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IMPACTS OF REGIONAL TRADE AGREEMENT ON AGRICULTURAL PRODUCTS IN AFRICA: PANEL DATA APPROACH

A CASE STUDY ON COMMON MARKET FOR EASTERN AND SOUTHERN AFRICA (COMESA)

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Addis Ababa, Ethiopia

June, 2012

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Impacts of Regional Trade Agreement on Agricultural Products in Africa: Panel data Approach

A Case study on Common Market for Eastern and Southern Africa (COMESA)

Adugna Lemma

A project paper submitted to the school of graduate studies of Addis Ababa University in partial fulfillment of the requirements for the degree of masters of Art in economics.

(Applied Trade Policy Analysis)

Addis Ababa University

Addis Ababa, Ethiopia

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This is to certify that the thesis prepared by Adugna Lemma entitled:

Impacts of Regional Trade Agreement on Agricultural Products in Africa: Panel data Approach

A Case study on Common Market for Eastern and Southern Africa (COMESA)

And submitted in fulfillment of the requirements for the Degree of Master of Art in Economics (Applied Trade Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Name Adugna Lemma Signature 11/06/2012

Signed by Girma Estifanos

Advisor---------- Signature---------- Date June 11/2012

Abstract

Impacts of Regional Trade Agreement on Agricultural Products in Africa: Panel data Approach

A Case study on Common Market for Eastern and Southern Africa (COMESA)

Adugna Lemma

This study examines the effects of regional trade area or free trade area on trade in agricultural products within intra- COMESA countries and extra-COMESA countries using a panel data for the period (2001-2010). A panel data framework has many advantages vis-à-vis the cross-section approach. It allows to disentangling country-specific and time-specific effects. In order to analysis the impacts this study employed random affects GLS model depending on Hausman test guidance.

The contribution of this study to the literature is that the effects of FTA of COMESA is positive and as expected and statistically significant .Agricultural trade have been diverting from former COMESA members and from SADC members to newly established FTA member countries.

The findings is consistent the theory of Linder hypothesis that large size countries tend to trade more with large size countries and Heckscher-Ohlin- Samuelson theorem. Most result of standard variable included in the gravity model is positive as expected and statistically significant. The results of the study also confirm with the hypothesis that both FTA and extra-COMESA agricultural trade is positively correlated with the volume of trade but inversely with SADC and non FTA member COMESA countries.

Key words: Gravity model, Agriculture, FTA, RCA, Regional Trade Agr

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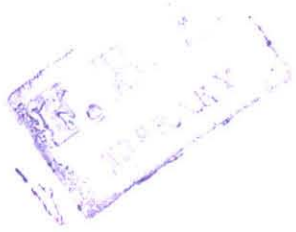

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Acronyms and Abbreviations

2SLS	Two stage Least Square
AFTA	ASEAN Free Trade Area
ASEAN	Association of Southeast Nations
BLUE	Best Linear Unbiased Estimator
CACM	Central American Common Market
CEPII	Center for Prospective International Information
CGE	Computable General Equilibrium
COMESA	Common Market for Eastern and Southern Africa
CU	Customs Unions
CUSTA	Canada-US Free Trade Agreement
EAC	East African Community
ECOWAS	Economic Community of Western African States
ECSC	European Coal and Steel Community
EEA	European Economic Area
EEC	European Economic Community
EFTA	European Free Trade Agreement
EU	Europe, the European Union
FDI	Foreign direct investment
FEM	Fixed Effects Model
FTA	Free Trade Areas
GATT	General Agreements on Trade and Tariff
GDP	Gross Domestic Products
GLS	Generalized Least Square
GNP	Gross national Products
H-O	Heckscher-Olin

HRCA	High Revealed Comparative Advantages
LM	Lagrange Multiplier Test
MERCOSUR	Common Market of the South
MFN	Most Favored Nations
NAFTA	North American Free Trade Agreement
NRCA	No Revealed Comparative Advantages
OAU	Organization of African Unity
OECD	Organization for Economic Co operation and Development
OLS	Ordinary Least Square
POLS	Pooled Ordinary Least Square
PPML	Poisson Pseudo-Maximum-Likelihood
PS	Preferential scope Agreement
PTA	Preferential Trade Areas
RCA	Revealed Comparative Advantages
REM	Random Effects Model
RTA	Regional Trade Area
SACU	South African Customs Union
SADC	Southern African Development Community
SITC	Standard International Tariff Classifications
U.S.	United States of America
UNCOMTRADE	United Nations Commodity Trade
UNCTAD	United Nations Conference for Trade and Development
WLS	weighted Least Square
WTO	World Trade Organization

1. Introduction

1.1 Background of the study

The standard analysis of the trade effects of regional integration dates back to Viner (1950), who distinguished between two major effects from the establishment of customs unions between a group of countries can lead to 'trade creation' between members (which should increase welfare) and "trade diversion " that is it can also reduce trade between the CU and its trading partners. This 'trade diversion' can potentially reduce welfare for all as a member switches from a relatively efficient, low cost producer outside the CU to less efficient, higher cost producer within the CU, leading to a global misallocation of resources. Before Viner analysis often believed that a CU would be welfare improving ,since some tariffs would fall and tariffs are, in general welfare reducing. Most of the debate on the static impacts of trade blocs on the global economy rests on the theoretical and empirical evaluations of whether RTAs are more trade-creating or trade-diverting.

Regional integration agreements (RTAs) have become an increasingly prominent feature of the world economy in recent years. The surge in RTAs has continued unabated since the late 1980s and early 1990s in parallel with the GATT negotiation under the Uruguay Round many countries entered into negotiation aimed at the formation revitalization or extension of Regional Trade Agreements (RTAs). Today, it is difficult to identify any country that does not participate in some kind of regional integration agreement. Well over two-third of world trade takes places within different kinds of trade blocs.

As of 15 January 2012, some 511 notification of RTAs counting goods service and goods and accessions separately have been received by the GATT/WTO. Of these 370 notifications were made under article XXIV of the GATT 1947 or GATT 1994, 36 under article V of the GATTs. At the same date 319 were in force [1] .While the total number of notified RTAs is 124 for 36 years during 1948-1994, almost around 400 additional RTAs have been notified for the last two decades. Bhagwati (1991) has termed this latest resurgence as "the second regionalism". The overall number of RTA in force has been

[1] As of January 2012. See WTO website http;//www.wto.org/English/tratop_e/adp_e/adp_e.htm#statistics.

increasing steadily tends likely to be strengthened by RTAs currently under negotiations of these RTAs FTA and PS.

It is not surprising, given the latest wave of regionalism in world trade, that RTAs are once again receiving a considerable amount of attention from international trade econmists (Baier & Bergstrand,2007, Baier et al.,2008; Grant & Lambert,2008;Vollrath 2009.

Regional integration initiatives in Africa have a long history, dating back to the establishment of the South African Customs Union (SACU) in 1910 and the East African Community (EAC) in 1919. Since then a number of regional economic communities have been formed across the continent, particularly since 1970. Currently there are about 14 regional economic groupings in Africa. Today there is no country in Africa that is not a member of at least one regional economic group. As reflected in the number of regional agreements both in the continent and worldwide, therefore, the issue continues to occupy a center-stage in the economic agenda of countries (Geda and Kibert 2002).

Apart from the economic rationale that integration is an important stimulus for trade, investment and economic development, also political factors contributed to regional integration in Africa. These have its roots in the pan African movement of shared value, collective self-reliance in development and political independence (UNCTAD 2009)

Despite the unsatisfactory performance to date regional integration in Africa however there seems to be new momentum to invigorate the process of integration of African economics. This is reflected in the resurgence of political will expressed in the Abuja Treaty of 1991. Among others, first, formation and the Strengthening of various regional blocks outside of Africa (in Europe, Asia and the America) seems to have forced African countries to reconsider the issue more seriously if they are to avoid further marginalization. Second the realization by African countries (particularly the small ones) that their respective national markets are too small to provide the benefits of economics of scale and specialization. Third, the liberalization initiatives undertaken by almost all countries in Africa has also created a conductive environment to pursue an outward-looking economic policy, which encompasses economic cooperation in general and trade liberalization policy in particular. Whether these factors among others are sufficient to

take integration initiatives to a higher level or not remain to be seen, but that they have created some optimism than ever before is apparent.

The history of COMESA began in December 1994 when it was formed to replace the former Preferential Trade Area (PTA) which had existed from the earlier days of 1981. COMESA (as defined by its Treaty) was established 'as an organization of free independent sovereign states which have agreed to co-operate in developing their natural and human resources for the good of all their people' and as such it has a wide-ranging series of objectives which necessarily include in its priorities the promotion of peace and security in the region.

