall, Kenya continued to dominate the EAC regional trade, accounting for 44.8 percent of total value of trade and recorded a surplus in this

trade. Uganda and Tanzania accounted for 28.1 percent and 27.1 percent of the total intra-EAC trade respectively. Table 6 presents details on Intra-EAC trade for the period 2005 to 2008.

Table 6: Total Intra-EAC, 2005-2008 (US$ million)

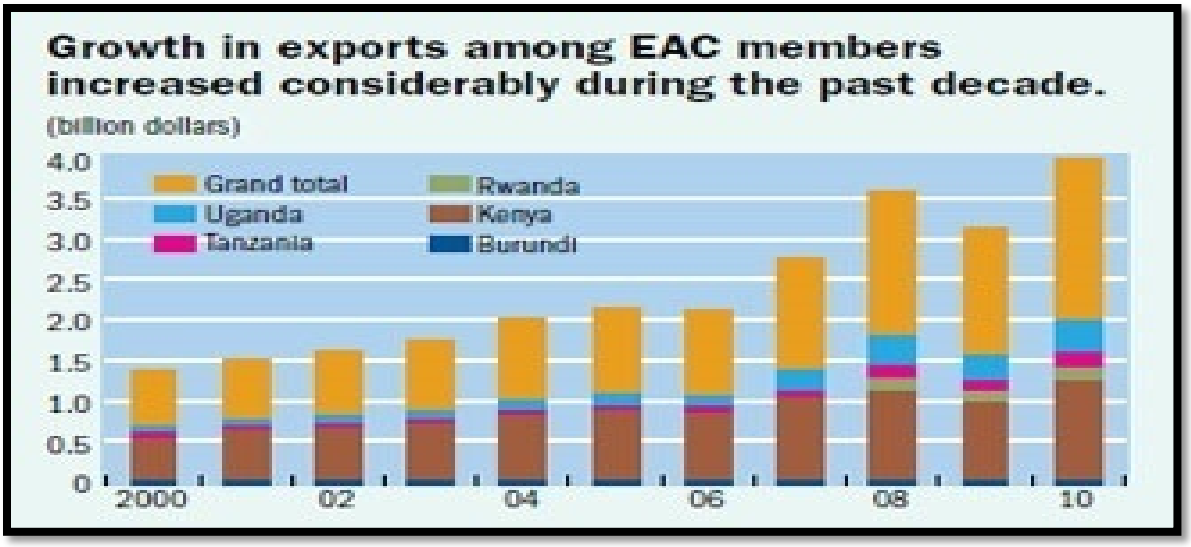
Country /Year	Imports				Percentage Change		
	2005	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**
Uganda	550.8	429.7	526.5	566.8	-22.0	22.5	7.7
Tanzania	175.9	220.6	110.1	425.3	25.4	-50.1	286.3
Kenya	59.5	76.7	188.0	181.0	28.9	145.1	-3.7
Total	**786.2**	**727.0**	**824.6 1**	**173.1**	**-7.5**	**13.4**	**42.3**
	Exports				**Percentage Change**		
Country	**2005**	**2006**	**2007**	**2008**	**2006**	**2007**	**2008**
Uganda	87.9	101.8	148.8	195.2	15.8	46.2	31.2
Tanzania	142.0	147.4	169.4	310.5	3.8	14.9	83.3
Kenya	831.2	641.0	830.4	1,036.6	22.9	29.5	24.8
Total	**1,061.1**	**890.2**	**1,148.6**	**1,542.2**	**16.1**	**29**	**34.3**

Source: Partner States Revenue Authorities, Central Banks and National Statistics Offices, 2012

The total intra-EAC imports increased by 42.3 percent to US$ 1,173.1 million in 2008 compared to US$ 824.6 million in the previous year. The rise in intra-EAC imports was accounted for by increased imports of capital and consumer goods. Uganda remained a major importer in intra-EAC trade accounting for 48.3 percent of total imports while Tanzania and Kenya accounted for 36.3 percent and 15.4 percent respectively.

The total intra-EAC exports rose to US$ 1,542.2 million in 2008 compared to US$ 1,148.6 million registered the previous year. Tanzania recorded high growth rate in intra-EAC exports while those of Uganda and Kenya declined compared to the performance in the previous year. Likewise, Tanzania's share in intra-EAC exports increased to 20.1 percent while those of Uganda and Kenya declined to 12.7 percent and 67.2 percent respectively when compared to the previous year.

Figure 2: Growth in Export among EAC member countries over 2000-2010



Source: The East African Community after Ten Years – Deepening Integration, 2012, P.64

During 2000–2010, intra-regional exports between Burundi, Kenya, Rwanda, Tanzania, and Uganda tripled—from nearly $700 million to nearly $2 billion. Rwanda's exports have grown the most during this period, from about $1.6 million to $156 million, but are still a fraction of those of the region's largest economy, Kenya. Kenya's exports to the other EAC members were about $1.2 billion in 2010. In contrast, export growth in Burundi—the poorest member—has remained constant and imports have declined, mainly because of civil war and inferior infrastructure, such as airports, roads, and docks, which is needed for trade. At the same time, EAC countries have been exploiting new markets, including those within the region. Exports to other EAC countries are now as high as exports to the euro area, followed by exports to the rest of Africa and developing Asia.

The free movement of goods between the Partner States as provided in Article 6 shall be governed by the Customs Law of the Community as specified in Article 39 of the Protocol on the Establishment of the East African Community Customs Union. The EAC Customs Union became fully operational on 1 January 2010. It allows intra-trade in goods locally produced within the region. Also providing legal basis of the operations of the Common Market are the East African Community Protocol on Standardization, Quality Assurance, Metrology and Testing; the East African Community Standardization, Quality Assurance, Metrology and Testing Act, 2006 which have been enacted and are in operation.

The provisions of the Common Market Protocol also permit the incorporation of the protocols that may be concluded in the areas of cooperation on sanitary and technical barriers to trade; and as in the inimitable lingo of the drafters of the Protocol, "any other instruments relevant to the free movement of goods". As it is seen in the below Table: the top tradable products from Ethiopia to EAC and Main products imported from EAC countries to Ethiopia are stated.

Table 7: Main Products traded by Ethiopia -EAC Countries

Main products Exported to EAC	Main products imported from EAC
Dried kidney beans, white pea beans	Toner cartridge and ribbon for computer printers
Vegetable products, ginger, other fruits	Mosquito nets of cotton (not knitted or crocheted)
Chat	parts of machinery of 8422.19 to 8422.40
Maize, raw cane sugar, in solid form	Aerials and aerial reflectors of all kinds and parts
Footwear	Articles for the packing of goods, of plastics, nets
Vitamins, minerals and other food supplements	Cartons, boxes and cases, of corrugated paper or paperboard
Vaccines for veterinary medicine	Disodium carbonate
Shirts of other textiles, knitted or crocheted, tents of textiles, Cotton and synthetic fibers	Dormant bulbs, tubers, rhizomes
Boxes, cases, crates and similar articles of plastics	Electric ovens, cookers, cooking plates, boiling rings, grillers
Articles of nickel	Medicaments of other antibiotics, for retail sale
Medicaments of other antibiotics, not for retail sale	Office or school supplies of plastics, exercise-books
Travelling circuses and travelling menageries	Other petroleum oils and oils obtained from

	bituminous minerals
Stranded wire, cables... Of aluminum alloys, not electrically insulated	Paints and varnishes, in a non-aqueous medium
Roses and derivatives	Plasticized polyvinyl chloride mixed, in primary forms
Roundabouts, bouts, swings shooting galleries/fairground amusements	Plates. (excl. Rectangular) of aluminum alloys, >0.2mm thick
Nails, tacks, drawing pins, corrugated nails... Of iron or steel	Rolled iron/steel, width >=600mm, plated or coated with aluminum alloys
Powders, whether or not compressed, for cosmetic/toilet use	Screws and bolts of iron or stainless
Black tea fermented/partly fermented and flavored	Kitchen or other household articles and parts thereof, of aluminum, wooden furniture

Source: Own computation based on COMTRADE -WITS data.

EAC goods exports are mostly simple and light manufactured products. Unlike EAC exports outside the region, which are mainly commodities, the bulk of intra-regional exports are manufactured goods (food products, beverages, and tobacco), Semi Processed Medicare products and oil re-exports. There has been limited variation between years to year. With the basket of top traded goods within the region remaining broadly the same. Although a noticeable change is the reduction in the amount of oil traded between EAC countries, which comprised of 41 percent of the top 18 products in 2000 compared to only 11 percent in 2009.

When we ask: Why is trade integration among East African countries so weak? The prime factor is the lack of complementarities between the export bundles of one country and import bundles of another. The higher the degree of industrialization; The greater the complementarities between imports and exports of different economies and Export bundles of least developed economies are based on their respective natural resource endowments – such as coffee, cotton, coco, oil, copper, etc. The type of such endowments in a given area/country is largely limited.

Moreover, different countries may have similar natural resource endowments. This is typical of most East African countries whose main export commodity is petroleum oil, others – Ethiopia, Kenya, Uganda and Tanzania largely export few (undiversified) and similar agricultural products and import manufactured goods. This is a typical case of absence of complementarities; there is little to trade among them. Complementarily is a necessary criterion for trade, but not a sufficient one.

Another factor influencing trade integration in EAC is competitiveness – in this context referring to cost Efficiency, productivity and marketing efficiency; this is largely determined by technology, use of economies of scale, production and marketing organizational structure/skill, etc. Hence least developed economies like EAC inevitably prefers to trade with advanced economies than otherwise. Still another element influencing trade integration is the restrictiveness of prevailing trade policy, particularly tariff and non-tariff barriers, in a given economy. Non-tariff barriers include quota, price and quantity control measures, non-automatic (discriminatory) licensing, anti-dumping, technical regulations, monopolistic measures, subsidies, etc.

4. Empirical Methodology and Model Specification for Estimation

This chapter is organized as follows: In section 1 introduction for Gravity model will be elucidated and in section 2 it outline some issues of Trade Models for proper specification of

gravity equations. Section 3 presents specifications of the gravity models estimated in the paper and describes proxies of variables. The data description and procedures for the empirical results are considered in section 4.

4.1 Introduction for the Trade Gravity Models

This study is conducted with the aim of identifying the main determinants of Ethiopia's bilateral trade and addresses the question of whether Ethiopia has untapped potentials with the East African Countries or not. It analysis the major determinants of Ethiopian's bilateral trade and explores the unexploited potentials that the country may have in the East African Countries using different methods. The gravity model estimated by using 9 years data for the 4 EAC partner countries of Ethiopia. The estimated coefficients then used to analyze the existing bilateral Trade and predict the potential that the country could have in the partner countries.

Accordingly, per capita GDP of both exporting and importing countries found to have positive and significant impact on Ethiopia's bilateral Trade whereas, distance between countries negatively affect their bilateral trade . In this light, the export potentials of the country are estimated using the estimated coefficients of the gravity model. Accordingly, Ethiopia has the highest unexploited potential in East Africa. Secondly, using the ITC measure, the potential to increase Ethiopian's Trade in these countries that increase the county's Trade potential are also identified.

The gravity model is considered one of the most successful empirical frameworks in International Economics. It has become a successful tool for the evaluation oftrade policies or the calculation of trade potential associated with regional integration. However, a more detailed analysis of the theoretical underpinnings, the use of larger datasets and improvements in statistical and econometrics software have highlighted new problems in estimating the gravity equation.

The gravity model is widely used in econometric analysis of international statistics. For the foreign trade, the gravity model analyses the determinants of bilateral trade flows, the goal being the development of more precise predictions on the bilateral trade. Newton's gravitational

equation measures the maximum force between two masses that are separated in space. Trade gravity equation follows the same principle, measuring trade that may exist between two countries, mainly depending on the distance between them and their level of development, plus a few specific factors.

Theoretical foundations of gravity models for exploring international trade flows mainly rely on classical and new trade theories (Helpman and Krugman 1985; Krugman 1991and 1995; Helpman 1999). Initially, gravity models have been estimated on the basis of cross-section data. Since the middle of the 1990s, a lot of attention has been given to the proper specification and estimation of gravity equations in the panel data framework (Egger, 2002 Baltagi, 2003; Cheng and Wall, 2005).

After 2004, the papers are highly empirical, extending the model with a number of factors that show geographical, historical or economic relationships between the partner countries. This paper is empirical and aims to identify significant influence factors on bilateral trade flows between Ethiopia and its trade partner countries, in order to estimate the degree of the external trade efficiency, identifying the most effective and most ineffective foreign trade partnership for Ethiopia and EAC member countries and it uses gravity variables as explicative factors.

4.2 The Trade Gravity Models

The gravity model is a popular formulation for statistical analyses of bilateral flows between different geographical entities. In the following, an overview of the evolution and use of this equation are provided. Originally, in 1687, Newton proposed the "Law of Universal gravitation." This inspiration of gravity model which comes from physics states that the force of gravity between two objects is proportional to the product of the masses of the two objects divided by the square of the distance between them, it is given by:

$$\boldsymbol{F_{ijt} = G\frac{M_{it}.M_{jt}}{D_{ij}^2}} \quad \textbf{(1)}$$

Where

- i and j are the country i (host) and j (bilateral)countries
- t is the time period
- F_{ijt} is the attractive force.

- M_{it} and M_{jt} are the masses.
- D_{ij} is the distance between the two objects.
- G is a gravitational constant depending on the units of measurement for mass and force.

However, economists discovered the gravity model to apply in international trade when Tinbergen (1962) and Poyhonen (1963) proposed that roughly the same functional form could be applied to international trade flows. Consequently, a large number of empirical works applied gravity model to inspect the trade creation and trade diversion effects of the RTAs like EAC.