However, due to COMESA's economic history and background its main focus is on the formation of a large economic and trading unit that is capable of overcoming some of the barriers that are faced by individual states.[2]

COMESA's current strategy can thus be summed up in the phrase 'economic prosperity through regional integration'. With its 20 member states, population of over 464 million and COMESA forms a major market place for both internal and external trading. Its area is impressive on the map of the African Continent figure (3) and its achievements to date have been significant.

By 2010, 13 member countries had joined the free trade area and are trading on a free a tariff free basis. Ethiopia is one of the founding countries of COMESA. However, to this year Ethiopia is not member of Free Trade Area (FTA). This study will consider the impacts of FTA on trade in agricultural products between member countries of COMESA.

1.2 **Statements of the problem**

The effects of RTAs on agricultural trade has until recently, received very little attentions. The current gravity literatures on regional integration has focused almost on

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[2] Members of COMESA: Burundi, Comoros, Democratic ,Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe

trade in non-agricultural products and in many cases, agricultural trade has been excluded from the estimation of gravity model. Yet the special treatment of agricultural trade within preferential trading blocs and in WTO negotiations suggests that agricultural trade within preferential trading blocs and in the WTO negotiations suggest agricultural trade within RTAs may not be trade crating.

Furthermore agricultural products are characterized by high protection levels, complex tariff structures, low transportability and strong 'home bias' in preferences all that induces larger border effects. Finally agriculture is presently at the center of the WTO trade talks, thus a close examination of the level and trends in border effect, in an endeavor to better understanding the degree to which trade policies matter, would offer new insight in to this literature.

The recent proliferation of RTAs has revived academic interest in the desirability of these agreements in themselves and vis-à-vis multilateral free trade. A growing literature addresses the debate based on the welfare effects of RTAs and their likely impacts on the Multilateral trading system (Panagariya 2000; Krueger 1999). One school of thought views RTAs as reducing global welfare and creating "stumbling blocks" to multilateral free trade (Bhagwati 1998 Panagariya 2000). Thc other school of thought argues that RTAs are likely to raise global welfare and can act as "building blocks" to multilateral free trade (Summers 1991; Ethier 1998). Despite a number of empirical contributions in recent years, the effects of RTAs on trade in agricultural products have not been investigated rigorously.

This motivates initiated this study , which focuses on the effects of Regional Trade Agreement or Free Trade Area of Common Market for Eastern Southern Africa (COMESA) and its effects on trade of agricultural products in recent history

1.3 Objective of the Study

1.3.1 General Objective

The general objective of this study is to investigate the potential of COMESA intra-regional trade in agricultural products. Despite the proliferation of RTA, the debate about the costs and benefits of regionalism continues to be lively. One of the main

questions is whether regional agreements serve as an obstacle or a "Stepping Stone" in the process towards multilateralism or toward global free trade (WTO (1995), World Bank (2000)). The opponents see RTAs as fostering protectionism, encouraging governments to look-inward rather than-outward, which undermines multilateral trading system. And whether it is trade creating or diverting or welfare crating or not is going to be answered by this study.

Therefore, the purpose or objective of this study is to empirically investigate whether a RTA promotes welfare of the participating countries through trade creation and thus provides a positive move towards multilateral trade; or lowers welfare by diverting trade and becomes stumbling block to trade liberalization in COMESA region using agricultural products.

1.3.2 **Specific Objectives**

- To analyze the impacts of COMESA FTA, on bilateral trade of agricultural commodities, with specific aim of determining whether the agreement resulted in trade creation or trade diversion.
- To analysis the impact of, land lockedness, The Reveled Comparative Advantage (RCA) and in intra-COMESA and extra –COMESA trade.
- To analysis the impacts of overlapping of membership in different regional blocks.
- To analysis whether intra and extra-COMESA trade in agriculture increase or not over time (impacts of Globalization).

1.4 Significance of the Study

The focus on agricultural trade is motivated by the fact that, there exist a vast literature on impact and economic benefits of RTAs on manufacturing and service sectors but there are only few studies (literature) that investigates the impact of RTAs on agricultural trade in Africa as a whole and COMESA as particular. In addition, many of the studies are either less detailed, looking at the aggregate trade levels than the product level. This paper contributes to this literature by analyzing the process and the levels of agricultural

market integration among COMESA countries. And refines and revise different existing literatures, methodologies relevant to this study.

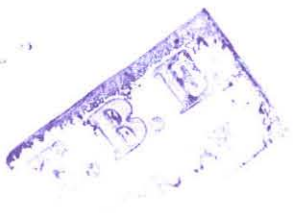
Since there is relatively less literature on impacts of RTAs on trade in agricultural products and food commodities still there is a need of investigation of impacts of RTAs in Agricultural products rigorously especially in the COMESA region. More over the study intended to fill the gap of the previous studies by determining how revealed Comparative Advantage (RCA) index, boarder effect land lockedness, overlapping of membership FTA in COMESA countries will affects agricultural trade in the region. In addition common language, GDP, distance, common colony, colony, Intra and Extra-COMESA etc will affect agricultural trade in the region.

Changes in the nature of exports and the specialization of trade within the RTA are examined using the index of revealed comparative advantage (RCA). The RCA measures the export intensity in a given agricultural product by members of the RTA, relative to other countries in the world.

The result of the study could be base for further studies on related issues and it will be important input for future negotiation.

1.5 **Organization of the paper**

The remainder part of this paper is presented as follows: section two briefly review both empirical and theoretical aspects of the Regional Trade Agreements Section three Brief overviews of COMESA economic political and regional trade agreement and its performance, section four present Empirical methodology and descriptions; section five will present estimation result and discussions, finally it will present conclusion and policy implications in section six.



2. REVIEW OF LITERATURE

2.1 An Overview of Regional Trade Agreements

In respective of the catchphrase used to characterize it regionalism has intensified over the last two decades.RTA/FTA are, numerous than ever and at the moment there seems to be little, if anything, that can stop this trend. It almost visible with regard to bilateral trade agreements notified to the WTO in the last decade.

As of 15, January 2012, some 511 notifications of RTAs counting goods and services accession separately have been received by the GATT/WTO. Of these 370 notifications were made under article XXIV of the GATT 1947 or GATT 1994, 36 under article V of the GATTs. At the same date 319 were in force. While the total number of notified RTAs is 124 for 36 years during 1984-1994, almost around 400 of them additional RTAs have been notified for the last two decades Therefore Given the current trends, it is becoming increasingly important to understand not only the rationale behind them but also their likely effects on participants and third countries.

The overall number of RTAs in force has been increasing steadily a tend likely to be strengthened the by RTAs currently under negotiations, of these RTAs FTA and PS account for 90%.While CU accounts for10% WTO 2012.

2.2 Definition of Regionalism and Sages of economic integration

Regional economic integrations have been defined by many scholars in economic literatures. This study tries to asses few of them as follows.

Regional integration is defined" as a process by which a group of nations or countries voluntarily and in various degrees "have access to each other's market and establish mechanism and techniques that minimizes conflicts and maximize internal and external economic ,political, social and cultural benefits of their interaction(Haarlov,1997:15) . Regional trade integration is a condition wherein separate national economies maintain lower barriers to mutual trade, while maintaining the same barriers to third parties Carim (1997: 336).

Regionalism As also defined by Hilbun, Kennedy, and Dufour (2006) as the preference of nations to trade with nations with which a common geographical region is shared. The integration of countries into trade blocs is commonly referred to as 'regionalism', irrespective of whether the trade bloc has a geographical basis or not (Sanoussi Bilal 2000). The first waves of RTAs appeared in the 1930s leading to a fragmentation of the world into trade blocs. This 'old (first) regionalism' is also associated with regional initiatives involving developing countries in the 1950s and 1960s. Based on the objective of import-substitution industrialization, the rationale was that developing countries could reap the benefit from economies of scale by opening up their trade preferentially among themselves, hence reducing the cost of their individual import-substitution strategy while the trade bloc became more self-sufficient. More successful experiences followed with the recent proliferation of trade blocs, the so-called 'new (second) regionalism', which involve mostly countries from the North with the South (the North-South trade blocs).

The main trade blocs in the world are:

1. In Europe, the European Union (EU), the European Free Trade Agreement (EFTA), the European Agreements, and the European Economic Area (EEA);
2. With the United States, the North American Free Trade Agreement (NAFTA), the Canada-US Free Trade Agreement (CUSTA), and the US Israel Free Trade Agreement;
3. in Latin America, the Common Market of the South (MERCOSUR), the Central American Common Market (CACM), the Andean Pact, the Latin American Integration Association (LAIA), and the Caribbean Community and Common Market (CARICOM);

4. In Sub-Saharan Africa, Communauté Economique del'Afrique Occidentale (CEAO)/Union Economique et Monétaire de l'Afrique Occidentale (UEMOA), Union Douanière et Economique d'Afrique Centrale (UDEAC),

5. the Common Market of Eastern and Southern Africa (COMESA)/Preferential Trade Area for Eastern and Southern African States (PTA), the Southern African Customs Union (SACU); and

6. In Asia, the Association of Southeast Nations (ASEAN) and the ASEAN Free Trade Area (AFTA), and the Australia-New Zealand Closer Economic Relations Trade Agreement (ANZCERTA).

One of the obvious reasons for regionalism is that it overcomes distance as a hindrance to trade. In a number of literatures, distance is commonly referred to as a 'friction to trade', subsequently, distance is viewed (from both intuitive and econometric viewpoints) as having a negative impact on trade flows, and as a result insinuating that from both expectation and economic theory a negative sign should be the expected sign for the distance coefficient in any econometric equation (Pöyhönen1963, Linneman, 1966, Tinbergen, 1962). Srivastava and Green assert that of all the determinants of trade intensity between nations, distance is the single most important determinant. (Srivastava and Green, 1986).

There are also other underlying reasons for the rise of regionalism world-wide. It has been proposed that regionalism has been embraced due to frustration with the delay in GATT negotiations and that the United States has shifted its tendencies from that of multilateralism to that of ardent regionalism(Baldwin, 1997)

During the past two decades, the move toward regionalism became a head-long rush. According to WTO reports most of the RTAs have been notified within these two decades. Most of the RTAs have been moved from closed regionalism toward more open RTAs in the past two decades in line with prevailing views about national economic policy. Many of the trade blocs that were formed between developing countries in the 1960s and 1970s were based on a model of import substituting developments, and regional agreements with high external trade barriers were used as a way of implementing this model. New-wave RTAs are generally more outward looking and more committed to boosting rather than controlling international commerce.

There is also the recognition that effective integration requires more than simple reduction of tariffs and quotas. There are many types of barrier that have the effect of segmenting markets and impeding the free trade flow of goods, services, investments and ideas, and wide-ranging policy measures-going well beyond traditional trade policies are need to remove them. Such "deep integration "was first actively pursued in single market programme of the European Union (EU),but its elements are now finding their way into the debate on other regional agreements.

2.3 Rationale for regionalism

Several reasons explain recent spurt in regionalism. The so-called 'old regionalism' was motivated by the desire to pursue in developing countries import substitution development at a regional level, to insulate a region from the world economy and to stabilize and foster the economy at a regional level. Political and economic considerations also played a major role, as in the case of the European Coal and Steel Community (ECSC, 1951) and the European Economic Community (EEC, 1957).

The recent proliferation of RTAs (the so-called 'new regionalism') could be explained by various factors. Recognizing the gains from liberalization, it is often argued that concluding RTAs is politically easier than pursuing multilateral trade liberalization agreements. It is easier to negotiate with few partners than with a large number of participants in the multilateral process as envisaged under the General Agreement of Tariffs and Trade (GATT)/World Trade Organization (WTO). Not only concessions can be more easily exchanged among a small number of countries, but effective enforcement mechanisms can also be agreed upon at a lower cost. The length and difficulties encountered during the Uruguay Round of GATT negotiations (1986-1994) is usually considered to have contributed to increase the attractiveness of the regional (i.e. preferential) path to trade liberalization.

RTAs also allow trading partners to go deeper and faster in their liberalization process, addressing modern trade barriers which are more varied, more complex and less transparent than standard tariffs and quotas traditionally considered under GATT Rounds. Preferential integration agreements can also entail elements beyond standard trade policy

concerns, such as competition, investments, labor and capital market considerations. In other words, the fewer a number of participants to trade negotiations, the larger a number of issues on which it is possible to reach an agreement.

RTA participation may appear attractive to countries through the prospect of economies of scale and the potential for more efficient use of resources. Access to a larger market, made possible by adherence to an RTA, allows firms to exploit economies of scale more fully (OECD, 2001). Firms may make more efficient use of inputs into their production processes, taking advantage of complementarities that exist among countries in the RTA. Their costs are therefore reduced and they can lower output prices as they capture and create larger markets for their outputs at home and abroad. This results in changes in production processes and potential changes in the product basket of exports and imports (korinek, and Melatos (2009).

Initially, regional cooperation schemes among developing countries were also encouraged by international organizations as a means toward regional stability and development. In this context it was also argued that regionalism could serve as an elite-socialization process and as a lock-in mechanism for domestic political and economic reforms in the less developed RTA members (Whalley, 1996).

Maurice Schiff and L. Alan Winters also identified some of the objectives as follows:

- Governments' wish to bind themselves to better policies including democracy and to signal such bindings to domestic and foreign investors or regionalism serve to pursue non-economic objectives, or objectives beyond the immediate economic concerns of a regionalism, such as political stability, democratic development or security issues (either domestic security, or as a response to third-country). Security threats or security threats between partner countries);
- A desire to obtain more secure access to major markets;
- The pressures of globalization, forcing firms and countries to seek efficiency through larger markets, increased competition and access to foreign technologies and investment;

- Governments' desire to maintain sovereignty by pooling it with others in areas of economic management where most nation states are too small to act alone;
- A desire to jog the multilateral system into faster and deeper action in selected areas by showing that the GATT was not the only game in town and by creating more powerful blocs that would operate within the GATT system;
- A desire to help neighboring countries stabilize and prosper, both for altruistic reasons and to avoid spillovers of unrest and population;
- The fear of being left out while the rest of the world swept into regionalism, either because this would be actually harmful to excluded countries or just because "if everyone else is doing it, Shouldn't we?" shortly in order to reduce the costs of being "left out": the so-called 'domino effect' of regionalism(Sanoussi Bilal 2000);

The collapse of Soviet hegemony, which led the countries of Eastern Europe and the Baltic to embrace democracy and capitalism and those of Western Europe to seek ways of cementing and accelerating their transition;

The change in understanding of the role of openness in development coupled with a natural political desire to limit the feared adjustment costs of unilateral nondiscriminatory liberalization;

The need to create a domestic dynamic for the reforms required to achieve greater openness while at the same time minimizing the political problems of disrupting existing sources of incomes and rents;

The changed in attitude of the United States toward trade blocs from active hostility to a broadly enthusiastic stance,

This shift both fostered RTAs and reduced the diplomatic pressure overt (Through the GATT) and covert for countries to desist from forming them. It stemmed at least in part from an expressed frustration with the slowness of the multilateral process. Also important, if less public, were the increasing influence of business lobbies in U.S. policymaking, the decreasing competitiveness of U.S. industry, and a lessened willingness

to bear the costs of managing the global system without receiving direct payoffs in the form of markets. With the end of the Cold War, the overriding political justification for bearing those costs disappeared, and the debate focused more directly on mercantilist objectives, as it always had in smaller countries.

2.4 Regionalism versus Multilateralism

The ambiguity on the static impacts of trade blocs led to the current debate on whether the new wave of regionalism pauses a threat to the multilateral liberalization process (because of the discriminatory nature of RTAs, RTAs are, by nature, exclusive clubs) or on the contrary is compatible with and even complementary to further global trade liberalization (as a stepping stone towards free trade). In other words, are RTAs 'stumbling blocks' or 'building blocks' towards a more liberal multilateral trade system? The answer rests on the analysis of the dynamic time-path effects of trade blocs, and not simply on the (static) immediate impact of RTAs. The proponents of the regionalism path towards multilateral liberalization emphasize the benefits of trade creation over the problems associated with trade diversion. They argue that RTAs support the integration of groups of countries into the international economy as they highlight the benefits from freer trade. As such, regionalism helps creating a momentum for global trade liberalization initiated by intra-bloc liberalization. This internal dynamic of trade liberalization, and more generally economic reforms, is particularly important in developing countries where regional commitments can facilitate the integration of these economies into an increasingly sophisticated multilateral trading system.

Notwithstanding its multilateral and non-discriminatory focus, the GATT permits RTAs (via Article XXIV) provided they encourage free trade among their member countries without raising barriers to trade with non-members. In other words, regional integration should complement the multilateral trading system and not threaten it. Regional agreements provide an opportunity for groups of countries to negotiate rules and commitments to strengthen their integration; these often go beyond what is possible multilaterally at the time. In turn, some of these rules have paved the way for agreement in the WTO (Korinek and Melatos (2009).

There are several reasons why RTAs might provide better or more credibility than can multilateral agreements, specifically the WTO. First, many countries have bound their tariffs at the WTO at levels significantly higher than their applied tariffs and can raise them without violating their WTO commitments. Given the weakness of the lock-in mechanism, domestic and foreign investors will remain hesitant to commit resources.

Second, RTAs allow countries to make commitments on matters that are difficult to negotiate multilaterally, including aspects of deep integration, such as harmonization of investment codes. Thus, not only are more policies explicitly constrained, but there are more areas in which punishment can be exercised.

Third, for commitments to be credible there must be a high degree of certainty that retaliation will follow violations. More countries are affected by a country's actions at the WTO than in an RTA, which by definition has few members. RTA members therefore internalize a larger share of the total loss from any violation 100 percent in a two-country RTA and have a stronger incentive to retaliate than countries at the WTO. In addition, RTA members have less scope for free-riding on the punishment (that is, for letting others take action) and more direct returns to making the agreement credible overall (Fernandez and Portes 1998).