According to this model, flows of export between two countries are explained by their economic sizes (GDP or GNP), population and direct geographical distances between the countries. Based upon Newton's Law of Gravitation; the gravity model predicts that the flow of people, ideas or commodities between two locations is positively related to their size and negatively related to the distance. In its original form, they specified the following gravity model equation:

$$\boldsymbol{F_{ijt} = C\frac{GDP_{it} * GDP_{jt}}{D_{ij}}} \text{..... (2)}$$

F_{ijt} is the bilateral trade flows between country *i* and country *j*;

C is the constant of the equation;

GDP_{it} is the gross domestic product for the country *i*; and GDP_{jt} is the gross domestic product for the country *j*

D_{ij} is the distance between the capitals of the two partner countries.

For empirical estimation, normally the gravity model has been used in the log linear form while the coefficients represent elasticity of bilateral trade to estimated parameters (Butt, 2008).Taking this fact into account and applying to the basic concept of the gravity model gives us the following linear form of equation:

$$\boldsymbol{X_{ijt} = \alpha_0 (GDP_{it})^{\alpha_1} (GDP_{jt})^{\alpha_2} (DIS_{ij})^{\alpha_3}} \text{ ..... (3)}$$

Where X_{ijt} 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 GDP_{it} and GDP_{jt} are economic size 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.

Usually, the gravity models are estimated in log linear form, in which case the estimated coefficients would be interpreted as elasticity. Accordingly, equation 3 would take the following form:

$$\boldsymbol{lnX_{ijt} = \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDIS_{ij} + U_{ij}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textbf{(4)}$$

Where U_{ij} is the error term

In recent literatures on estimation methods for the gravity equation, there are at least two problems related to the log linearization of the gravity equation that require further research as there is no consensus about the optimal method to solve them. First, the exclusion of the multilateral trade resistance terms defined by Anderson and van Wincoop (2003), as well as the unobserved heterogeneity present in trade data leads to biased estimates due to misspecification.

One usual procedure to solve this problem is to Log-linearize the model and to estimate it by OLS with fixed effects. However, the heteroskedasticity intrinsic to the log-linear formulation of the gravity model can result in biased and inefficient estimates when applying OLS. Second, the logarithm of zero is unfeasible. As a result, the presence of zero trade flows in data means that these observations must either be dropped or replaced by an arbitrary positive value, leading to sample selection bias and loss of information.

Furthermore, the generalized gravity model augments the basic model with other variables which are thought to explain the flow of trade among countries. It states that the volume of bilateral trade between a pair countries does not depend only on their incomes(GDPs) and geographical distance, but also on their populations, trade variables and a set of dummy variables either facilitating or hindering trade between pairs of countries. (Martinez-Zarzoso and Nowak-Lehmann; 2003)

In contrast to the cross section and time series cases, this study adopts the panel data approach. The advantage of the panel is that time series and cross-section observations are combined to offer more variability, more degree of freedom, and reduce the multicollinearity among explanatory variables (Nguyen, 2010).

During the recent decade, gravity approaches of international trade have widely been applied for analyzing the impact of a variety of policy issues and institutional determinants, including

regional trading groups, currency unions, political blocs and border region activities on bilateral trade flows of the countries (Eichengreen and Irwin; 1998; Soloaga and Winters; 2001; Martinez-Zarzoso and Nowak-Lehmann; 2003; de Groot etal. 2004; Cheng and Wall; 2002 and 2005). The regional integration effects are ordinarily handled as deviations from the volume of trade predicted by a baseline gravity model adding dummies that characterize several effects of integration.

Apart from the above basic gravity variables, there are so many additional variables that may either enhance or discourage bilateral trade between countries. Accordingly, the model which use augmented by dummy variables for absence or presence of common border and presence or absence of System of Preference scheme and benefits between countries.

To capture the impact of depreciation or appreciation of domestic currency, the model is also augmented by including Real Exchange Rate between Ethiopia and the selected trading partner countries. It is also augmented by time-specific dummies to control for omitted (unobservable variables) that are cross sectional specific but remain constant over time affecting all countries in the sample respectively. Cheng and Wall; 2005, cited by Rahman et al (2006), noted that the incorporation of specific fixed effect is the best way to control for heterogeneity in gravity model.

Classical gravity models generally use cross section data to estimate trade effects and trade relationships for a particular time period, for example one year. In reality, however, cross-section data observed over several time periods (panel data methodology) result in more useful information than cross-section data alone. The advantages of this method are: first, panels can capture the relevant relationships among variables over time; second, panels can monitor unobservable trading-partner-pairs' individual effects. If individual effects are correlated with the regressors, OLS estimates omitting individual effects will be biased. Therefore, we have used panel data methodology for our empirical gravity model of trade. The generalized gravity model of trade states that the volume of trade / exports / imports between pairs of countries is a function of their incomes (GDPs or GNPs), per capita income, their distance (proxy of transportation

costs) and a set of dummy variables either facilitating or restricting trade between pairs of countries. That is:

$$X_{ijt} = \beta_o Y_{it}^{\beta_1} Y_{jt}^{\beta_2} y_{it}^{\beta_3} y_{jt}^{4} D_{ij}^{\beta_5} A_{ij}^{\beta_6} U_{ijt} \text{---------- (5)}$$

Where: Y_i (Y_j) indicates the GDP or GNP of the country i (j), y_i (y_j) are per capita income of country i (j), D_{ij} measures the distance between the two countries' capitals (economic centers), A_{ij} represents time invariant dummy variables, U_{ij} is the error term and β s are parameters of the model.

As the gravity model is originally formulated in multiplicative form, we can linearize the model by taking the natural logarithm of all variables. So for estimation purpose, equation (6) can be log-linearized in a form expressed as:

$$lX_{ijt} = \beta_o + \beta_1 lY_{it} + \beta_2 lY_{jt} + \beta_3 ly_{it} + \beta_4 ly_{it} + \beta_5 lDij + \sum \delta hPijht + U_{ij} \text{--------- (6)}$$

Where: *l* denotes variables in natural logs, δ as coefficients for preferential trade dummies and P_{ijh} is a sum of preferential trade dummy variables. Dummy variable takes the value one when a certain condition is satisfied and zero otherwise.

Apart from the above basic gravity variables, there are so many additional variables that may either enhance or discourage bilateral trade between countries. Accordingly, the model is going to use augmented by dummy variables for absence or presence of common border and presence or absence of System of Preference scheme and benefits between countries.

To capture the impact of depreciation or appreciation of domestic currency, the model is also augmented by including Real Exchange Rate between Ethiopia and the selected trading partner countries. It is also 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.

4.3 Specification of Gravity Equations

The considerations about theoretical foundations of the gravity model for analyzing International Trade flows do not generate a proper and unique specification of the gravity equation used in empirical work. In the basic form of the gravity model, it is assumed that the amount of trade between two countries increases with their size - measured by their national incomes (or GDP) - and decreases with the cost of transport between them - measured by the distance between their economic centers (Tinbergen 1962). Linnemann (1966) included population as an additional variable for the size of the country and its economy in the gravity model. This model is sometimes called “the augmented gravity model”. Including the size of economy in the gravity equation corresponds to new trade theory models in their basic form in which trade is positively related to the market size.

It is also common to specify the augmented gravity model using per capita income or per capita GDP as an explanatory variable. Per capita income expresses the level of economic development. Presumably, if the level of income is higher, also domestic expenditure per capita will be higher and consequently both domestic production and imports are expected to rise. Adding per capita income as an indicator for the level of economic development to the gravity equation also makes it possible to distinguish the effects of size and economic development level of a country (see also de Groot et al.2004, p 110).

Trade theories themselves do not provide a clear explanation for the positive effect of per capita income in bilateral trade flows. The main push factors of international trade flows are related to transportation costs. Distance as an explanatory variable of bilateral trade flows serves as a proxy for transportation costs. Additionally, there are some so-called man-made conditions that have an impact on bilateral trade relations of the countries. Man-made conditions may consist of tariffs, quotas, subsidies, export taxes, exchange controls, marketing restrictions, etc.

For exploring the deviations from the baseline gravity equation, some dummies are included in the equations as explanatory variables. A typical gravity equation of international trade consists of three types of variables, which may vary i) in all three dimensions: over country pairs *i* and *j* (*i*

$\neq j$) and over time t (Y_{ijt}) ii) in two dimensions: over country i or j and over time t (for instance the explanatory variables X_{it} and X_{jt} population or GDP of the country i and j, respectively, at time t); iii) in two dimensions i and j but not over time t (e g distance or dummies indicating regional trade blocs like RTA, common language and common border, common languages, etc). So the proxy variables of the study are stated in the table A5 on the Annex part.

4.4 Data Description and Procedures

In order to deduce sound conclusions from the empirical study, it is important to choose an appropriate time period and to include all EAC member countries as possible into the sample. The study covers the period from 2004 to 2012 GC for a total of 4 trading partners of Ethiopia. The countries are chosen based on their importance for Ethiopia as a trading partner and the data availability for the different variables. Moreover, the year 2004 coincides with the beginning of the implementation of trade protocol of EAC trade agreements which was signed in 1999 and helps to assess the post implementation effects of trade agreements on EAC's trade flows. All observations are in annual basis. The data used in the study have been collected from different sources as stated below.

1. Export (X)

The annual values (in USD million) of Ethiopian exports to each of the 4 trading partners of EAC mainly collected from International Monetary Fund's Direction of Trade Statistics (DOTS) database, and the exports of EAC towards Ethiopia is also found from EAC official Data.

2. Domestic and Foreign Income (GDP)

Data on GDP of Ethiopia and its trading partners (in million US dollars) are collected from World Economic Outlook Data Base. Since exports are the difference between domestic supply and domestic demand, they should be affected by the growth in domestic income.

3. Distance

Data on the distance between Ethiopia and her trade partners are collected based on the distance between Addis Ababa and capital of trading partners. These data are available fromwww.indo.com/distance. Based on distance data and GDP as measured accordingly, we calculate the weighted distance between Ethiopia and its trading partners for each year in the observation period.

4. Foreign Trade Policy (FTP)

Trade policy is a measure of the degree of tariff and non-tariff barriers that trading partners apply. Trade policy in this study is proxied by a trade policy index, which is taken from the Index of Economic Freedom created by the Heritage Foundation. The index ranges from 0 to 100. A country with zero tariffs and non-tariff barriers will have a trade freedom score of 100 i.e. 100 signifies an environment that is most conducive to trade. Given that more freedom encourages trade, the sign of the index variable is expected to be positive.

5. The Remaining Data

The data for Import of the countries (constant 2005), nominal exchange rate (national currency per US Dollar), population size (in millions), Trade-GDP ratio, inflation rate the others variables have been obtained from the World Development Indicator database and World Economic Outlook Data Base and from the national statistical Agencies.

Chapter Five

5.1 Estimation Results and Discussion

Using our data set, we estimate three bilateral gravity models of Ethiopia: (a) the gravity model of Ethiopia's trade (exports + imports), (b) the gravity model of Ethiopia's exports, and (c) the gravity model of Ethiopia's imports. For the model (a), we have followed Sharma (2000) and Hassan (2000, 2001) way. Since the dependent variable in the gravity model is bilateral trade (sum of exports and imports) between the pairs of countries, the product of GDP/GNP and the product of per capita GNP/ GDP have been used as independent variables. We have added some additional independent variables in our model. Thus the gravity model of trade in this study is:

$$\begin{aligned} \boldsymbol{lnX_{ijt}} = \boldsymbol{\beta_o} + \boldsymbol{\beta_1 ln}(\boldsymbol{GDP_{it} * GDP_{jt}}) + \boldsymbol{\beta_2 ln}(\boldsymbol{GDPPC_{it} * GDPPC_{jt}}) + \boldsymbol{\beta_3 ln}(\boldsymbol{Tax_{it} * Tax_{jt}}) + \boldsymbol{\beta_4}(\mathbf{Distance_{ij}}) \\ + \boldsymbol{\beta_5}(\boldsymbol{ln}\mathbf{PCGDPD_{ijt}}) + \boldsymbol{\beta_6}(\frac{\boldsymbol{TR}}{\boldsymbol{GDP}})_{it} + \boldsymbol{\beta_7}(\frac{\boldsymbol{TR}}{\boldsymbol{GDP}})_{jt} + \boldsymbol{\beta_8 ln}\mathbf{NER_{ijt}} + \boldsymbol{\beta_9 ln}(\boldsymbol{In_{it}}) + \boldsymbol{\beta_{10}}(\boldsymbol{lnIn_{jt}}) \\ + \boldsymbol{\beta_{11}}(\boldsymbol{lnTP_{it}}) + \boldsymbol{\beta_{12}}(\boldsymbol{lnTP_{jt}}) + \boldsymbol{\beta_{13}}(\mathbf{Border_{ij}}) + \boldsymbol{\beta_{14}}(\mathbf{EAC_{ij}}) + \boldsymbol{\beta_{15}}(\boldsymbol{ComLan_{ij}}) \\ + \boldsymbol{\beta_{15}}(\boldsymbol{Comcol_{ij}}) + \boldsymbol{\beta_{16}}(\boldsymbol{Landlockedness_{ij}}) + \boldsymbol{Uijt} \qquad (\boldsymbol{a}) \end{aligned}$$

Where:

X_{ij} = Total trade between Ethiopia (country i) and country j,

GDP_i (GDP_j) = Gross Domestic Product of country i (j),

$GDPPC_i$ ($GDPPC_j$) = per capita GDP of Country i (j),

Tax_i (Tax_j) = Trade tax as % of revenue of country i (j),

$Distance_{ij}$ = Distance between country i and j,

$PCGDPD_{ij}$ = per capita GDP difference between country i and j,

$(TR/GDP)_i$($TR/GDP)_j$ = Trade to GDP ratio of country i (j),

NER_{ij}=Nominal Exchange Rate between Ethiopia and the bilateral country j,

In_i (In_j) =Inflation Rate of country i (j),

TP_i (TP_j) =Trade policy of Country i (j) which had represented by its trade freedom index,