Yet, another school of thought expresses serious concerns about the compatibility of trade blocs with the pursuit of multilateral liberalization. First, because of their discriminatory nature, RTAS/ PTAs generate trade diversion, which not only negatively affects excluded countries, but could also antagonize them, rendering multinational negotiations more difficult. Moreover, if (intra-) trade liberalization generates 'sunk costs' (for instance associated with the setting of a distribution network), or creates 'hysteresis' in trade, the trade structure of a country joining a PTA can be altered in the long run. This can delay or prevent further adjustments of trade patterns in the case of global liberalization, and consequently reduce the incentive of PTA members to pursue the multilateral path to trade liberalization. Besides, regionalism may divert the attention of countries away from the multilateral system, as the former becomes an alternative to the latter Sanoussi Bilal (2000).

2.5 Stages of Economic Integrations

Carim (1997) also gives two different types of classification of regional trade integration. The first one complies with the sequential progression of degrees of integration, which are the following.

- A preferential trade area (PTA) this is the lowest form of economic integration that provides lower barriers on trade among the participating nations than on trade with non member nations. In this type of integration member countries reduce barriers to the intra-trade but maintain tariffs on trade with non-members. British Common Wealth preferential Scheme, established in 1932 by the UK is the best example of this form of economic integration, PTA of COMESA is also one of modern preferential trade integration in Africa.
- A free trade area (FTA) is the form of economic integration where member countries eliminate all barriers to the intra-trade but maintain their separate tariffs vis-à-vis non-members. Examples are EFTA in Europe, NAFTA in North America MERCOSUR in South America etc. FTA of COMESA is also one of free trade area in COMESA.
- A customs union (CU) is a free trade area where member countries establish a common external tariff on goods from non-members. The structure of the common external tariff (CET) of FTA in COMESA since its establishments in oct.2000 is zero tariffs on raw materials and capital good 10% and 25% on intermediate good and finished good respectively.
- A common market (CM) is a customs union where member countries also allow free movement of labor and capital in their territories. Good example is EU which achieved the status in 1993.
- An economic union (EU) is a common market where member countries harmonize their monetary and economic policies of member states. This is the most advanced type of economic integration. NAFTA is the best example of this type of integration.

- Political Union (PU) this is total unification of nations including economy and politics. It is the highest form of integrations eg. Unification of western and eastern Germany.

Generally the first three forms integrations in this classification imply the removal of barriers to the free movement of goods, services and production factors, while monetary integration is viewed as an "adoption of a common currency, a common central monetary authority, and a surrender of national autonomy in the field of monetary and exchange rate policy" (Foroutan, 1993:239). The integration of government activity and regulation, also called government co-operation, is viewed by Foroutan (1993; 239) as an "adoption of similar tax and investment codes, harmonization of administrative and bureaucratic rules, creation of a joint administration, creation of a common infrastructure, and the provision of common services.

For Carim (1997) and Foroutan (1993), the second classification of integration (CM,EU,PU) is preferable to the first, as it allows the six forms of integration to occur either together or separately. Carim (1997) furthermore argues that the combination of government co-operation and trade integration is the most appropriate form of integration for African countries, as long as this combination can provide an adequate environment for producers that are starting to compete in the world market.

The European Union may be regarded as an example of a successful regional integration scheme that has followed the first classification of integration from the PTA up to the EU. In Africa, some RTAs have also followed the same classification, but have encountered implementation problems, so that after several decades they are still at the level of a FTA. COMESA achieved that level in 2000, with only 9 out of 20 of its member countries. Owing to problems that arise between countries forming the FTA (which may be solved by forming the CU), COMESA member countries must make sure that they reach the CU level if they want their integration process to be sustainable.

2.6 Theories of Regional Economic Integration

The rationale for RTAs is drawn from the standard international trade theory, which states that free trade is superior to all other trade policies.(i.e. under the assumption of

competitive environment and in the absence of market distortions and externalities, free trade will lead to an optimal global welfare that is it leads to Pareto efficiency).It is an optimal allocation of production factors-a situation where those that gain from trade could fully compensate those that loss from trade still be better off and international welfare is maximized. Removing trade barriers between a subset of countries could therefore appear to be, a priori, a move in the right direction. Yet, the 'theory of second best' points out that removing a distortion while others remain in place may not increase welfare. Trade blocs are examples of second best since a distortion is removed, i.e. trade barriers between member countries, while another distortion is created in the form of a discrimination between members and non-members (the latter facing trade barriers from the RTAs), as well as other market imperfections. Hence, the welfare implications of a trade bloc are ambiguous as they depend on many factors, Jacob Viner (1950).

Both economic theory and a vast body of empirical evidence on RTAs tend to point towards static and dynamic gains as the potential economic gains members of RTAs stand to benefit from (de Melo et al. 1993; de la Torre and Kelly 1992; Langhammer and Hiemenz 1990; Robson 1987; Balassa 1961). The static gains and dynamic gains are discussed below.

2.6.1 The Static Effects

The static impact refers to changes occurred in the equilibrium market price and quantity before and after the creation of the economic bloc. This can be a trade creation or a trade diversion. According to the cline (1978) static gain can be broadly classified in to traditional and non -traditional effects. The traditional effects include trade creation and trade diversions of viner 1950s.Cline (1978) also provides additional non-traditional static effects from regional trade integration, which are as follows: Labour opportunity effect, economies of scale effect and foreign exchange saving effect . Further studies also discover more static gains from regional trade integration, depending on the models used. Following the classification of Baldwin and Venables (1995) and that of Lloyd and Maclaren (2004), the models assuming perfect competition and constant returns to scale identify that trade volume, trade cost and terms of trade increasing returns and

competition, investment as beneficial effects of regional trade integration. However, models assuming imperfect competition and increasing returns to scale identified benefits from regional trade integration in the form of output, scale and variety effect.

2.6.1.1 Traditional static Gain: Trade Creation and Trade Diversions

The classical reason for gains from trade is that global free trade allows consumers and firms to purchase from the cheapest source of supply, ensuring that production is located according to comparative advantage. In contrast, trade barriers discriminate against foreign producers in favor of domestic suppliers. Domestic import-competing producers are induced to expand even though their costs are higher than the cost of imports. This misallocation starves domestic export sectors of resources, raises their costs, and causes these sectors to be smaller than they otherwise would be. Switching production from goods that a country can produce efficiently to those it cannot. These could reduce real incomes of the country.

According to the traditional static gain, trade creation appears when high cost production is substituted by low cost production welfare improving because of regional integration while trade diversion occurs when low cost production is substituted by high cost of production .

The formation of RTAs will not necessarily increase welfare of neither the member's country nor non member countries. The "gains from trade" argument tells us what happens if all trade barriers are reduced, but it need not apply to a partial and discriminatory reduction in barriers, as in an RTA. The reason is that discrimination between sources of supply is merely shifted, not eliminated. If partner country production displaces higher cost domestic production, there will be gains (trade creation). But it is also possible that partner country production may displace lower-cost imports from the rest of the world, resulting in trade diversion.

However, some research studies do not support the possibility of trade diversion as a result of an RTA creation (Meade, 1955; Ohyama, 1972; Kemp and Wan, 1976). These studies tend to argue, based on what is characterized as the Kemp-Wan Theorem, that trade diversion is averted in a customs union or free trade area since there would exist a set of

common external tariffs that leave unchanged the emerging trading bloc's trade with non-member countries. Meade, in particular, argues that when pre-arranged tariffs for member nations of the RTA are high, the pressure for trade diversion may be great in the aftermath of RTA creation. On the other hand, the potential for trade diversion in the regional arrangement may be low since such external barriers offer less scope for the displacement of imports from third countries with regional production.

Another interesting scenario in the literature is the case in which the RTA brings together countries that were previously major trading partners. According to Lipsey (1957), opportunities for trade creation in such circumstances appear to be enhanced more whereas trade diversion is minimized. Again, the contention is that since least-cost sourcing exists prior to the RTA's introduction of preferences, the removal of trade barriers would reduce the likelihood that trade would be diverted from third countries' least-cost suppliers to higher cost suppliers within the RTA. Other researchers, such as Wonnacott and Lutz (1989) and Summers (1991), have developed the "natural trading bloc" argument that appeals to similar reasoning and incorporates transportation costs in the supply expenditure.

We can conclude that as it was examined by different scholars above Even though there are vast literature on trade creation and trade diversions there is no clear- cut evidence whether or not trade creation outweigh trade diversion starting from the vinerians theory of customs union. Since there are trade creations for some trade bloc's trade diversions for others the result is mixed. This study will investigate this issue empirically whether there is trade creation and diversions due to the formation of FTA in COMESA trade bloc.

2.6.1.2. Non-traditional static gains

Cline (1978) also refers to additional non-traditional static effects from regional trade integration, which is as follows: firstly, there is what has been termed the "labour opportunity cost"- effect. This occurs when an increase of output made possible by regional trade integration allows for the employment of extra labour at a wage below the minimum wage rate. In fact, this occurs because the extra labour is withdrawn from

family farm agriculture or non-organised urban services, where the salary was absent or very small.

Secondly, there is the 'economies of scale'- effect, which occurs when counties are become able to produce at their capacity, thanks to the increase of the market made possible by the integration. Lastly, there is the 'foreign exchange savings'- effect. The foreign exchange that is referred to here is that of non-member countries, because, in effect, when a group of countries forms an RTA, they increase imports from within the union and reduce the level of imports from outside the union, thus saving foreign exchange.

2.6.2 Welfare Effects

Across the globe, there is a fierce debate about the merits of regional trading agreements. While some herald such agreements as stepping stones towards worldwide free trade, others fear that these initiatives will be stumbling blocks, acting primarily to divert trade from other countries to those countries receiving preferential treatment. Although these issues are essential for the future of the world's trading relationships, a number of obstacles prevent economists from reaching any consensus on the effects of preferential trading agreements.

The second-best nature of tariff liberalizations under preferential trading arrangements makes it very difficult to assess a priori whether the welfare effects from a preferential trading arrangement will be positive, even for the members of the arrangement. In addition, the empirical works fail to provide firm conclusions on even the most basic issue regarding preferential trading agreements: whether trade creation outweighs trade diversion (Clausing, 2001).

2.6.3 Dynamic Effects

The effects considered in the above subsection are purely static responses of producers and consumers in more general models to changes in relative prices owing to changing patterns of tariffs. Besides these effects, however, there are also a variety of potential dynamic effects. These may be felt more gradually but will be longer lasting and in some cases continued. First, there is the competition effect, brought about by freeing imports

from partner countries. Second, there is the investment effect, which appears when there are new foreign and domestic investments that have not occurred in the absence of regional trade integration. Third, the larger market provides greater possibilities for the exploitation of economies of scale. Fourth, there is an effect on capital formation, possibly through various channels: reduction on barriers to diffusion, technological transfer, externalities from export growth, rising marginal product of capital and so on. Fifth, the union members acting as a group may be more able to influence the terms of trade they face. Lastly, there is the structural transformation effect, which is a shift from traditional primary-products export to new industrial-products export.

In contrast to the static effect of regional trade integration, the dynamic effects are presumed to continue to generate annual benefits, even after the withdrawal of a country from the union .For instance, a rising in the growth rate made possible by integration will have continued effects provided that it is sustained5. They likely constitute stronger arguments for regional integration than the static arguments based on resource allocation arguments addressed above. More precisely, dynamic effects, if present, are likely to dominate static effects.

2.7 Empirical Evidences on Regional Trade Agreements

There are large numbers of empirical findings applied to assess the effects of regional trade agreements which vary in approaches. Thus, for analytical purposes, it is useful to classify the findings on the topic according to the type of methodology they, approach to examine the impacts of regional trade agreements multi sartorial computable general equilibrium(CGE)or simulation approach, descriptive approach and econometric approach(gravity model and others) as well as the nature of data the employ.

2.7.1 Computable General Equilibrium (CGE)

CGE is one of techniques to investigate the effects of RTAs. There is a large body of empirical literature that uses economy wide, multi-sect oral or multi countries computable general equilibrium (CGE) models to analyze the welfare impacts of RTAs.It 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. These models incorporate information about levels of protection not only in RTA members but also in nonmembers. Simulation of these models accounting to some extent for the overall effects of regional integration arrangements attributable to extra-regional levels of protection Lucian Cernat (2001).

There are large numbers of ex ante CGE studies of trade agreements (Anderson et al.2005 ,Brown and Stern,1998a Brown et al.1992;Haaland and Norman,1992 Robinson and Thierfelder (2002);).More recently, Hertl and Keeney(2006) recently reviewed these studies and generated two general conclusions:

RTAs increase welfare of the member countries and the rest of the world, and
Aggregate trade creation is much larger than trade diversion. Although the CGE models have been influential in analyzing the welfare effects, their empirical limitations have been highlighted. First, the CGE studies have been prospective rather than retrospective (Krueger 1999). Second, the sectoral aggregation does not allow analysis of specific markets .Policy information is often outdated, and baseline scenarios are unrealistic and based on older data (McKitrick 1998; Gunter,Cohen and Ackerman,2005;Kehoe,2003; Lofgren,2005). This reflects the growing concern about their poor performance and the fact that their results are highly sensitive to the assumptions made-which often do not capture key features of the structure of the economies being analyzed. It also reflects the fact that CGE model often have weak economic foundations. Hence, the results of CGE studies are sometimes questionable in some cases.

2.7.2 **Descriptive approach**

A descriptive method is also one of the approaches followed in the literature to analyze the impacts of RTAs (Anderson and Norheim 1993; Yeats 1998; dell' Aquila, Sarker, and Meilke 1999).

These studies use various indicators to measure the regional concentration of trade. A recent study by Yeats (1998) provides empirical evidences of trade diversion in

MERCOSUR. The descriptive approach implicitly assumes that the share of trade occurring with partner countries would not have changed in the absence of the agreement. This method depends on a static framework and the results are dependent on the level of aggregation. Consequently, changes in the terms of trade due to changes in the relative trade importance of members and outsiders, as well as declines in the volume of trade for a single commodity included in the broader class, cannot be detected (Dell' Aquila, Sarker, and Meilke 1999).In addition, the descriptive approach lacks the ability to analyze trade creation and diversion effects and, hence, the welfare implications of RTAs. (Jayasinghe and Sarker 2004).

2.7.3 The Gravity Model

Developing an accurate counterfactual of Ex post studies of how much trade would have increased in the absence of a given free trade agreement or customs union has proved difficult. For instance, Balassa (1967, 1975) constructs a counterfactual of how trade would have changed in the absence of European integration by calculating pre-integration income elastic ties that were assumed to continue post-integration.

It was later exhibited, however, that income elastic ties vary substantially pre- and post integration, making these results sensitive to the sample period. Some (including Frankel and Wei, 1995; Frankel and Kahler, 1993; Frankel, 1997; Krueger, 1999; Aitkin, 1973; Aitkin and Obutelewicz, 1976; Willmore, 1976) apply gravity model to assess the impact of preferential arrangements on trade flows8. Schwanen (1997) undertakes a comprehensive study of changes in Canadian trade patterns, considering the effects of both CUSFTA and NAFTA between 1989 and 1995. He compares trade in sectors that have been liberalized by these agreements to trade in other sectors, finding that trade growth with the United States was much faster in liberalized sectors.

Helliwell et al (1998) use two types of evidence in their approach to assess the impact of the FTA on inter provincial trade. First, they develop a gravity model to explain inter provincial and province-state trade flows. Then, they analyze new industry-level data to estimate the extent to which tariff changes in Canada and the United States help explain inter-industry differences in the growth of inter provincial trade. At the aggregate level,

their results show that the FTA increased north-south trade relative to east west trade. After adjusting for appropriate factors, the gravity model suggests that in 1996, inter provincial trade would have been 13 percent higher than it actually was if the1988 trade structure had remained unchanged. However, since the FTA also affected the provinces general economic growth, it is hard to calculate the FTA's net effect on the overall 15 percent increase in inter provincial trade between 1988 and1996.

The disaggregated results of Helliwell et al (1998) suggest that the FTA-related reduction in Canadian tariffs led to increases in imports from the United States and to reductions in inter provincial trade. On the other hand, reductions in U.S. tariffs led to increases in exports to the United States and to increases in inter provincial trade. Overall, the authors calculate that FTA- induced tariff cuts led to reductions in inter provincial trade by about 7 percent, only about half of the total reduction previously calculated with aggregate data.

Regional dummy variable (inter and extra) have been used in gravity models (using ex-post 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.

However, the existing empirical literatures on the topic exhibit that most of the researchers' findings are based on aggregated data level .Nonetheless , there is firm argument that estimation relied on aggregated data could mask changes that may be occurring at disaggregated level. In addition, the use of more disaggregated data allows one to exploit the variation in the extent of tariff liberalization under the agreement without utilizing such variable. It is difficult to identify the effects of tariff liberalization on different sectors. Thus, sectoral variation could make a difference in the welfare outcome.

Realizing this deficiency in the existing literature on the topic, using a simple supply and demand Frame work specification analysis, Clausing (2001) employ data at the commodity level and the results indicate that CUSFTA had substantial trade creation

effects, with little evidence of trade diversion. Further, he argues that unlike the approaches of many previous studies of preferential trading agreements that have relied on aggregate data, disaggregate data are used to analyze how actual tariff changes affect trade flows. Without utilizing the variation in the extent of liberalization across goods, it would be far more difficult to distinguish the effects of an agreement from other influences affecting trade flows. Here, the current study agrees with the above notions.