$Border_{ij}$ = Land border or contiguity between country i and j (dummy variable),

EAC_{ij}= membership of EAC trade community for Country i (j) is (dummy variable),

$ComLan_{ij}$ = common Language shared between country i and j (dummy variable),

$ComCol_{ij}$ = common colonial link between country i and j (dummy variable),

$Landlockedness_{ij}$ = Landlockedness of country i and j (dummy variable),

U_{ij} = error term; t = time period: t = 1, 2… T; T = 9, βs = parameters

Hypotheses

1. The product of GDPs is considered as the size of the economy. As it is bigger, there will be more trade between the two countries; so we expect a positive sign for the coefficient of GDPs.
2. Per capita GDP provides a good proxy for the level of development and infrastructures that are essential to conduct trade, and as such the more developed the countries are, the more would be the trade between the pairs of countries (Frankel 1993). So we expect a positive sign for the coefficient of PCGDP variable.
3. Trade tax always prevents trade. Also trade flow is inversely related to the transport costs. So we expect negative signs for the coefficients of these variables.
4. Due to economies of scale effect in the bilateral country j, if more goods are produced in country i or j, then per capita of a nation would be positive. Then the coefficient of per capita difference would be positive if the H - O hypothesis holds and negative if the Linder hypothesis holds.
5. TR / GDP variable indicates the openness of the country. The more open the country is, the more would be the trade. So we expect a positive sign for this variable.
7. TP is Trade policy of a country which was represented by its trade freedom index, measure the degree of economic freedom in the world's nations, so the sign of the coefficient would be positive. Trade freedom is a composite measure for the absence/presence of tariff and non-tariff barriers that affect imports and exports of goods and services.
8. Nominal Exchange Rate between Ethiopia and the bilateral is then calculated by the ratio of the domestic country's Currency to the partner's Currency. Therefore a rise in nominal exchange rate represents currency depreciation for the domestic country Ethiopia and a fall in nominal exchange rate represents currency appreciation for the domestic currency. So we expect a positive sign for this variable.
9. Geographical distance is used as proxy of transport costs or remoteness implying that the coefficient of this variable is expected to have a negative sign. Due to its time invariant nature, definition of the distance is problematic. Although it is not a problem in cross sectional analysis, the variable causes a problem when time dimension is entered in the analysis (i.e. panel-data). In order to overcome this problem we will further go and choose from the fixed or random effect models.
10. Common Border (contiguity) and language, colonial link and Land lockedness are dummy variables that are assumed to facilitate or impede bilateral trade.

With regard to the gravity model of Ethiopia's export, we consider the following model:

$$\boldsymbol{lnEX_{ijt} = \beta_o + \beta_1(lnY_{it}) + \beta_2(lnY_{jt}) + \beta_3(lny_{it}) + \beta_4(lny_{jt}) + \beta_5(ln\mathrm{D}_{ij}) + \beta_6(lnyd_{ijt}) + \beta_7(ln\mathrm{NER}_{ijt})}$$
$$\boldsymbol{+ \beta_8(lnIn_{it}) + \beta_9(lnIn_{jt}) + \beta_{10} ln\mathrm{TE}_{it} + \beta_{11}(ln\mathrm{Ti}_{jt}) + \beta_{12}\left(\frac{IM}{Y}\right)_{it} + \beta_{13}\left(\frac{TR}{Y}\right)_{it}}$$
$$\boldsymbol{+ \beta_{14}\left(\frac{TR}{Y}\right)_{jt} + +\beta_{15}(lnFDI_{it}) + \beta_{16}(lnTP_{it}) + \beta_{17}(lnTP_{jt}) + \sum \delta hPijht}$$
$$\boldsymbol{+ U_{ij} \qquad (b)}$$

Where, EX= exports from i to j, Y=GDP, y = per capita GDP, D= distance, yd= per capita GDP difference, NER = Nominal exchange rate, In = inflation rate, TE_i = total export of i, TI =total import, IM/Y = Import-GDP ratio, TR/ Y= trade-GDP ratio, FDI= Foreign Direct Investment P=preferential dummies.

Hypotheses

1. We expect positive signs for $\beta 1$, $\beta 2$, $\beta 7$, $\beta 9$,$\beta 10$, $\beta 11$, $\beta 12$, $\beta 13$ and $\beta 14\beta 15$ $\beta 16$and $\beta 17$.
2. We expect negative signs for $\beta 5$ and $\beta 8$.
3. Signs may be positive or negative for $\beta 3$, $\beta 4$ and $\beta 6$.

The reasons for ambiguity are: with the higher per capita income if the country enjoys economies of scale effect, then $\beta 3$ would be positive; alternatively due to absorption effect if the country exports less, then $\beta 3$ would be negative. Similarly, if country j demands more country i's goods due to higher income, $\beta 4$ would be positive; on the other hand due to economies of scale effect in country j, if more goods are produced in country j, then $\beta 4$ would be negative. $\beta 6$ would be positive if the H- O hypothesis holds and negative if the Linder hypothesis holds.

For the gravity model of Ethiopia's imports, the following model is considered:

$$\boldsymbol{lnIM_{ijt} = \beta_o + \beta_1(lnY_{it}) + \beta_2(lnY_{jt}) + \beta_3(lny_{it}) + \beta_4(lny_{jt}) + \beta_5(ln\mathrm{D}_{ij}) + \beta_6(lnyd_{ijt}) + \beta_7(ln\mathrm{NER}_{ij})}$$
$$\boldsymbol{+ \beta_8(lnIn_i) + \beta_9(lnIn_j) + \beta_{10}(\frac{EX}{Y})_{jt} + \beta_{11}(\frac{TR}{Y})_{it} + \beta_{12}(\frac{TR}{Y})_{jt} + \beta_{13}(lnTP_{it})}$$
$$\boldsymbol{+ \beta_{14}(lnTP_{jt}) + \beta_{15}(lnTIM_{it}) + \beta_{16}(ln\mathrm{TEX}_{jt}) + \sum \delta hPijht + Uijt \qquad (C)}$$

Where, IM= imports, EX/Y= export-GDP ratio, TIM_i = total import of i and TEX_j=total export of j and other variables are the same as defined in the Export model.

Hypotheses

1. We expect positive signs for $\boldsymbol{\beta_1, \beta_2, \beta_8, \beta_{10}, \beta_{11}, \beta_{12}\beta_{13}, \beta_{14}, \beta_{15}\ and\ \beta_{16}}$

2. We expect negative signs for $\boldsymbol{\beta_5}$, $\boldsymbol{\beta_7}$ and $\boldsymbol{\beta_9}$

3. Signs may be positive or negative for$\boldsymbol{\beta_3}$, $\boldsymbol{\beta_4}$ and $\boldsymbol{\beta_6}$.

The reasons for ambiguity are: with the higher per capita income if the country i enjoys economies of scale effect, then $\boldsymbol{\beta_3}$ would be negative; alternatively due to absorption effect if thecountry i imports more, then $\boldsymbol{\beta_3}$ would be positive. Similarly, if country j demands more country j's goods due to higher income (absorption effect), $\boldsymbol{\beta_4}$ would be negative; on the other hand, due to economies of scale effect in country j, if more goods are produced in country j, then $\boldsymbol{\beta_4}$ would be positive. $\boldsymbol{\beta_6}$ Would be positive if the H - O hypothesis holds and negative if the Linder hypothesis holds.

In our estimation, we have used balanced panel data, so dummy variables and time invariant variable-distance should or should not be included in the regressions. So we have to decide whether they are treated as fixed or as random. From the regression results of the panel estimation, we get the results of Hausman test in our Panel estimation. So the results suggest that Random Effect Model of panel estimation is the appropriate model for our study. To decide between fixed or random effects the study run a Hausman test where the null hypothesis is that the preferred model is random effects vs. the alternative is the fixed effects (Green; 2008). It basically tests whether the unique errors (ui) are correlated with the regressors. So run a fixed effects model and save the estimates, then run a random model and save the estimates, then perform the test.

When using FE we assume that something within the individual may impact or bias the predictor or outcome variables and we need to control for this. This is the rationale behind the assumption of the correlation between entity's error term and predictor variables. FE removes the effect of those time-invariant characteristics from the predictor variables, so we can assess the predictors' net effect. Another important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different therefore the entity's error term and the constant (which captures individual characteristics) should not be correlated with the others. If the error terms are correlated then FE is no suitable since inferences may not be correct and you need to model that relationship by using random-effects, this is the main rationale for the Hausman test presented in

the Annex Part of the Study at Table A2, Table A3 and Table A4 for the Bilateral Trade, Export and import of Ethiopia and EAC countries.

5.2 Final Estimation and selected Models

Equation (a) above is estimated taking all the variables including distance and dummy variables for 36 observations. The variables-cross product of per capita GDP and tax- are found to be insignificant. The variable trade-GDP ratio is also not so robust. Thus another estimate has been taken substituting population variable instead of per capita GDP. Tax variable has also been dropped from the estimation. So Trade variable has been regressed on GDP, population, per capita GNP differential and the remaining variables. Since population are found to be insignificant. We dropping the population variable from the model, another estimate have been taken. This time all explanatory variables GDP, per capita GDP difference, Nominal exchange rate, inflation of Ethiopia and the geographic distance between bilateral are found to be significant with expected signs. So our selected estimated gravity model of Ethiopia for bilateral trade is:

$$\boldsymbol{lnX_{ijt} = \beta_o + \beta_1 ln(GDP_{it} * GDP_{jt}) + \beta_4(\mathbf{Distance}_{ij}) + \beta_5(ln\mathbf{PCGDPD}_{ijt}) + \beta_8 ln\mathbf{NER}_{ijt} + \beta_9 ln(In_{it}) + Uijt \qquad (af)}$$

To test the heterscadasticity in the model we have run a separate regression considering the heteroscadasticity for every observation and all observations within groups. Hetero corrected regression results are shown in the above Table 8. Regression results are very similar with significance levels and expected signs. The bilateral trade equation was also checked for the hetroscedasticity problem by Breusch-Pagan / Cook-Weisberg test for heteroskedasticity, so we fail to reject the null hypothesis of homoskedasticity such that the assumption of homoskedasticity was fulfilled (shown by Table A1 in the annex part)

All variables are tested for multicollinearity. To check whether there is multicollinearity in our model, we regress each independent variable of the model on the remaining independent variables and compute R^2's. If any of these R^2's is greater than the original R^2, then we can conclude that there is severe multicollinearity in the model. The results for multicollinearity test

are noted in Table A1. From the results we observe that the model doesn't have any multicollinearity problem. The estimation results of unchanged variables for equation (a) to equation (c) - are also noted in the annex section of Table A1.

Another important assumption is that the independent variables should not be perfectly linear functions of each other. However, in STATA, when variables are perfectly collinear, they are dropped automatically from the estimates. For example, the log of exporter GDP and population variable has been consistently collinear when regressions run. This is probably due to the fact that the evaluation process of the estimate – causing the problem of multicollinearity. As such, the variables were dropped from the estimation process by the statistical program.

Variance Inflation Factor may be used in lieu of tolerance as VIF is simply calculates the centered or uncentered variance inflation factors (VIFs) for the independent variables specified in a linear regression model. The rule of thumb is that VIF<10 when multicollinearity is a problem. Some authors use other lower lenient cut of VIF when multicollinearity is a problem. So from the Ethiopia's bilateral trade equation, when VIF is tested we got plausible results.

The gravity model of Ethiopia's exports-equation (b) above- has been estimated taking all explanatory variables and the dummy variables for 36 observations of the 5countries. Many variables are found to be either insignificant or possessed wrong signs. In the process of model selection, we have found only Gross domestic product of j, Nominal exchange rate ij, Trade policy of i and geographic distance between i and j are found to be significant. When tested for the multicollinearity of the variables, all the variables found to have no multicollinearity problem. So our estimated desired model is:

$$\boldsymbol{lnEX_{ijt} = \beta_o + \beta_2(lnY_{jt}) + \beta_5(ln\mathrm{D}_{ij}) + \beta_7(ln\mathrm{NER}_{ijt}) + \beta_{16}(lnTP_{it}) + U_{ijt}} \qquad (\boldsymbol{bf})$$

Now all explanatory variables are found to be significant with expected signs. The result of the heteroscedasticity corrected model is shown in Table 9. And the results for multicollinearity test are noted in Table A1. From the results we observe that the model does not have any multicollinearity problem. The estimation results of unchanged variables for equation (bf) is

noted in Table 9 and when we estimate the VIF of export equation, it indicates there is no multicollinearity problem as shown in Table A1. The export equation also checked for the hetroscedasticity problem by Breusch-Pagan / Cook-Weisberg test for heteroskedasticity, so we fail to reject the null hypothesis of homoskedasticity such that the assumption of homoskedasticity was fulfilled as shown in Annex Table A1.

The gravity model of Ethiopia's imports in the equation (c) above: has been estimated taking all variables, distance and dummy variables. The model covers all countries of our sample constituting 36 observations. In the estimation process GDP_i, GDP $_j$, NER_{ij}-nominal exchange rate, Geographic distance between bilateral trading counties and inflation of i are found to be significant and with another option; per capita GDP difference, NER_{ij}, Geographic distance and inflation of i are found to be significant. So after checking the approach of selecting the relevant variables for determinants of the import equation which is done based on general to specific method (Hennery's approach) which is suggested by most literatures like verbeek: GDP $_i$, GDP $_j$, NER_{ij}, Geographic distance and inflation of i are found to be significant. All other variables are found either insignificant or do have wrong signs.