Similarly, Jayasinghe and Sarker (2004) conduct a study that analyze trade creation and trade diversion effects the North America Free Trade Agreement (NAFTA) on trade of six selected agri food products from 1985 to 2000. Their investigation estimates an extended gravity model using pooled cross –sectional time –series regression and generalized least squares methods .As a result, they find that share of intra regional trade is growing with in NAFTA and that NAFTA has displaced trade with the rest of world . Using panel data econometric models analysis applied to highly disaggregated trade data, Milner and Sledziewska (2005) come out with the result that shows the European Agreement had transitory but significant trade diverting effects for Poland's import; the trade diversion substantially dominating the trade creation.

The panel gravity model for trade has often been estimated without taking account of the effects of past trade and income on current trade flows. However, there are numerous economic reasons that show trade is dynamic process. As a remedy for the observed weakness of static panel gravity model, Bun and Klassen (2002) apply a dynamic panel model by extending the static model with lagged repressors incorporating lags of trade and income. Consequently, using a panel of 221 annual bilateral OECD trade flows over 48 years, they explore that the dynamics are Significant and note that static models are misspecified

3 THE PERFORMANCE OF REGIONAL TRADE INTEGRATION IN COMESA

3.1. COMESA OVERVIEW

The Common Market for Eastern and Southern Africa (COMESA) is a regional organization of 20 sovereign African member states which have agreed to promote regional integration through trade development and to develop their natural and human resources for the benefit of all their citizens. They comprise a disparate group in terms of economic size and geography. Eight COMESA members are landlocked – Ethiopia, Burundi, Malawi, Rwanda, Swaziland, Uganda, Zambia and Zimbabwe. Four COMESA members are island states – Comoros, Madagascar, Mauritius and Seychelles, although Madagascar has been named "the fifth continent" due to its size and biodiversity. One COMESA member, Swaziland, is surrounded by countries that are not members of COMESA, while two countries that are not members of COMESA (Tanzania and Mozambique) are largely surrounded by COMESA members.

COMESA was established in Dec. 1994 to replace the Preferential Trade Area for Eastern and Southern Africa (PTA), which had been in existence since 1981.Currently 13 of them, are members of FTAs. Nine of the member's states formed a free trade Area (FTA) in Oct. Four additional members have been joined the FTA at different time since its establishment. Rwanda and Burundi joined in (2004) Libya and Comoros in (2005) and (2006) respectively. Among these 20 members of COMESA countries 10 members are also members of the southern African Development Community (SADC).This implies overlapping of membership in this two blocks and others. Table 2.1 and 2.2 in appendix

Furthermore COMESA is the largest and most recent economic community with total Area of 13,239,120.00 Sq.km spanning a large part of the African continent. Population of more than 464.00 million and an estimated GDP of 530.00 billion in a current US$(304 at constant 2000 US$) Table.3 appendix A

COMESA members not in the FTA that have reduced their tariffs vis-à-vis other COMESA members by at least 60% are eligible for preferential tariff rates when their goods enter FTA members' markets. All six of the COMESA members not in the FTA

have done so, and have therefore been granted preferential access into FTA member countries' markets.

Rules of origin in the COMESA agreement are less stringent than those for many other FTAs. Goods qualify for preferential access if at least 40% of materials or 35% of processing takes place in the region. The imposition of rule of origin is to reduce trade deflection (www.comesa.com).

Agriculture is important economically for COMESA members and therefore occupies a prominent place in the COMESA programme. Agriculture accounts for 32% of the region's GDP, provides a livelihood to about 80% of the region's labour force, accounts for about 65% of foreign exchange earnings and contributes more than 50% of raw materials to the industrial sector. There are large differences between countries, however, with the agriculture sector accounting for 17% of GDP in Egypt and Zambia, and 58% in the Democratic Republic of Congo. Productivity in the sector also varies widely between member countries, ranging from USD 138 per agricultural worker in Malawi to USD 1 189 in Egypt. Capitalizations in the agricultural sector is diverse, but generally low, ranging from less than one tractor per 1 000 agricultural workers in most COMESA countries, to 11 tractors per 1 000 agricultural workers in Egypt.(WDI).

Agriculture is therefore a key sector in the COMESA agreement. The aim of COMESA's agricultural sector programs is to enable sustainable food security. COMESA supports projects promoting marketing of agricultural products, irrigation development, food security and agricultural research and technology.

The primary objectives of COMESA as stated in the treaty are:

- Creation of a Free Trade Area among member states (achieved in the year 2000);
- Establishment of a Common External Tariff among member states by the year 2008;
- Facilitation of the removal of structural and institutional weaknesses of member states so that they are able to attain collective and sustained development.

COMESA members span a large portion of the African continent. Some have difficulty of accessing other's markets for physical and geographical reasons.

Eleven of the 20 COMESA members are least developed countries. COMESA's exports account for less than 1% of world trade. Agriculture is important for COMESA countries, as 21% of their exports are in agricultural goods. A free trade area was established in 2000 between nine of the 20 COMESA countries. Trade within COMESA is low, accounting for only 7% of total trade of the region, although trade within the region in agriculture has risen since its inception to equal 15% of total agricultural exports (Korinek and Maltose (2009)).

3.1.1 Main **Objectives of COMESA**

The COMESA Treaty, which sets the agenda for COMESA, covers a large number of sectors and activities. However, the fulfillment of the complete COMESA mandate is regarded as a long-term objective and, for COMESA to become more effective as an institution, it has defined its priorities within its mandate, over the medium term, as being Promotion of Regional Integration through Trade and Investment. A key area targeted for investment and development in the COMESA treaty is agriculture.

The role of the COMESA Secretariat is to take the lead in facilitating regional development and assist member States to make the adjustments necessary for them to become part of the global economy.

COMESA seeks to become a fully integrated, internationally competitive regional economic community; a community within which there is economic prosperity demonstrated by high living standards of its people with political and social stability; a community within which goods, services, capital and labour move freely across national geographical borders. For more information on COMESA, visit www.comesa.int.

3.1.2 The **Role of Agriculture in COMESA**:

COMESA Member States are cognizant of the critical role that agriculture plays in their national economies. Article 129 of the COMESA Treaty seeks to promote cooperation among member States in developing the agricultural sector. Agriculture is considered to

be the engine for economic development in the COMESA region. The sector accounts for more than 32 per cent of COMESA's gross domestic product (GDP), provides a livelihood to about 80 per cent of the region's labour force, accounts for about 65 per cent of foreign exchange earnings and contributes more than 50 per cent of raw materials to the industrial sector.

3.1.3 Constraints to Agricultural Development in COMESA

While the majority of the citizens of COMESA derive livelihood from agriculture, the sector's overall productivity is low. The main challenges to enhanced agricultural development and competitiveness in COMESA are market-related challenges, technological obstacles and policy constraints that leading to low agricultural productivity resulting in food insecurity.

In order to raise the competitiveness of the COMESA region's agricultural sector, the organization has in place a number of initiatives at different stages of implementation. These initiatives are in line with the aspirations of the COMESA treaty which seeks promotion of cooperation and co-ordination of regional agricultural policies, food security responses, product marketing, research and development, plant and animal disease and pest control, training, irrigation development, and exploitation of marine and forestry resources.

3.2 Empirical Evidence on Regional Trade Agreement in Africa and COMESA

Since attaining independence between the 1950s and 1960s, almost all African countries have embraced RTAs as means to enhancing policy credibility and accelerating trade to overcome the economic disadvantages of fragmentation of its many small-nation economies. Today, there is no country in Africa that is not a member of at least one regional economic group. As reflected in their number, both in the continent (14 at the last count) and world-wide, RTAs continue to occupy a centre-stage in the economic agenda of countries. Babatunde Omilola, (2009).

In addition to agreements at regional levels, attempts have also been made to create continent-wide economic co-operation and integration among African countries. The

OAU Summit of 1980, which led to the birth of Lagos Plan of Action and the Final Act of Lagos, was the first effort towards this goal. It led to the signing of the African Economic Community Treaty (or The Abuja Treaty) in 1991. The broad aim of the Treaty was to establish a single market in the continent by 2025. Furthermore, the Abuja Treaty announced more specific phases for creating and/or strengthening economic integration at the sub-regional level. In particular, its ultimate objective of a continent-wide integration was to be achieved through the building blocks of the lower level RTAs. The treaty anticipated that one RTA would exist in each of Africa's five sub-regions (i.e., Central, Eastern, North, Southern, and West). These challenges can be seen to have culminated into the creation of the African Union Commission.

There are huge empirical works that analyze the impacts of regional integration in African context. For example; 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, overlapping membership, policy harmonization and poor private sector participation.

The study by Chauvin and Gaulier (2002) was motivated by the SADC launch of the regional tariff schedules phase down as part of the implementation of the regional trade protocol.

Khorana et al (2007), using a partial equilibrium model, assessed the implications of the transitional measures for products sensitive from the Ugandan perspective. The simulation results question the underlying rationale for these arrangements. They also discuss whether the regional trading arrangements confer any real benefits on the stakeholders and suggest alternative approaches that may increase the benefits for Uganda from trade liberalization within the customs union .At this juncture, in depth analysis of specific regional bloc would be worthwhile because the existing empirical

findings on the effects of regional economic integration on partner nations' trade flows may vary from one region to other regions even with in Africa .

3.3 Problems and prospects of Africa Regional Trade Integration

Relatively high external trade barriers and low resource complementarily between member countries, overlapping of membership, lack of harmonization and policy coordination, poor private participation Small market size, poor transport facilities and high trading costs etc are some of the main problems facing African's regional trade integrations. Due to the problems mentioned above most Regional trade arrangements (RTAs) in Africa have been ineffective in promoting intra and extra trade of the region and also ineffective in attracting foreign direct investment to the region. Simply these make it difficult for African countries to reap the potential benefits of RTAs. To increase regional trade and investment, African countries need to undertake more broad-based liberalization and streamline existing RTAs, supported by improvements in infrastructure and trade facilitation. Early action to strengthen the domestic revenue base would help address concerns over revenue losses from trade liberalization.

Since one of variable of interest of this paper is to show the problems of overlapping of membership of COMESA and SADC for the illustrative purpose the study examine problems of overlapping of these two regions .Surprisingly ten of twenty COMESA members are also member of the SADC block and ten again member of CBI at the same times. Namibia is a member of all four blocks in table 4.1 in A appendix. Clearly this implies that many African countries are member of more than one regional group.

There are controversial arguments on overlapping of membership member countries. Some arguments states that overlapping of membership is beneficial for members in the such a way that it allows countries to integrate on various fronts, with some moving faster than others, to optimize benefits from integration and to create optimal economic spaces to coordinate and harmonize national policies and strategies in sub-regions and eventually in the entire regions. In contrast other arguments state that the difficulty posed by overlapping .ECA policy research report,(2004)explains that overlapping of

membership leads to wasteful duplication of efforts, and counterproductive competitions among countries and institutions. Moreover it adds burdens to member countries in such a way that countries belongs to two or more regional groupings not only face multiple financial obligations, but also required to cope up with different meetings, policy decisions, instruments, procedures and schedules.

3.4 Empirical evidences on COMESA Agricultural trade:

There are only few studies on the impacts of regional trade agreements on agricultural products in this region. Among the studies which empirically analyzed intra-trade in COMESA region is one by Korinek and Melatos(2009) used the gravity model on a panel data set containing annual trade data for55(3 digit SITC) agricultural products of three regional trade agreements including COMESA and found overall trade creating effects on agricultural products .According to their findings intra-COMESA trade was found to have increased as the result of the formation of FTA but the extent of trade creation was low compared with the coefficients of AFTA or intra-MERCOUSOUR trade. The study by Korinek and Melatos(2009) employed an OLS estimation of the gravity equation which is inconsistent because of Heteroscedasticity, and bias as it omits zero trade flows.

Tembo and Jayne (2009) used the gravity model and 11 years data on Zambia one of the COMESA member country and 12 major intra-SADC trading partners to estimate agricultural trading relationship and home bias ratios. They found mixed results. It is trade creating with few SADC members such as Malawi and South Africa but trade falls with Angola and Botswana.

3.5 Revealed comparative advantage

There exist mainly two prominent theories of trade based on comparative advantage: the Ricardian theory and the Heckscher-Ohlin (H-O) theory. The Ricardian theory assumes that comparative advantage arises from differences in technology across countries while the H-O theory suggests that technologies are the same across countries. Instead, the H-O theory attributes comparative advantage to cost differences resulting from differences in factor prices across countries. Utkulu and Seymen (2004)

According to the H-O theory, a country's comparative advantage is determined by its relative factor scarcity (i.e. its factor endowment ratios, relative to the rest of the world or a set of countries).

However, it is well known that measuring comparative advantage and testing the Hecksher-Ohlin (H-O) theory have some difficulties (Balassa, 1989: 42-4) since relative prices under autarky are not observable. Given this fact, Balassa (1965) proposes that it may not be necessary to include all constituents effecting country's comparative advantage. Instead, he suggests that comparative advantage is "revealed" by observed trade patterns, and in line with the theory, one needs pre-trade relative prices which are not observable. Thus, inferring comparative advantage from observed data is named "revealed" comparative advantage (RCA). In practice, this is a commonly accepted method to analyzing trade data. Balassa (1965) derives an index (called the Balassa Index) that measures a country's comparative advantage. The Balassa index tries to identify whether a country has a "revealed" comparative advantage rather than to determine the underlying sources of comparative advantage. However, since first suggested by Balassa (1965), the definition of RCA has been revised and modified such that an excessive number of measures now exist.

Some studies measures RCA at the global level (e.g. Vollrath, 1991), others at a sub-global / regional level (see Balassa's original index), and while some others evaluates the measurement as bilateral trade between two countries or trading partners (e.g. Dimelis and Gatsios, 1995).

In this paper order to take a closer look at the products that are traded and FTA's effect on their Composition, an analysis follows of revealed comparative advantage (RCA) based on the global level of Vollrath (1999) was employed. The RCA uses actual trade flows to ascertain the comparative advantage of exporters in agricultural products. The RCA of country i for product j is measured by the item's share in the country's exports relative to its share in world trade. The index ranges from zero to infinite and has a simple interpretation. If it is less than unity this implies the country has a revealed comparative disadvantage in the product, if it exceeds unity the country has a revealed

comparative advantage. The measure was first developed by Balassa (1965) and has been employed in numerous policy related studies including efforts to assess prospects for the success of regional trade arrangements (Yeats 1996).It measures indirectly the positive impact of trade liberalization and expansion .The RCA in theory provides an index measure of changes in comparative advantage. The RCA_{ijt} is defined as follows

$$RCA_{ijt} = \left(\frac{xij}{Xit}\right) \Big/ \left(\frac{x*wj}{X*w}\right)$$

Where the variables ijt, it, x and X represent the value of exports of product j from region (or country) i and total exports of all products from region (or country) i at time t respectively. The variables x^*_{wj} and X^*_w represent the value of world exports of product j and total world exports both exclusive of the exports of region (or country) r. The RCA ranges from zero to infinity. Values above unity reflect a comparative advantage while values below unity reflect a comparative disadvantage (Yeats, 1998).

COMESA countries' export product specialization is particularly strong in agricultural goods that

Make up a minor share of world trade flows in agriculture. COMESA countries have high revealed comparative advantages in agricultural products such as coffee and tea live animals Vegetables and fruits etc .Since the data for RCA extracted from United nations comtrade databases is not actual data rather it is an index .This study categories this index in to two dummy variables to capture comparative advantage (HRCA) and comparative disadvantages(NRCA) to capture agricultural products these have no comparative advantages depending on the Yeats,1998 definitions. If COMESA countries have RCA index below one for some agricultural products, then these countries have relative comparative disadvantages. According to the Ricardian relative comparative advantages countries should import goods with which they have no RCA rather than producing it at home .The opposite will be true if a country has a RCA.

4 EMPIRICAL METHODOLOGIES and MODEL SPECIFICATION:

4.1 Methodology and Data Sources

This study employed both descriptive and empirical methods to analysis of the impacts of RTA on agricultural trade in intra and ex-trade COMESA countries. The study also dominantly depends on the secondary data sources from different international websites, like: United Nations COMTRADE database 2012, (www.wits.worldbank.org,www.trademap.org) world trade map (www.tradmap.org) World Development Indicators(WDI),World Bank, UNCTAD . (www.comesa.int). Publications, journal such as world fact book, etc. and different research papers, ministry of trade (MOT) Ministry of Finance and Economic Development MOFED ; Ethiopian Revenue and Customs Authority (ERCA).

In addition the study employed augmented gravity model using panel data approach. The gravity model is a popular formulation for statistical analyses of bilateral flows between different geographical entities. The gravity model is originally, introduced by Isaac Newton in (1687) in the fields of physics "low 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 products of the masses of the two objects divided by the square of the distance between them.