While multicollinearity of these variables is being tested, all the variables found to have no problem, and also the variables were within the anticipated VIF values. So we have 5 explanatory variables where all variables are found to be significant with the correct signs. Therefore, our preferred estimated gravity model of imports is:

$$\boldsymbol{lnIM_{ijt} = \beta_o + \beta_1(lnY_{it}) + \beta_2(lnY_{jt}) + \beta_5(ln\mathbf{D}_{ij}) + \beta_7(ln\mathbf{NER}_{ijt}) + \beta_8(lnIn_{it}) + U_{ijt}} \qquad (\boldsymbol{Cf})$$

The detail results of the heteroscedasticity corrected model are shown in Table 9. The multicollinearity and VIF tests of the variables are also shown in Table A1. The hetroscedasticity problem by Breusch-Pagan / Cook-Weisberg test for heteroskedasticity of Random effect model was shown in Table A1.

The test for appropriateness of the REM in our analysis for the three equations shown was dealt for the three models, then Table A7 shows the descriptive statistics of the 3 models; Table A11

presents the correlation matrices of these models and Table A8-Table A10 gives the results of the basic gravity variables only.

5.3 Discussion of Results

As mentioned earlier, our all three gravity models suggest [see REM in Table A2, Table A3 and Table A4] that, based on the Hausman and LM tests, REM of Panel estimation is the appropriate strategy to be adopted. Empirical efforts of panel data often involves choosing between either running the within or squares dummy variables (called fixed effects model) on the one hand, and the generalized Least square (also called random effects).

To decide on which model to run, the Hausman test was used. The test specifies a null hypothesis, that, the preferred model is random effects. And the alternative is that the fixed effects model is preferred. To test this hypothesis in STATA, one runs the "xtreg" model with an option of fixed effects (fe) and stores its estimates. Further, the "xtreg" model, this time, with the random effects (re) option is run and the estimates are stored too. The program is then prompted to run the Hausman test. If the P-Value is less than 0.05 significant, then reject the null and conclude that the fixed effects models is more appropriate and vice versa.

Panel data models examine fixed or random effects of entity (individual or subject) or time. The core difference between fixed and random effect models lies in the role of dummy variables. If dummies are considered as a part of the intercept, this is a fixed effect model. In a random effect model, the dummies act as an error term. In REM the difference among groups (or time periods) lies in their variance of the error term, not in their intercepts. A random effect model is estimated by generalized least squares (GLS).

So the results of REM would be discussed here for the said three models. So random effects are examined by the Lagrange Multiplier (LM) test and (Breusch and Pagan 1980), the intercept terms in REMs of course, are considered to be random variables, instead of fixed country specific variables and the slope coefficients are considered to be the same for all countries.

In our bilateral trade model as shown in Table 8 below: the coefficient of product of GDPs is positive and highly significant with their expected value, so this implies that Ethiopia tends to trade more with larger economies. Ethiopia's bilateral trade with country j increases by 0.52% as; the product of Ethiopia's GDP and country j's GDP increases by 1%.

Table 8: Hetero corrected regression result of GLS Random-Effects Result for Bilateral Trade Model. Dependent Variable: Log of Bilateral Trade (LOG X_{ij})

Independent Variable	Coefficient	t-ratio	p-value
Log (GDP_i*GDP_j)	0.5201272**	2.04	0.041
Log ($PCGDPD_{ij}$)	3.444999*	5.19	0.0000
LOG(NER_{ij})	0.1098095**	0.82	0.012
LOG(In_i)	-0.409538*	-2.78	0.005
LOG(D_{ij})	-2.612429*	-4.14	0.0000
Constant	-7.6436	-0.74	0.458

sigma_u = 0
sigma_e = 0.56366183
rho = 0 (fraction of variance due to u_i)
Random-effects GLS regression — Number of observation = 36
Group variable: partner Id — Number of groups = 4
R-sq: within = 0.1307 — Observation per group: min = 9
between = 0.9999 — avg = 9.0
overall = 0.9381 — max = 9
Wald $chi^2(5)$ = 454.96
corr(u_i, X) = 0 (assumed) — Prob > chi^2 = 0.0000

*significance at 1%, **significance at 5%, ***significance at 10%

Source: Own STATA Estimation

The coefficient of per capita GDP difference between Ethiopia and country j is also significant at 1% level and has positive sign. The coefficient value is 2.44 which implies that bilateral trade with country j increases as the per capita GDP difference ij increases with a more than proportionately. From the positive sign of this coefficient we can have an indication that the H - O effect (differences in factor endowments) dominates the Linder effect in case of Ethiopia trade like few of Developing country cases.

The distance variable is the cost of transport between the bilateral trading countries as stated in Table 8 is significant at 1 % level and has anticipated negative sign which indicates that Ethiopia tends to trade more with its immediate neighboring countries. The coefficient value is -2.61 which indicates that when distance between Ethiopia and country j increases by 1%, the bilateral trade between the two countries decreases by 2.61%.

Nominal exchange rate is used as an indicator of the relative currency of a country's as compared to those of other countries. Depreciation (increment) of nominal exchange rate implies that the country's currency become relatively depreciating as compared to those of other countries and hence the demand for the country's export may increase. The coefficients of NER variable for ijis found smaller and significant at marginal 5% level and have expected positive sign. This implies that Ethiopia's trade with all other countries under consideration is likely to improve at 0.11% when the nominal exchange rate is increasing with 1%. It can also affect exporter's return positively making export more profitable there by encouraging firms to increase the volume of their exports. The results also reveal that higher bilateral depreciations lead to larger increases in exports from the devaluating country and also the absorption for foreign currency increase implies that it will indirectly stimulates the imports of the country from the bilateral.

A stable price level is one of the key indicators of macroeconomic stability but Sharp and persistent price increases may change the course of economic conditions in an economy. Inflation introduces uncertainties into the economy and may lead to slowdown of economic growth by discouraging domestic as well as foreign investments. It may also cause balance of payments problems by eroding a country's competitive advantage, Economic system and in response investments may decline. This effect is particularly severe with foreign investments as investors' decision to pull off their investments may result in massive capital outflows and to foreign exchange shortages. It also raises the relative price of domestically produced products and reduces the country's international competitiveness. This in turn may produce considerable balance of payments problems. The coefficient value is -0.41 indicates that, when inflation of Ethiopia increases by 1%, the bilateral trade between the two countries decreases by 0.41%.

From the Random effects option for the bilateral trade from differences across units are uncorrelated with the regressors as shown in the corr(u_i, X) = 0 (assumed) in table 8. If Prob>

chi^2 is less than 0.05 then the model is ok, as it is seen in table 8 the Prob>chi^2 = 0.0000.This is a test (F) to see whether all the coefficients in the model are different than zero. Two-tail p-values test P>|z| the hypothesis that each coefficient is different from 0. To reject this, the p-values should have to be lower than 0.05 (95%, we could choose also an alpha of 0.10), if this is the case then you can say that the variable has a significant influence on the dependent variable of bilateral trade-LNX_{ij}. Interpretation of the coefficients includes both the within-entity and between-entity effects. In the bilateral trade, it represents the average effect of all the Predictor variables over the Outcome variable LNX_{ij} when all Predictor variables changes across time and between countries by one unit.

Keep in mind that an intercept and dummy variables should be excluded in computation. This test statistic follows the chi-squared distribution with *k* degrees of freedom. The formula says that a Hausman test examines if "the random effects estimate is insignificantly different from the unbiased fixed effect estimate" (Kennedy, 2008). If the null hypothesis of no correlation is accepted or fail to reject, you may conclude that individual effects *ui* aren't significantly correlated with the regressors in the model and thus the random effect model is chosen.

For our export model (Table 9), as mentioned earlier, the variables Gross domestic product of j, Nominal exchange rate $_{ij}$, Trade policy of i and geographic distance between i and j are found to be highly significant (even at 1% level).

The size of the economy is ordinarily measured by total GDP. With the Helpman and Krugman (1985), Rose (2000) and Nitsch(2000)explained that; for those nations with large GDPs, imports become more and more from all destinations since they produce many varieties. The bilateral countries firms demand for variety of exports of Ethiopia for each variety of production will increase. The amount of export will increase with their size or economic mass-GDP boosts. The positive coefficient 1.307 of GDP_j implies that Ethiopia's exports depend on its bilateral economic size. From the estimated results it is evident that a 1% increase in bilateral economic size leads to 1.307 % in exports of Ethiopia to j countries as it is shown in the below Table.

Table 9: Hetero corrected regression result of GLS Random-Effects Result for Export Model. Dependent Variable: Log Export of Ethiopia (Log EX_{ij})

Independent Variable	Coefficient	t-ratio	p-value
LOG(GDP_j)	1.307149 *	4.44	0.000
LOG(NER_{ij})	0.5867511*	3.25	0.001
LOG (TP_i)	3.921664*	2.59	0.010
LOG (D_{ij})	-2.253883 ***	-1.65	0.099
Constant	-28.00113	-1.74	0.082

sigma_u = 0
sigma_e = 1.2437179
rho = 0 (fraction of variance due to u_i)
Random-effects GLS regression Number of observation = 36
Group variable: partner Id Number of groups = 4
R-sq: within = 0.3282 Observation per group: min = 9
between = 0.9999 avg = 9.0
overall = 0.7049 max = 9
Wald $chi^2(4)$ = 74.04
corr(u_i, X) = 0 (assumed) Prob > chi^2 = 0.0000

*significance at 1%, **significance at 5%, ***significance at 10%

Source: Own STATA Estimation

The other independent variable is Nominal exchange rate. When NER_{ij} (Ethiopia to other currencies) is increasing, the currency of Ethiopia is depreciating relative to the bilateral currencies. The positive coefficient of exchange rate implies that Ethiopia's exports depend on its currency devaluation. So export of Ethiopia to the bilateral countries became easy. From the estimated results it is apparent that 1% currency devaluation leads to a 0.58% increase in exports of Ethiopia to j countries.

Bilateral distances typically the "great-circle" distances between capitals, i.e. the shortest distance measured on the earth. The main push factors of international trade flows are related to transportation costs. Distance as an explanatory variable of bilateral trade flows serves as a proxy for transportation costs. From table 9 the coefficient of distance is negative, implies that; with a 5% significance level, 1% increase in distance will leads to 2.25% decrease in exports of Ethiopia to bilateral countries. Even the data revealed this estimation.

Trade policy of Ethiopia represented by its trade freedom index is a measure of the degree of tariff and non-tariff barriers that trading partners apply. Trade policy in this study is proxied by a trade policy index, which is taken from the index of economic freedom created by the Heritage Foundation. The index ranges from 0 to 100. A country with zero tariffs and non-tariff barriers will have a trade freedom score of 100 i.e. 100 signifies an environment that is most conducive to trade. Given that more freedom encourages trade so as it seen in table 9 the sign of the index variable was significant and positive.

From the Random effects option differences across units are uncorrelated with the regressors from corr(u_i, X) = 0 (assumed) in table 9. If Prob>chi^2 is less than 0.05 then the model is ok, as it is seen in table 9: Prob>chi^2 = 0.0000 this is a test (F) to see whether all the coefficients in the model are different than zero. Two-tail p-values test P>|z| the hypothesis that each coefficient is different from 0, to reject this, the p-values should have to be lower than 0.05 (95%, we could choose also an alpha of 0.10), if this is the case then you can say that the variable has a significant influence on the dependent variable of export. Interpretation of the coefficients includes both the within-entity and between-entity effects. In the export case it represents the average effect of the four Predictor variables over the Outcome variable export (LNEXij) when four Predictor variables changes across time and between countries by one unit.

Apart from the above variables to analyze the actual trade between Ethiopia and its trading partners, the country's export potentials to the East Africa countries can be shown by Index of Trade Conformity (ITC) of the country. Understanding the importance of this index and as a complimentary with estimated potential using the estimated gravity model, the study has applied it for Ethiopia and tried to identify potential that Ethiopia's export can be increased in countries of EAC as it is shown in table A6 below, Ethiopia has relatively large ITC measures between its export structure and import structure of EAC counties.

In the import model as shown in table 10, GDP has negative sign with 1% increase of this variable, import of Ethiopia decrease by 2.66%. However; an import of Ethiopia is positively responsive with the increase in GDP of country j with a 0.01 highly significance level. The

estimated results show that with 1% increase of GDP of country j, other things being equal, has an effect of 2.72 % of Ethiopia's imports.

Table10: Hetero corrected regression result of GLS Random-Effects Result for Import Model. Dependent Variable: Log Import of Ethiopia (Log IM_{ij})

Independent Variable	Coefficient	t-ratio	p-value
LOG(GDP_j)	-2.662373*	-4.28	0.000
LOG(GDP_i)	2.725503*	14.69	0.000
LOG(NER_{ij})	.7303484*	6.50	0.000
LOG (D_{ij})	-1.44059 ***	-1.74	0.082
LOG (In_i)	0.379049***	-1.91	0.056
constant	27.68102	1.81	0.070

sigma_u = 0
sigma_e = 0.68757219
rho = 0 (fraction of variance due to u_i)
Random-effects GLS regression — Number of observation = 36
Group variable: partner Id — Number of groups = 4
R-sq: within = 0.1335 — Observation per group: min = 9
between = 1.0000 — avg = 9.0
overall = 0.9321 — max = 9
Wald $chi^2(5)$ = 412.07
corr(u_i, X) = 0 (assumed) — Prob > chi^2 = 0.0000

*significance at 1%, **significance at 5%, ***significance at 10%

Source: Own STATA Estimation

The predictor distance variable between the bilateral trading countries as stated in Table 10 is significant at 10 % level and has expected negative sign which indicates that Ethiopia tends to import less from bilateral countries. The coefficient value is -1.44 which indicates that when distance between Ethiopia and country j increases by 1%, the import trade of Ethiopia from countries j decrease by 1.44%.

The inflation of Ethiopia positively responds to the import trade. The inflation elasticity of imports was 0.37 for Ethiopia with 10% significance. The estimated results show that; with 1%

increase of inflation of Ethiopia, other things being equal have an effect of 0.37% increases in import of Ethiopia.

The Random-effects GLS regression of import equation for differences across units are uncorrelated with the regressors from corr(u_i, X) = 0 (assumed) in table 10. Since Prob> chi^2 is less than 0.05 then the model is ok, as it is seen in table 10 the Prob> chi^2, = 0.0000. This is a test (F) to see whether all the coefficients in the model are different than zero. From the two-tail p-values test, P>|z| the hypothesis that each coefficient is different from 0, to reject this, the p-values should have to be lower than 0.05 (95%, we could choose also an alpha of 0.10), if this is the case then, we can say that the variable has a significant influence on the dependent variable of import. Thus interpretation of the coefficients includes both the within-entity and between-entity effects. In the Import equation it represents the average effect of the regressor variables over the Outcome variable Import ($LNIM_{ij}$) when regressor variables changes across time and between countries by one unit.

The model was estimated by allowing for all coefficients, including time and time invariant fixed effects for all periods. The Time Effect as just as we used the dummy variables to account for individual effect, we can allow for time effect in the sense that the Gravity dependent variables function shifts over time, because of different factors such as technological changes, changes in government regulatory and tax policies, and external effects such as wars or other conflicts. Such time effects can be easily accounted for, if we introduce time dummies one for each year.

Since we have data for 9 years, from 2004 to 2012, we can introduce 9 time dummies. The dummy time takes a value of 1 for observation on the specific year and 0 otherwise. The study present the regression results in the annex part, so that matter none of the individual time dummies were statistically significant. It probably suggests that the year or time effect is not significant. This might suggest that perhaps the Gravity dependent functions have not changed much over time. We have already seen that the individual time invariant effects weren't statistically insignificant and just like that the study found the individual year effects were not significant too. Even some of the year effects were omitted from the Time Effect model. This part of the study was indicated in Table A14, Table A15, and Table A16 at the annex part. Thus

none of the three models do have a significant time dummy variables in the fixed effect model test, thus we choose random effect model estimation for the selected models to get the explanatory variables effect on the Trade Models.

For the full-fledged methodology of the paper, Panel unit root Test was employed in Stata by using xtunit root command. Varieties of tests for unit roots or stationary in panel data set were imputed. The Levin–Lin–Chu (2002), Harris–Tzavalis (1999), Breitung (2000; Breitung and Das 2005), Im–Pesaran–Shin (2003), and Fisher-type (Choi 2001) tests have the null hypothesis that all the panels contain a unit root. Options allow you to include fixed effects and time trends in the model of the data-generating process. The assorted tests make different asymptotic assumptions regarding the number of panels in your dataset and the number of time periods in each panel. The majority of the tests assume that you have a balanced panel dataset, but the Im–Pesaran–Shin and Fisher-type tests allow for unbalanced panels.

Since each cross sectional unit has the same number of time series observations, the study has a balanced panel data structure. So it employs Levin and Lin panel unit root test. Panel unit root tests can have the usual benefits for the panel. In Levin and Lin (1992) have shown that the panel approach substantially increases the power of the test like the time series ADF tests. They adopt a similar approach to the ADF test for a unit root, where the null hypothesis is that there is a unit root. There are a variety of different tests with panel data, which differ in terms of the assumptions regarding the null hypothesis and how the autocorrrelation is removed though the study doesn't have such kind of problem. In Levin and Lin test, the error terms across the cross sections are assumed to be independent. It is assumed the ρ is the same across all the cross sections and the lag length for the lagged dependent variables is chosen in the usual way.

We have data on the natural logarithm of Bilateral Trade/Export/Import to the panel of countries for 9 years. Here we apply the Levin–Lin–Chu test to a subset of data for the bilateral countries to examine whether the series contains a unit root. When computing the LNX_{ij}, $LNEX_{ij}$ and $LNIM_{ij}$ series, the data contains four panels. Lags specify the lag structure to use for the ADF regressions performed in computing the test statistic. Specifying lags requests that number of lags of the series will be used in the ADF regressions. The default is lags (1). Specifying lags

(aic #) requests that the number of lags of the series be chosen such that the Akaike information criterion (AIC) for the regression is minimized.

As the output indicates, the Levin–Lin–Chu test assumes a common autoregressive parameter for all panels, so this test does not allow for the possibility that some partner countries' $LNX_{ij,}$ $LNEX_{ij}$ and $LNIM_{ij}$ contain unit roots while other countries' $LNX_{ij,}$ $LNEX_{ij}$ and $LNIM_{ij}$ do not. Each test performed by xtunit root also makes explicit the assumed behavior of the number of panels and time periods. The Levin–Lin–Chu test with panel-specific means but no time trend requires that the number of time periods grow more quickly than the number of panels, so the ratio of panels to time periods tends to zero. The test involves fitting an augmented Dickey–Fuller regression for each panel; we requested that the number of lags to include be selected based on the AIC with at most 10 lags. To estimate the long-run variance of the series, xtunit root by default uses the Bartlett kernel using 10 lags as selected by the method proposed by Levin, Lin, and Chu.

From Table A17,Table A18 and Table A19 respectively: The Levin–Lin–Chu bias-adjusted t statistic is -4.9071, -3.7836 and -3.7784; which were significant at all the usual testing levels. Therefore, we reject the null hypothesis and conclude that the series is stationary. When we use the demean option to xtunit root to remove cross-sectional means from the series to mitigate the effects of cross-sectional correlation, we obtain a test statistic that were significant at 1% level for all the Models.

Because the Levin–Lin–Chu test requires that the ratio of the number of panels to time periods tend to zero asymptotically, it is not well suited to datasets with a large number of panels and relatively few time periods. Here we use the Harris–Tzavalis test, which assumes that the number of panels tends to infinity while the number of time periods is fixed, to test whether $LNX_{ij,}$ $LNEX_{ij}$ and $LNIM_{ij}$ in our entire dataset for the bilateral countries contain a unit root or not: Here we find overwhelming evidence against the null hypothesis of a unit root and therefore conclude that all LNX_{ij}, $LNEX_{ij}$ and $LNIM_{ij}$ are stationary as attached in the annex.

5.4 Comparison among the three models

From the empirical evidences of the three models, it is observed that GDP of the economies of Ethiopia and its trading partners is the crucial factor for enhancing Ethiopia's trade. This variable is found largely significant in all three models. Per capita GNP differential, which supports the H - O effect is found common as the determinant of trade both in the trade model. The exchange rate is found as a determining factor for all of Ethiopia's three models specially it has a vital factor for the import. Inflation rate of Ethiopia is playing central role in the import and trade equations especially in the bilateral trade. With regard to the distance effect, all models supports that transportation costs are inversely related to the Ethiopia's trade. When we estimate the models taking only the gravity variables, distance is found highly significant (see Table A7, A8 and A9) for all three models though the export and import model when estimated separately. When the study estimates the models taking only the gravity variables, distance is found highly significant for all three models though the goodness of fit is not reasonably high.

Comparably $GDPPCD_{ij}$ has a bigger effect on the bilateral trade of Ethiopia and the NER_{ij} take the lower share of effect in the bilateral trade. Whereas on the export of Ethiopia TP_i and NER_{ij} take the bigger and the smaller share of changes respectively. Finally on the import of Ethiopia GDP_j and In_i the larger and lower factors that affect the imports of Ethiopia.

5.5 Empirical Results of Gravity studies to substantiate result of the study

From the Bilateral Trade study between Ethiopia and Sudan for a Free Trade Area, it tried to evaluate the determinants of bilateral trade flows particularly the effect of the Free Trade Agreement between Ethiopia and Sudan during the years 2002 to 2011. Based on Panel data, Static and Dynamic Gravity models are applied to assess the determinants of basic and export trade flows including FTA, GDP, population, exchange rate and distance. An estimation result of the static model indicates that Economic sizes, FTA, distance are the basic factors affecting trade flows. Whereas the dynamic model shows the existence of strong correlation between the Ethiopian contemporary trades (export) flows and those of the previous year. (Abebe. E, 2012)

The gravity equation has been often and effectively used for nearly thirty years to further understanding of the determinants of bilateral trade flows across countries and, subsequently, to analyze commercial policy measure. This study estimated the determinants of Ethiopian export

for the period 2003 to 2007 using a gravity model approach and analyses. The estimation was done for 30 main importers. The paper found that importer's GDP has a positive effect on exports of Ethiopia, while importers population has a negative impact on the export. The negative effect of the importer's population suggests that the trading partners become self-sufficient as their populations grow. Distance has a negative and significant effect on the exports of Ethiopia. While sharing common border has significant and positive effect to Ethiopian export. The study also found negative relationship between Ethiopian export and trade agreement for preferential trades. The negative effect might be because of the preferential trade is given not only for Ethiopia but also for all the LDCs which result in high competition among them as a result Ethiopia may not resist the high competition. (Hiwot. G, 2009)

From the study of an empirical work of another study on how Exchange rate affects Ethiopia's exports: depreciation (appreciation) of exchange rate is supposed to stimulate (reduce) exports from a particular country. The study mainly focuses on examining whether Ethiopia's exports are determined by movements in exchange rate. To examine this issue, the aggregate export and the exports of two main subsectors; namely, Coffee and Oilseeds are taken into consideration using bilateral exports to seventeen major trading partners over the period 2000-2009 including EAC countries. Accordingly, a dynamic panel data gravity model that takes into account the persistent nature of trade is estimated using the system GMM estimator. The results of the study show that both lagged and current exchange rates are not in a position to exert significant effect on the bilateral exports of the country. The implication of the study was that; complementary measures are required to gain competitiveness in international market. Diversifying exports from traditional primary commodities to non-traditional price elastic export items, expanding exports destinations and giving due attention to the quality of exports are reasonable options. (Kebede. B, 2011)

From the study of determinants of export performance with an econometric gravity model analysis; a model is employed with panel data using 30 Ethiopia's trading partners for the period 1995–2007. The model was estimated with the Generalized Two Stages Least Squares (G2SLS) method, the results suggest that supply side conditions are a major factor for Ethiopia's export performance. The results show 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.(Yisak. T, 2009)

From the Evaluation of Ethiopia's bilateral and potential Exports in the Middle East: A Gravity Model Approach by the study is conducted with the aim of identifying the main determinants of Ethiopia's bilateral exports and addresses the question of whether Ethiopia has untapped export potentials with the Middle Eastern Countries or not. From the augmented gravity model estimated by G2SLS estimation technique using 13 years data of 15 exporting partners: GDP Per capita of both exporting and importing countries found to have positive and significant impact on Ethiopia's bilateral exports whereas, distance between countries negatively affect their bilateral trade . In this light, the export potentials of the country are estimated using the estimated coefficients of the gravity model. Accordingly, Ethiopia has the highest unexploited potential in U.A. E and significant amount in Saudi Arabia. Secondly, using the ITC measure, the potential to increase Ethiopian's export in these countries and the top 20 commodities that highly contribute to increase the county's export potential are also identified. The finding of this index shows that gold, coffee and tea, fruits and vegetables, live animals, meat and meat preparations and cut flowers are among the products that have the highest potentials to increase Ethiopia's Export in the Middle East. (Abdulaziz. A, 2012)

From the Horn Economic and Social Policy Institute (HESPI) study of Trade integration: despite the existence of many regional economic communities (RECs) in Africa, intra-regional trade remains staggeringly low compared to other trading blocs in Europe, Asia and Latin America. Hence the study tries to cover the main factors behind the low level of intra-regional trade and the role of RECs in promoting intra-regional trade by taking four RECs in Africa (COMESA, ECOWAS, IGAD and SADC) and applying the intuitive and theoretical gravity model of Anderson Wincoop in panel data framework. The traditional gravity model variables (GDP,

population, distance, border, language, colonial links, bilateral real exchange rate, difference in preference among trading partners are found to be important factors for bilateral trade flows. But the impact of the RECs on bilateral trade is found to be mixed; SADC and ECOWAS have created trade to COMESA has implausibly negative coefficient suggesting that it hasn't expanded trade among the member states whereas IGAD has an insignificant positive coefficient implying that it hasn't contributed to the expansion of intra-regional trade. (Edris. H, 2011)

6 Conclusions and Recommendations

6.1 Summary and conclusions

The purpose of this study has been to examine Ethiopia‘s trade with bilateral Trading countries in light of the recent acceleration of the bilateral trade. The paper was providing analysis of bilateral total trade, Exports and imports by applying the gravity model to analyze the Ethiopia’s trade with its trading partners using the panel data estimation technique. The study established the application of the gravity model on applied research of bilateral trade among countries.

We have estimated the generalized gravity models of trade, export and import. Our results show that Ethiopia‘s trade (sum of exports and imports) is positively associated by the size of the economies, per capita GNP differential of the countries involved and the nominal exchange rate of the trading countries, transportation cost between the trading countries and the inflation rate of Ethiopia . The major associates of Ethiopia’s exports are: the individual size of the economies of the partner countries, the nominal exchange rate, transportation cost and the Trade policy of Ethiopia. Total import demand and openness of the Ethiopia economy. All the stated three factors are associated with the Ethiopia’s export positively except Distance. Ethiopia’s import is found to be influenced to a great extent by the economic size of the partner country, and followed by economic size of Ethiopia, transportation cost, inflation of Ethiopia and Nominal exchange rate. So on the basis of the estimation results; it is possible to conclude that the traditional gravitational forces are important in explaining the trade relations of Ethiopia and EAC countries. All corresponding parameter estimates show the expected sign and they are statistically significant.

The dummies variables under the trade relationships in the three models indicated that all the variables included in the gravity equation; Contiguity (common border), common Language, common colonial link and Landlockedness don’t have any significant effect on the three models because of their statistical insignificance. Though Ethiopia was on the verge for membership of the COMESA trading bloc, EAC dummy doesn’t have any figurative influence in the Ethiopia’s bilateral trade. Thus the estimated coefficients of dummies between Ethiopia and partner countries aren’t statistically significant.

This paper is attempted to investigate the effects of regional trade relation for the case of Ethiopia and EAC's trade with its major trading partners using an augmented gravity model. For this purpose, panel data is employed. In this paper, it tried to identify the major determinants of Ethiopian's bilateral trade as well as the potential exports and imports that the country may have in East African countries applying the specified Gravity model of bilateral trade flow with 9 years (2004-2012) panel data of the Ethiopian trading partners.

In addition to Trade determining factors, diversification in the type of export products, expand its export destinations and capturing new export markets may reduce the competition that comes from countries exporting similar products. The recent expansion of exports to these East African countries gives a clue that the country may benefit significantly if it manages to exploit these increasingly growing markets. In this study it has been found that supply side factors, particularly economic growth and domestic infrastructure are important determinants of the country's exports. This may mean that the country could benefit a lot through improving its export supply capacity. In this case, competitiveness may be attained by giving due emphasis on the quality of exportable products.

6.2 Recommendations

The policy implications of the results obtained are that necessary devaluation of the currency is required to promote the country's bilateral trade taking other adverse effects, such as domestic inflation, and proper quality of the goods and services must be maintained as well as the varieties of goods and service must be increased.

The Ethiopia's exports are largely depending on the foreign demand both in the demand and supply side. So trade policy for tariff and non-tariff barriers that area pplied to partners should have to be revised, because it signifies an environment that is most conducive for trade. Certainly when there is more freedom, it encourages trade. And also for the promotion of the import of Ethiopia from the partner countries, inflation of the country should have to be taken into account sufficiently when trade policy is set. Vociferously, Inflation of an economy will have an impact on the Imports to become more expensive, Exports and Aggregate demand increase causing

demand pull inflation, firms may have less incentive to cut costs, increases costs and reduces competitiveness.

The empirical results show that common markets among these countries foster trade (export). Ethiopia should strengthen the level of bilateral trade agreement. Reforms in trade policy alone are not adequate but efforts should also be directed against country specific constraints: domestic business environment, competitiveness of market structures, quality of market institutions, and supply constraints like poor infrastructure, and undeveloped human capital and skills. Government needs also to pay adequate attention to destination markets with cheaper transport costs. Access to such markets should be facilitated by relevant policies to take advantage of the geographical location in strengthening Ethiopian trade (exports) competitiveness.

An increase of trade among EAC countries and Ethiopia will imply either an openness of Eastern African market, a changing of specialization of EAC countries or a reduction of protection on sensitive goods like agricultural commodities. The quality and strength of effective institutions in EAC is also essential in overcoming obstacles for promoting greater trade. This helps to facilitate the implementation of trade protocol and achieve its final goals at the scheduled time. It is also anticipated that with Reduction in tariff barriers and non-tariff barriers within the region raise intra-regional trade in the EAC region. Exploring the major determinants of Ethiopia's bilateral trade (export) combined with identified exporting potential countries and products have the following important policy implication:

1. In designing trade policies that aimed at increasing Ethiopia's bilateral export to the EAC member countries should pay due attention to variables that are large in magnitude and statistically significant.
2. For the best use of the country's resources, the government should focus on building capacity that improves the quality as well as quantity of products that are found to have high export potential especially in the Light and Medium Industrial products.
3. The country also required a research that able to identify and prioritize the countries as well as types of products on which it has better trade potential. Furthermore, to reach at better conclusion and design valuable and practical trade policies.

References

Alemayehu Geda (2009). Fundamentals of International Economics for Developing Countries: A Focus on Africa Volume I: Trade Theory and Policy; Addis Ababa University, Addis Ababa, Ethiopia & African Economic Research Consortium (AERC), Nairobi, Kenya ; p59

Alemayehu Geda and haile Kibret (2006), Regional Integration in Africa: A Review of problems and Prospects with Case Study of COMESA (Dept of Economics, University of London)

Anderson, James (1979) "A Theoretical Foundation for Gravity Model," *American Economic Review*, 69: P106–116.

Anderson, E. and Wincoop, V. (2004) 'Trade Costs', Journal of Economic Literature, 42(3), 691-751.

Anderson, J., and E.V. Win coop (2003). "Gravity with Gravitas: A Solution to the Border Puzzle." American economic review 106.

Balassa, B (1967).Trade Creation and Trade Diversion in the European Common Market, in Comparative Advantage Trade Policy and Economic Development, (eds). Balassa, B, New York University Press.

Bergstrand (1985) "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory in International Trade," *Review of Economics and Statistics*, 67: 474–481.

Bhagwati, J. (1991). *The World Trading System at Risk*. New York: Harvester Wheatsheaf.

COMESA (2002). *COMESA Merchandise Trade Statistics, Bulletin 3*. Lusaka: COMESA; p 44

Bhagwati, J. (1993). Regionalism and Multilateralism: An Overview. In De Melo, J and Panagariya, A.v:6; p 29

Brown, D.K, and R.M. Stern (1989a). 'U.S.-Canada Bilateral Tariff Elimination: The Role of Product differentiation and Market Structure in Trade Policies for International Competitiveness R. Feenstra (Chicago: University of Chicago Press).

Chauvin, S and Gaulier, G. (2002). Regional trade integration in Southern Africa; CEPII working paper No2002-12.

Cheng, I., Wall, H.J., (2005). "Controlling for heterogeneity in gravity models of trade and integration".

Deardorff, A. (1998). "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" the regionalization of the world economy edited by J. Frankel. Chicago: University of Chicago Press.

De Melo, J and Panagariya, A. (1993). New dimension in regional integration; Cambridge: Cambridge University Press.

Economic commission for Africa (2004).Assessing Regional Integration in Africa (ARIA I). UnitedNations Economic Commission for Africa: Addis Ababa.

Egger, P. and Pfaffermayr, M.(2000). 'The Proper Econometric Specification of the Gravity Equation: A Three Way Model with Bilateral Interaction Effects', Working Paper, Austrian Institute of Economic Research, Vienna, Austria.

Frankel, J.A. and M. Kahler (1993) Regionalism and Rivalry: Japan and the U.S. in Pacific Asia (Chicago University of Chicago Press).

Frankel, J.A. and S.Wei (1995) European Integration and the Regionalization of World Trade and Currencies:

Frankel, J. (1997). "Regional Trading Blocs in the World Economic System." institute for International Economics, Washington, DC.

Greene, W.H. (2003), Econometric Analysis, Fifth Edition, Pearson Education, Inc., USA.

Greenway, D. and Milner, C. (2002) 'Regionalism and Gravity', Research paper 20, Leverhulme Center for research on Globalization and Economic Policy, University of Nottingham.

Harris, M.N. and Matyas, L. (1998), The Econometrics of Gravity Models., Working Paper No. 5/98, Melbourne Institute of Applied Economic and Social Research.

Hausman, J.A. (1978), Specification Tests in Econometrics, Econometrica, 46(6): 1251-1271.

Head, K. (2003), Gravity for Beginners. Lecture Note, University of British Columbia, Vancouver.

Helmers, C. and Pasteels, J.M. (2005), TradeSim (third version): A Gravity Model for the Calculation of Trade Potentials for Developing Countries and Economies in Transition, ITC Working Paper, Geneva, Switzerland.

Helmers, C. and Pasteels, J.M. (2006), □\Assessing Bilateral Trade Potential at the Commodity Level: An Operational Approach, ITC Working Paper, Geneva, Switzerland.

Helpman, Elhanan, Marc J. Melitz and Yona Rubinstein. 2008. Estimating Trade Flows: Trading Partners and Trading Volumes", Harvard University, Quarterly Journal of Economics, p 441-487.

IMF (2010), Direction of Trade Statistics and World Economic Outlook Databases: International Monetary Fund, Washington, DC.

Haile Kibret (2000) “Regional Integration in Africa: A Review of the Outstanding Issues and

Mechanisms to Monitor Future Progress,” Paper Presented at African Knowledge Networks

forum Preparatory Workshop, ECA, Addis Ababa.

Karagoz, K. and Saray, M.O. (2008), Trade Potential of Turkey with Asia Pacific Countries: Evidence from Panel Gravity Model, Seventh APEF International Conference on East and West Asia Economic Relations, University of Esfahan, Iran.

Krugman, P. and Helpman, E. (1985), Market Structure and Foreign Trade: Increasing Returns, Imperfect Competition and the International Economy, Cambridge, MA: MIT Press.

KHOR M. (2005), Bilateral/Regional Free Trade Agreements: An Outline of Elements, Nature and Development Implications, September 2005.

Mengistuyayo, Trade Effects of Regional Economic Integration in Africa: The Case of SADC

Martincus C.V., and Gomez S.M. (2009), Trade Policy and Export Diversification: What Should Colombia Expect from the FTA with the United States, IDB Working Paper, and IDB WP-136.

MatiasAssefa (2010) an empirical Study of China's Trade Potential with Africa: MSc thesis, Addis Ababa University.

Matyas, L. (1997), Proper Econometric Specification of the Gravity Model. The World Economy, 20(3): 363-368.

Mikic, M. and Gilbert, J. (2007),Trade Statistics in Policymaking-A Handbook of Commonly used Trade Indices and Indicators, Economic and Social Commission for Asia and the Pacific.

Mileva, E. (2007), Using Arellano-Bond Dynamic Panel GMM Estimators in Stata, Lecture Note, and Fordham University.

Musila J.W. (2004), The common market for Eastern and Southern Africa and Kenya's export trade International Journal of Social Economics 31(1/2):67-77

NBE (2009/2010), Annual Report 2009/10., Economic Research and Monetary Policy Directorate, Addis Ababa.

Nguyen, B.X. (2010), the determinants of Vietnamese exports: Static and Dynamic panel Gravity Approaches, International Journal of Economics and Finance, 2 (4): 112-129. 69

Oguledo V.I. and MacPhee C.R. (1994) □\Gravity Models: a reformulation and an application to discriminatory trade arrangements, Applied Economics, 26: 107-120.

Piermartini, R. and Teh, R. (2005), Demystifying Modeling Methods for Trade Policy, WTO Discussion Paper No.10, Geneva, Switzerland.

Pusterla F. (2007), Regional Integration Agreements: impact, Geography and Efficiency..IDB-SOE Working Paper, January 2007.

Rahman, M.M. (2009), Australia's Global Trade Potential: Evidence from the Gravity Model Analysis, Oxford University, UK.

Rajan R.S. and Sen R.(2002), The Japan-Singapore □\New Age. Economic Partnership Agreement: Background, Motivation and Implications, IPS Working Paper, April 2002.

Rahman, M.(2006). A Panel Data Analysis of Bangladesh's Trade: The Gravity Model Approach¡±, University of Sydney, NSW, Australia.

Rahman, M., Shadat, W.B., and Das, N.C.(2006). Trade Potential in SAFTA: An Application of Augmented Gravity Model, CPD Occasional Paper Series 61.

Ricchiuti, G. (2004). Empirical Evidence on the North-South Trade Flows: an Augmented Gravity Model, Munich PersonelRePEc Achieve, paper No: 1326. available at http://mpra.ub.uni-muenchen.de/1326/.

Roodman, D.(2006). How to Do xtabond2: An Introduction to Difference and System GMM in Stata, Center for Global Development, working paper 125.

Roodman, D.(2007). A Short Note on the Theme of Too Many Instruments , Center for Global Development, working paper 125.

Snape, R.H. (1988). Real exchange rates, real interest rates and agriculture , paper presented at the Twentieth International Conference of Agricultural Economists, Buenos Aires, August.

Sohn, C.H. (2001). A Gravity Model Analysis of Korea.s Trade Patterns and the Effects of a Regional Trading Arrangement¡±, Korea Institute for International Economic Policy Working Paper Series Vol.9.

Srinivasan, T.N. and Archana, V. (2009), India in the Global and Regional Trade: Determinants of Aggregate and Bilateral Trade Flows and Firms. Decision to Export , Indian council for research on international economic relations, working paper no.232.

Stucka, T.(2004). The Effects of Exchange Rate Change on the Trade Balance in Croatia , IMF Working Paper 65.

Terra, C. and Vahia, A. L. (2008) A Note on Purchasing Power Parity and the Choice of Price Index , RBE Vol.62,No.1,pp. 95-102.

Teshale, N. (2005). Export Performance and the Case for Diversification in Ethiopia, Unpublished MA Thesis, Addis Ababa University.

Thapa, N. B. (2002). An Econometric Analysis of the impact of Real Effective Exchange Rate on Economic Activities in Nepal. Internet Slide: http//www.nrb.org.np/red/publication/ Economic Review

Tinbergen, J. (1962). Shaping the World Economy: Suggestions for and International Economic Policy, New York: The Twentieth Century Fund.

Thorbecke, W. and Zhang, H.(2008). The Effect of Exchange Rate Changes on China.s Labor-Intensive Manufacturing Exports, RIETI Discussion Paper Series 38.

Trang, N.T., Tam, N.T., and Nam, V. H.(2008). An Inquiry into the Determinants of Vietnamese Product Export, DEPOCEN working paper series no.2011.

Wang, J. and Ji, A.G. (2006).Exchange rate sensitivity ofChina.s bilateral trade flows , BOFIT Discussion Paper No. 19 .

Were, M., Ndung.u, S.N., Alemayehu, G. and Karingi, S. N. (1992). Analysis of Kenya.s Export Performance: An Empirical Evaluation , KIPPRA Discussion Paper No. 22.

Wilson, J. and Takacs, W. (1979).Differential response to price and exchange rate influences in the foreign trade of selected industrial countries, Rev. Econ. Stats.Vol.61, No. 267-279.

Wooldridge J. M. (2006) *Introductory Econometrics: A Modern Approach*. Thomson South western College Publishing.

World Bank (2005). *African Database (CD-ROM).* Washington, D.C.: The World Bank.

World Bank (2010), World Development Indicators Database: the World Bank, Washington DC.

WTO (2008), Gravity Models: Theoretical Foundations and Related Estimation Issues‖, ART Net Capacity Building Workshop for Trade Research, Phnom Penh, Cambodia.

WTO/UNCTAD, World Trade Profile, 2008

YishakT. (2009). Determinants of Ethiopia's Export Performance: A Gravity Model Analysis, trade and development discussion paper no.01.

Younes, H. and Kaleb, A (2006), augmented gravity model: An empirical Application to Arab Mediterranean Countries-European Union trade flows.

Table A1: Multicollinearity Test (Variable Inflation Factor for the Estimated Variables)

Item	Variable	VIF for Trade Model	1/VIF for Trade Model	VIF for Export Model	1/VIF for Export Model	VIF for Import Model	1/VIF for Import Model
1	$LOG(GDP_i\_GDP_j)$	4.89	0.204341	****	****	****	****
2	$LOG(GDP_i)$	****	****	****	****	1.48	0.675676
3	$LOG(GDP_j)$	1.19	****	1.19	0.839899	1.23	0.812305
4	$LOG(PCGDPD_{ij})$	7.53	0.132813	****	****	****	****
5	$LOG(NER_{ij})$	3.02	0.330693	1.26	0.79443	1.27	0.78885
6	$LOG(In_i)$	1.3	0.767362	****	****	1.41	0.7112
7	$LOG(D_{ij})$	1.3	0.768283	1.33	0.752254	1.34	0.745373
8	$LOG(TP_i)$	****	****	1.03	0.975153	****	****
Mean VIF		3.61	****	1.2	****	1.35	****
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity Ho: Constant variance variables fitted values of Dependent Var chi2(1) = Prob> chi2 =		chi2(1) = 0.54 Prob> chi2 = 0.4624		chi2(1) = 5.11 Prob> hi2=0.0239		chi2(1) = 1.70 Prob> chi2 = 0.1923	

Source: Own STATA Estimation

Table A2: Hausman Specification Test for Fixed and Random effects for Bilateral Trade Model

Hausman Fixed-Random Test	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	difference	S.E.
LOG $(gdp_i\_gdp_j)$	3.239924	3.460217	-0.2202925	12.91802
$LOG(gdppc_i\_gdp_j)$	-8.831267	-6.891772	-1.939495	18.2921
$LOG(Tax_i\_Tax_j)$	-0.3140318	-0.424935	0.1109035	0.2392007
$LOG(PCGDPD_{ij})$	5.976819	3.540219	2.436599	5.795863
$TR(GDP_i)$	-0.033655	-0.013072	-0.0205833	0.0314853

$TR(GDP_j)$	-0.0071371	-0.009948	0.0028106	0.0104045
$LOG(RER_{ij})$	2.291054	0.9031691	1.387885	1.963218
$LOG(TP_i)$	0.3126755	1.240608	-0.9279325	1.479015
$LOG(TP_j)$	0.1780893	0.2472483	-0.0691591	0.4592313

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic

$chi^2(9) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)$
$= 0.71$
$Prob>chi^2 = 0.9999$

Source: Own STATA Estimation

Table A3: Hausman Specification Test for Fixed and Random effects for Export Model

Hausman Fixed-Random Test	**--- Coefficients ----**			
	(b)	**(B)**	**(b-B)**	**sqrt(diag(V_b-V_B))**
	fixed	**random**	**difference**	**S.E.**
$LOG(gdp_i)$	-108.3333	7.02135	-115.355	144.1149
$LOG(gdp_j)$	101.2991	12.5636	88.73553	74.00879
$LOG(gdppc_i)$	100.6346	-35.04	135.6742	190.634
$LOG(gdppc_j)$	-116.479	23.0448	-139.524	112.1299
$LOG(PCGDPD_{ij})$	15.26766	-21.135	36.40225	31.92783
$LOG(NER_{ij})$	2.949013	2.39852	0.550496	5.900425
$LOG(In_i)$	0.703083	1.27623	-0.57315	0.6552259
$LOG(In_j)$	-1.24921	-1.3505	0.101263	0.6922056
$LOG(TEX_i)$	6.62149	5.79739	0.824105	4.439254
$LOG(TIM_j)$	-1.926615	-5.8982	3.971555	4.695589
IM_Y_j	-0.080899	-0.1167	0.03579	0.1409191
TR_GDP_i	-0.1799836	-0.2147	0.034715	0.1063305
TR_GDP_j	-0.0196825	0.04288	-0.06257	0.0786135
$LOG(FDI_i)$	-0.5171763	-0.6362	0.119038	0.395322
$LOG(TP_i)$	5.220474	6.43577	-1.2153	2.273024
$LOG(TP_j)$	-1.018919	0.11728	-1.1362	2.401253

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 1.60

Prob>chi2 = 0.9999

Source: Own STATA Estimation

Table A4: Hausman Specification Test for Fixed and Random effects for Import Model

Hausman Fixed-Random Test	Coefficients			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	difference	S.E.
$LOG(gdp_i)$	-22.33177	-40.522	18.19027	45.09353
$LOG(gdp_j)$	77.32483	5.90119	71.42364	37.60718
$LOG(gdppc_i)$	23.63596	65.105	-41.4691	54.42878
$LOG(gdppc_j)$	-111.5921	-14.161	-97.4308	49.11563
$LOG(PCGDPD_{ij})$	22.1082	4.71607	17.39213	12.51074
$LOG(NER_{ij})$	-5.147072	1.46055	-6.60763	2.578102
$LOG(In_i)$	0.0348496	-0.1435	0.178358	.
$LOG(In_j)$	-0.4352199	0.21473	-0.64995	0.0406167
EX_Y_j	-0.1360541	0.02203	-0.15808	0.0760589
TR_GDP_i	-0.0010443	0.02134	-0.02238	.
TR_GDP_j	0.0012571	-0.0213	0.022582	0.0069345
EX_Y_j	-0.1360541	0.02203	-0.15808	0.0760589
$LOG(TP_i)$	-1.075181	-0.6774	-0.02238	.
$LOG(TP_j)$	1.03501	0.23746	0.797551	0.7274468
$LOG(TIM_i)$	-2.707197	-2.5692	-0.138	.
$LOG(TEX_j)$	0.5639121	-1.3698	1.933679	.

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$chi^2(14)$ = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 9.21

Prob>chi^2 = 0.8175

(V_b-V_B is not positive definite)

Source: Own STATA Estimation

Table A5: Trend of Augmented Gravity Model variables

Name of variable	Expected sign	Measurement	Source	Remarks
GDP	Positive/Negative	In US dollar	WDI-CD-R0M(2008)	Growth in economic capacity boosts trade flows
GDP per Capita income	Positive and Negative	In US dollar	WDI-CD-R0M(2008)	Because of Economies of scale effect or absorption effect GDP per Capita income differ
population	Positive and Negative	In US dollar	WDI-Report of 2011	Because it Boosts the Labor demand side or Increase unemployment Burden
Distance	Negative	In kilometers	Indo.com/distance	seen as a restriction or friction to trade
Real Exchange Rate	Positive and Negative	In US dollar	Eshetu A , 2012	Depreciation of the Ethiopian birr makes exported goods cheaper relative to foreign goods, and

				therefore raises the quantity demanded for the Ethiopian trade and the reverse
Common language and Border(contiguity) and colony	Positive		World Fact Book(2008)	sharing common language and border is assumed to facilitate trade activities
Regional dummy	Positive /Negative		Estrella Gómez(2009)	capture the influence of regional-trading agreements on trade flows among nations

Source: Own Imputation

Table A6: Index of Trade Conformity (ITC) between Ethiopia and EAC member countries

Destination / Origin	Kenya	Uganda	Tanzania	Rwanda	Burundi	Ethiopia
Ethiopia	0.51	0.496	0.286	0.221	O.241	NA
Kenya	NC	NC	NC	NC	NC	0.7
Uganda	NC	NC	NC	NC	NC	0.45
Tanzania	NC	NC	NC	NC	NC	0.41
Rwanda	NC	NC	NC	NC	NC	0.29
Burundi	NC	NC	NC	NC	NC	0.32

Where: NC and NA stand for 'not calculated' and 'not available' respectively

Source; World Bank, ICT official data

Table A7: General Descriptive Statistics for the selected Gravity Models

Variable	Obs	Mean	Std. Dev.	Min	Max
year	36	2008	2.618615	2004	2012
gdpi	36	1.68e+10	4.06e+09	1.09e+10	2.32e+10
gdpj	36	1.36e+10	7.34e+09	2.37e+09	2.57e+10
gdpi_gdpj	36	2.36e+20	1.57e+20	2.58e+19	5.96e+20
PCGDPDij	36	215.2124	90.14068	108.7161	377.5528
gdppci_gdp~j	36	84541.8	28176.17	37638.16	150480.7
TR_GDPi	36	46.65582	3.491659	39.88346	51.09488
TR_GDPj	36	54.34612	13.58769	33.12345	81.27242
Taxi_Taxj	36	214.3127	117.0467	68.47383	523.6806
Dij	36	1425	252.5189	1157	1748
NERij	36	.0430124	.0584556	.0043793	.1902835
Ini	36	18.08227	12.71667	3.256273	44.39128
Inj	36	9.916835	4.798283	2.309146	26.23982
Borderij	36	.25	.439155	0	1
j_EAC	36	1	0	1	1
lanij	36	.25	.439155	0	1
Landlocked~s	36	.25	.439155	0	1
LNXij	36	14.38009	2.158344	10.71442	18.00721
LNEXij	36	12.84563	2.098062	7.600902	16.62353
LNIMij	36	13.70166	2.669839	8.29405	17.96724
LNgdpi_gdpj	36	46.62349	.8507401	44.69685	47.83678
LNgdppci_g~j	36	11.28875	.3463218	10.53577	11.92159
LNPCGDPDij	36	5.290268	.405135	4.68874	5.93371
LNTaxi_Taxj	36	5.221569	.5537243	4.226452	6.260882
LNDij	36	7.246632	.1773242	7.053586	7.466228
LNNERij	36	-4.00001	1.271999	-5.430871	-1.65924
LNTPi	36	4.129117	.0776253	3.951244	4.228293
LNTPj	36	4.232508	.1108966	3.86073	4.38577
LNIni	36	2.639261	.7601105	1.180583	3.793043
LNInj	36	2.177306	.5089278	.8368778	3.267278

Table A8: Bilateral Trade Model with gravity variables only

Source	SS	df	MS	Number of obs =	36
				F(2, 33) =	40.73
Model	116.037692	2	58.0188461	Prob > F =	0.0000
Residual	47.0079858	33	1.42448442	R-squared =	0.7117
				Adj R-squared =	0.6942
Total	163.045678	35	4.65844794	Root MSE =	1.1935

LNXij	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdpi_gdpj	1.628373	.2498446	6.52	0.000	1.120061	2.136686
LNDij	-4.643311	1.198668	-3.87	0.000	-7.082019	-2.204603
_cons	-27.89199	16.58015	-1.68	0.102	-61.62455	5.840574

Source: Own STATA Estimation

Table A9: Export Model with gravity variables only

Source	SS	df	MS	Number of obs =	36
				F(3, 32) =	14.05
Model	87.5694727	3	29.1898242	Prob > F =	0.0000
Residual	66.4957848	32	2.07799328	R-squared =	0.5684
				Adj R-squared =	0.5279
Total	154.065258	35	4.4018645	Root MSE =	1.4415

LNEXij	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdpi	1.685676	1.010224	1.67	0.105	-.3720816	3.743434
LNgdpj	1.417308	.3533577	4.01	0.000	.6975423	2.137075
LNDij	-3.796085	1.474144	-2.58	0.015	-6.798819	-.7933513
_cons	-32.03581	25.8893	-1.24	0.225	-84.7706	20.69897

Source: Own STATA Estimation

Table A10: Import Model with gravity variables only

Source	SS	df	MS	Number of obs =	36
				F(3, 32) =	51.08
Model	206.385782	3	68.7952606	Prob > F =	0.0000
Residual	43.0956714	32	1.34673973	R-squared =	0.8273
				Adj R-squared =	0.8111
Total	249.481453	35	7.12804152	Root MSE =	1.1605

LNIMij	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdpi	-2.944147	.8132747	-3.62	0.001	-4.600733	-1.28756
LNgdpj	2.87156	.2844686	10.09	0.000	2.292116	3.451004
LNDij	-3.473649	1.186752	-2.93	0.006	-5.890983	-1.056315
_cons	41.74231	20.84203	2.00	0.054	-.7115279	84.19614

Source: Own STATA Estimation

Table A11: Correlation Matrix for Bilateral Trade Model Variables

Corr Trade	LOG(Xij)	LOG(gdpi_gdpj)	LOG(PCGDPDij)	L0G(NERij)	LOG(Ini)	LOG(Dij)
LOG(Xij)	1					
LOG(gdpi_gdpj)	0.762	1				
LOG(PCGDPDij)	0.9377	0.788	1			
L0G(NERij)	0.6421	0.2821	0.6717	1		
LOG(Ini)	-0.0606	0.2665	0.0398	0.0497	1	
LOG(Dij)	-0.5836	-0.3149	-0.4277	-0.4302	0	1

Source: Own STATA Estimation

Table A12: Correlation Matrix for Export Model Variables

Corr Export	LOG(EXij)	LOG(gdpj)	LOG(NERij)	LOG(TPi)	LOG(Dij)
LOG(EXij)	1				
LOG(gdpj)	0.6713	1			
LOG(NERij)	0.5829	0.2773	1		

LOG(TPi)	0.3461	0.1381	0.0693	1	
LOG(Dij)	-0.5018	-0.3527	-0.4302	0	1

Source: Own STATA Estimation

Table A13: Correlation Matrix for Import Model Variables

CorrImport	LOG(IMij)	LOG(gdpi)	LOG(gdpj)	LOG(NERij)	LOG(Dij)	LOG(Ini)
LOG(IMij)	1					
LOG(gdpi)	-0.0895	1				
LOG(gdpj)	0.8362	0.2259	1			
LOG(NERij)	0.5695	0.1182	0.2773	1		
LOG(Dij)	-0.5188	0	-0.3527	-0.4302	1	
LOG(Ini)	-0.1286	0.5372	0.1228	0.0497	0	1

Source: Own STATA Estimation

Table A14: Individual Time Dummy Variables effect for Bilateral Trade Model

```
. xi:xtreg LNXij LNgdpi_gdpj LNgdppci_gdppcj LNTaxi_Taxj LNPCGDPDij TR_GDPi TR_GDPj LNRERij  LNTPi LNTPj LNDij i.year ,
> fe
i.year            _Iyear_2004-2012    (naturally coded; _Iyear_2004 omitted)
note: LNTPi omitted because of collinearity
note: LNDij omitted because of collinearity
note: _Iyear_2009 omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =        36
Group variable: partnerid                       Number of groups   =         4

R-sq:  within  = 0.4926                         Obs per group: min =         9
       between = 0.8305                                        avg =       9.0
       overall = 0.7776                                        max =         9

                                                F(15,17)           =      1.10
corr(u_i, Xb)  = -0.9996                        Prob > F           =    0.4215
```

LNXij	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdpi_gdpj	56.11976	25.75642	2.18	0.044	1.778477	110.4611
LNgdppci_gdppcj	-91.5579	39.68743	-2.31	0.034	-175.2911	-7.824744
LNTaxi_Taxj	.0743714	.5302904	0.14	0.890	-1.044444	1.193186
LNPCGDPDij	31.90999	14.18269	2.25	0.038	1.987126	61.83285
TR_GDPi	.0122683	.7615	0.02	0.987	-1.594356	1.618893
TR_GDPj	-.0439535	.0306997	-1.43	0.170	-.1087243	.0208172
LNRERij	4.708289	2.734492	1.72	0.103	-1.060985	10.47756
LNTPi	0	(omitted)				
LNTPj	-.4317904	1.246232	-0.35	0.733	-3.061109	2.197529
LNDij	0	(omitted)				
_Iyear_2005	.1086506	4.385425	0.02	0.981	-9.143787	9.361089
_Iyear_2006	.154086	5.349575	0.03	0.977	-11.13253	11.4407
_Iyear_2007	.5869024	2.236867	0.26	0.796	-4.132474	5.306279
_Iyear_2008	.5333067	1.560245	0.34	0.737	-2.758523	3.825137
_Iyear_2009	0	(omitted)				
_Iyear_2010	-.0810651	6.949757	-0.01	0.991	-14.74377	14.58164
_Iyear_2011	-1.903557	8.823146	-0.22	0.832	-20.51877	16.71165
_Iyear_2012	-2.897549	7.624662	-0.38	0.709	-18.98418	13.18908
_cons	-1721.007	832.1095	-2.07	0.054	-3476.604	34.59092
sigma_u	36.087159					
sigma_e	.57601956					
rho	.99974528	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(3, 17) =     1.85                 Prob > F = 0.1768

. testparm _Iyear* // if time fixed effects are needed when running a FE

 ( 1)  _Iyear_2005 = 0
 ( 2)  _Iyear_2006 = 0
 ( 3)  _Iyear_2007 = 0
 ( 4)  _Iyear_2008 = 0
 ( 5)  _Iyear_2010 = 0
 ( 6)  _Iyear_2011 = 0
 ( 7)  _Iyear_2012 = 0

       F(  7,    17) =    1.10
            Prob > F =    0.4050
```

Table A15: Individual Time Dummy Variables effect for Export Model

```
. xi:xtreg LNEXij LNgdpi LNgdpj LNgdppci LNgdppcj LNPCGDPDij LNNERij LNIni LNInj LNTEXi LNTIMj IM_Yj TR_GDPi TR_GDPj LN
> FDIi LNTPi LNTPj i.year , fe
i.year            _Iyear_2004-2012    (naturally coded; _Iyear_2004 omitted)
note: LNgdpi omitted because of collinearity
note: LNgdppci omitted because of collinearity
note: LNTPi omitted because of collinearity
note: _Iyear_2006 omitted because of collinearity
note: _Iyear_2008 omitted because of collinearity
note: _Iyear_2009 omitted because of collinearity
note: _Iyear_2012 omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =        36
Group variable: partnerid                       Number of groups   =         4

R-sq:  within  = 0.5911                         Obs per group: min =         9
       between = 0.5659                                        avg =       9.0
       overall = 0.3283                                        max =         9

                                                F(17,15)           =      1.28
corr(u_i, Xb)  = -0.9996                        Prob > F           =    0.3206

------------------------------------------------------------------------------
      LNEXij |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      LNgdpi |          0  (omitted)
      LNgdpj |    98.3911   79.42818     1.24   0.234    -70.90606    267.6883
    LNgdppci |          0  (omitted)
    LNgdppcj |  -111.7303   121.9988    -0.92   0.374    -371.7645     148.304
  LNPCGDPDij |   14.16823   37.99433     0.37   0.714    -66.81476    95.15123
     LNNERij |   2.770891   6.394927     0.43   0.671    -10.85957    16.40136
       LNIni |   2.064943   1.072976     1.92   0.073    -.2220514    4.351937
       LNInj |  -1.280131   1.301299    -0.98   0.341    -4.053785    1.493522
      LNTEXi |  -13.18344   12.17563    -1.08   0.296    -39.13518     12.7683
      LNTIMj |  -2.183593   6.502807    -0.34   0.742      -16.044    11.67681
       IM_Yj |  -.0832512   .2059055    -0.40   0.692    -.5221284    .3556259
     TR_GDPi |  -.2461662   .1561912    -1.58   0.136    -.5790798    .0867473
     TR_GDPj |  -.0166992   .1177521    -0.14   0.889    -.2676818    .2342833
      LNFDIi |   .4082207    .943811     0.43   0.672    -1.603465    2.419906
       LNTPi |          0  (omitted)
       LNTPj |  -.9279406   3.592115    -0.26   0.800    -8.584352    6.728471
 _Iyear_2005 |  -.7255707   1.068767    -0.68   0.508    -3.003593    1.552452
 _Iyear_2006 |          0  (omitted)
 _Iyear_2007 |  -.6116943   1.524213    -0.40   0.694    -3.860476    2.637088
 _Iyear_2008 |          0  (omitted)
 _Iyear_2009 |          0  (omitted)
 _Iyear_2010 |   3.287609   2.798059     1.17   0.258    -2.676312     9.25153
 _Iyear_2011 |    2.63763   1.649784     1.60   0.131    -.8788008    6.154061
 _Iyear_2012 |          0  (omitted)
       _cons |  -1319.231   1140.971    -1.16   0.266    -3751.152     1112.69
-------------+----------------------------------------------------------------
     sigma_u |  63.250628
     sigma_e |  1.3578184
         rho |  .99953937   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(3, 15) =     0.43                 Prob > F = 0.7322

. testparm _Iyear* // if time fixed effects are needed when running a FE

 ( 1)  _Iyear_2005 = 0
 ( 2)  _Iyear_2007 = 0
 ( 3)  _Iyear_2010 = 0
 ( 4)  _Iyear_2011 = 0

       F(  4,    15) =    0.98
            Prob > F =    0.4465
```

Table A16: Individual Time Dummy Variables effect for Import Model

```
. xi:xtreg LNIMij LNgdpi LNgdpj LNgdppci LNgdppcj LNPCGDPDij LNNERij  LNIni LNInj  EX_Yj TR_GDPi TR_GDPj LNTPi LNTPj LN
> TIMi LNTEXj i.year , fe
i.year            _Iyear_2004-2012    (naturally coded; _Iyear_2004 omitted)
note: LNgdpi omitted because of collinearity
note: LNgdppci omitted because of collinearity
note: LNTPi omitted because of collinearity
note: LNTIMi omitted because of collinearity
note: _Iyear_2005 omitted because of collinearity
note: _Iyear_2008 omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =        36
Group variable: partnerid                       Number of groups   =         4

R-sq:  within  = 0.5859                         Obs per group: min =         9
       between = 0.5388                                        avg =       9.0
       overall = 0.5009                                        max =         9

                                                F(17,15)           =      1.25
corr(u_i, Xb)  = -0.9993                        Prob > F           =    0.3359
```

LNIMij	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNgdpi	0	(omitted)				
LNgdpj	85.35752	40.11664	2.13	0.050	-.1490818	170.8641
LNgdppci	0	(omitted)				
LNgdppcj	-119.1586	52.869	-2.25	0.040	-231.8462	-6.470979
LNPCGDPDij	24.36246	18.34767	1.33	0.204	-14.74468	63.4696
LNNERij	-6.843332	3.390365	-2.02	0.062	-14.06973	.3830607
LNIni	-1.564264	1.289403	-1.21	0.244	-4.312562	1.184033
LNInj	-.5289797	.638895	-0.83	0.421	-1.890752	.8327927
EX_Yj	-.1644806	.1378614	-1.19	0.251	-.4583251	.129364
TR_GDPi	.1935683	.1914866	1.01	0.328	-.2145757	.6017123
TR_GDPj	-.0011915	.0511471	-0.02	0.982	-.1102089	.1078259
LNTPi	0	(omitted)				
LNTPj	1.749479	1.90334	0.92	0.373	-2.307393	5.806352
LNTIMi	0	(omitted)				
LNTEXj	-.2384976	2.475999	-0.10	0.925	-5.515964	5.038969
_Iyear_2005	0	(omitted)				
_Iyear_2006	-1.550737	1.181339	-1.31	0.209	-4.068702	.9672279
_Iyear_2007	-1.065273	.9831682	-1.08	0.296	-3.160847	1.0303
_Iyear_2008	0	(omitted)				
_Iyear_2009	-2.858119	2.756454	-1.04	0.316	-8.733362	3.017124
_Iyear_2010	-5.048487	5.385124	-0.94	0.363	-16.52661	6.429632
_Iyear_2011	-3.507379	4.688263	-0.75	0.466	-13.50017	6.485416
_Iyear_2012	-5.054591	5.555006	-0.91	0.377	-16.89481	6.785625
_cons	-1400.258	679.2022	-2.06	0.057	-2847.944	47.42697
sigma_u	54.880927					
sigma_e	.72667888					
rho	.99982471	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(3, 15) =     2.96                 Prob > F = 0.0659

. testparm _Iyear* // if time fixed effects are needed when running a FE

 ( 1)  _Iyear_2006 = 0
 ( 2)  _Iyear_2007 = 0
 ( 3)  _Iyear_2009 = 0
 ( 4)  _Iyear_2010 = 0
 ( 5)  _Iyear_2011 = 0
 ( 6)  _Iyear_2012 = 0

       F(  6,    15) =    0.67
            Prob > F =    0.6731
```

Table A17: Panel Unit Root Test for Bilateral Trade Model

```
xtunitroot llc LNXij if  partnerid, lags(aic 1)

Levin-Lin-Chu unit-root test for LNXij
--------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 0.25 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t         -6.6807
 Adjusted t*          -4.9071        0.0000
------------------------------------------------------------------------------

. xtunitroot ht LNXij

Harris-Tzavalis unit-root test for LNXij
----------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N -> Infinity
Panel means:  Included                                      T Fixed
Time trend:   Not included
------------------------------------------------------------------------------
                     Statistic          z          p-value
------------------------------------------------------------------------------
 rho                   0.1535       -3.6225        0.0001
------------------------------------------------------------------------------
```

Table A18:Panel Unit Root Test for Export Model

```
.xtunitroot llc LNEXij if  partnerid, lags(aic 1)

Levin-Lin-Chu unit-root test for LNEXij
---------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 0.75 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
------------------------------------------------------------------------------
                     Statistic      p-value
------------------------------------------------------------------------------
 Unadjusted t         -4.7184
 Adjusted t*          -3.7836        0.0001
------------------------------------------------------------------------------


.xtunitroot ht LNEXij

Harris-Tzavalis unit-root test for LNEXij
-----------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N -> Infinity
Panel means:  Included                                      T Fixed
Time trend:   Not included
------------------------------------------------------------------------------
                     Statistic          z          p-value
------------------------------------------------------------------------------
 rho                   0.3039       -2.6255        0.0043
------------------------------------------------------------------------------
```

Table A19:Panel Unit Root Test for Import Model

```
xtunitroot llc  LNIMij if  partnerid, lags(aic 1)

Levin-Lin-Chu unit-root test for LNIMij
---------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 0.75 lags average (chosen by AIC)
LR variance:     Bartlett kernel, 6.00 lags average (chosen by LLC)
--------------------------------------------------------------------------------
                     Statistic      p-value
--------------------------------------------------------------------------------
 Unadjusted t         -8.7123
 Adjusted t*          -6.7120        0.0000
--------------------------------------------------------------------------------


xtunitroot ht LNIMij

Harris-Tzavalis unit-root test for LNIMij
-----------------------------------------
Ho: Panels contain unit roots                  Number of panels  =      4
Ha: Panels are stationary                      Number of periods =      9

AR parameter: Common                           Asymptotics: N -> Infinity
Panel means:  Included                                      T Fixed
Time trend:   Not included
--------------------------------------------------------------------------------
                     Statistic          z          p-value
--------------------------------------------------------------------------------
 rho                  -0.0641       -5.0646        0.0000
--------------------------------------------------------------------------------
```