In the same fashion 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. According to this model, flows of export between two countries are explained by their economic sizes (GDP or GNP), population and direct geographical distance between the countries. Based on Newton's law of gravitation, the gravity model in economics 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 addition this study will use panel data from period 2001-2010. The reason to use panel data is that a panel data set contains repeated observations over the same unit collected

over a number of periods. The availability of repeated observations on the same units allows specifying and estimating more complicated and more realistic model than a single cross-sectional or a single time series would do. An important advantage of panel data compared to time series or cross sectional data set is that it allows identification of certain parameters of questions without the need to make restrictive assumptions. The disadvantages are more of a practical nature (Verbeek (2008)). It is failed to employ disaggregate data for analyzing the effects of regional economic integration on trade. This indicates a limitation of model's dependence up on aggregate data as opposed to disaggregate data which can help in analyzing the effects of trade agreements on specific tradable commodities and helps member countries to identify sectors which are advantageous in joining the trading bloc. In addition, aggregate data masks commodity level heterogeneity, which may also bias the estimate.

In recent years, there has been a growing interest in the specification and estimation of econometric relationships based on panel data. This interest can be explained by the fact that panel data offer researchers extended modeling possibilities as compared to purely cross-sectional data or time-series data. It also offers opportunity for controlling unobserved individual and/ or time specific heterogeneity, which may be correlated with the included explanatory variables. Panel data are generally more informative, and they contain more variation and less collinearity among the variables. The use of panel data results in a greater availability of degrees of freedom and hence increases efficiency in the estimation. Panel data also allow for the specification of more complicated behavioral hypotheses, including effects that cannot be addressed using pure cross-sectional or time-series data (Hsiao 1986, 2003, 2005; Baltagi 2001, Gujarati, 2003, Woolridge (2002), Klevmoarken(1989) Greene (2005), etc). Listed several benefits for using panel data, such as it increases the precision of parameter estimates, allows sorting out model temporal effects without aggregation bias.

Therefore, using panel data approach at sect oral level is hardly practiced in Africa. As elaborated earlier, this lead to a biased estimate and hence incorrect inferences. Clausing (2001) and Romalis (2005) eliminate some of these problems by using commodity level data.

Therefore, this study will use gravity model with panel data in order to avoid heterogeneity in investigation of the trade impact of regional Trade Agreements in COMESA region on agricultural products at product level as well as at aggregated level.

4.2 Data Descriptions

All 20 COMESA member countries and 60 non-COMESA trade partners including most of the SADC members for bilateral agricultural trade for period 2001 to 2010 is covered in this study. Naturally it is impossible to get all export data for all countries included in the sample during the period specified. Due to some missed values for few countries the data employed in the study is unbalanced. There are 10781 observations and ten year annual export, 80 countries are included. The study also included ten agricultural products by their HS code classifications depending on SITC version 3 at the HS2-digit level. Calculation of Revealed comparative advantage for agricultural products (RCA) has been derived from the United Nations Comtrade data base (UNCOMTRADE). Data on constant 2000 US$ GDP, country size and country population was obtained from the World Bank's World Development Indicators (2011) Data for the standard covariates distance, contiguity, common language, colonial ties, Landlocked countries, are taken from the Centre d'Etudes Prospectives et d'Informations Internationales-(CEPII)geo-distance dataset(Mayer-and-Zignago-2006) (http:\www.cepii.fr/anglaisgraph/bdd/distance.htm.It incorporates country-specific geographical variables for 225countries in the world, including the geographical coordinates of their capital cities, the languages spoken in the country under different definitions, a variable indicating whether the country is landlocked, etc.

4.3 THE GRAVITY MODEL

The analysis of this paper is based on the estimation of gravity model which has been applied extensively to explain the bilateral and multilateral international trade flows for about half a century. Understanding the theoretical and empirical back ground of the gravity model provides a unique contribution to the literature of international trade. This section is reviewing the theoretical and empirical foundation of gravity equation. The

gravity model has become an important tool in the analysis and simulation of international trade flows.

$$FIJ = G.\frac{MiMj}{Dij2} \quad \text{----------(4.1)}$$

Where notation is defined as follows;

Fij is the attractive force.

Mi and Mj are the masses.

Dij is the distance between the two objects.

G is a gravitational constant depending on the units of measurement for mass and force.

The gravity equation has been used to explain economically the ex-post effects of GATT/WTO membership, RTAs, Currency Unions, migrate flows, FDI between countries Disasters and other measures for about half century. The equation was first proposed by a Dutch economist and noble laureate, Jan Tinbergen. He was trained in physics so he thought about the trade between countries as a similar to the force of gravity between objects. Newton's universal law of gravitational force states that objects with larger mass, or that are closer to each other, have a greater gravitational pull between them. The basic intuition for the adoption of the law is that bilateral trade flows between two countries depends directly on the products of the level of economic activities in the two countries and indirectly as the square of the distance between them. Tinbergen gravity equation for trade that countries with larger GDP's, or that are closer to each other, have more trade between them. The traditional Tinbergens' gravity model designed for international is presented below.

$$Tij = A.\frac{(MiMj)B1}{DistjB2} \text{.....(4.2)}$$

Where: Tij is the value of bilateral trade between country *I* and *j*, Mi and Mj are country *I* and*j's* respective national incomes, distij is a measure of the bilateral distance between the two countries and *A* is a constant of proportionality.

The multiplicative nature of the gravity equation means that we can take natural logs and obtain linear relationship between log trade flows and the logged economy sizes and

distances. Taking logarithms of the gravity model in equation (4.2), we get the estimable equation:

LnTij=A+ B1(Mi+Mj)+ B2+ Distij+ ϵ_{ij} ----------(4.3)

Where A, B1 and B2 are coefficients to be estimated. The error term ϵij captures any other shocks and chance events that may affect bilateral trade between the two countries.

Although a gravity model has been widely recognize for its empirical success at predicting bilateral trade, initially it lacked a strong theoretical background. Early gravity models applications including Beckerman (1956),Tinbergen(1962),Polyhonen(1963),and Linneman(1966) and Aitken(1973) applied to international trade provided little theoretical foundations for the gravity model. Due to the lack of this coherent theoretical foundation its application has long been controversial. Estimated results of empirical gravity equations suffer omitted variable bias due to the lack of a strong theoretical foundations(Anderson and Wincoop(2003).As a result ,the estimates cannot validly be used to draw comparative-static inference about the impacts of barriers on trade flows. This shortcoming has been addressed recently (Baier and Bergstrand 2001;Anderson and Wincoop 2003;and Feenstra 2002).

The first study that develop the theory is Anderson(1979),which derives a simple theoretical gravity equations from a framework of two countries under the assumption of complete specializations(i.e country produces a particular variety).In late 1980s the new trade theory with an assumption of monopolistic competition that is used to explains intra-industry trade was applied to endogeneing variety. Evenett and Keller(2002) and Wincoop(2003),assume each country has an endowment of its good. They also showed that (GM) is consistent with Hechser-Olin trade theory under perfect competition. Eaton and Kortum(1997) Kortum(1997) derived it from Ricardian framework while Deardorff(1998) From a Hechser Olin(H-O) respectively. Indeed Deardorff(1998) are argue that the gravity equation does not prove the validity of one theory or another, but it is the fact of life.

Krugman(1991) also formalized the role played by geographical proximity in the regionalization process in his seminal work. He analyzed how proximity could lead to production agglomeration and hence regional bas in trade flows. He showed that if a pair of countries has low transport cost or if

they are nearby countries they will tend to have high volume of trade than countries further apart. In addition, other variable have to be taken into consideration when measuring the cost of related to doing business at distance. Related to the effects of the transportation cost Linnemann (1966),Frankel(1997) identified shipping costs, time elapsed in transporting and cultural unfamiliarity. Moreover Rauch(1999) shoed differentiated products exhibited stronger geographical proximity effects than homogeneous products.

4.4 **Methodological Aspects**

In the literature on gravity models the emphasis was often placed on the relevance and importance of the certain policy variables on international trade instead of the intensity of trade purse. Among the most prominent examples are the studies by Rose(2000) on effects of having the same currency, MCallum's(1995) seminal work of the effects of border or the studies by Frankel(1997) and Egger(2004) on the effects of free trade arrangements. In terms of methodology, many applications have been used data average over longer horizons time. However, ignoring country heterogeneity can lead to high distorted estimates. Many recent papers discuss the relevance of the econometric tools used to estimate gravity equations. In this context, Matyas(1997,1998) proposed to include two set of country dummies(for exporting and importing countries). Egger (2000) among others show that a panel approach yields better results than a cross-section approach since it allows to capture the overall business cycle phenomenon faced by the trading partners and helps to disentangle time-invariant country-specific effects. These specific effects can be modeled as fixed or random. Matyas (1997) and Matyas (1998) argue that countries specific effects should be assumed fixed if the sample only includes a predetermined subset of countries, and random if we use a larger sample including any country at random.

This approach was also employed by Abraham and VanHove(2005) in a gravity model application to Asian countries and China. Egger and pfaffermayr (2003) showed, however that instead of having one dummy variable per country individual country pair dummies (fixed effects) and time dummies to control common shocks should be used to get efficient estimator.

Following the above convention, this paper selects all COMESA countries and trade partners randomly as mentioned above by Matyas. The augmented gravity model and is used in order to estimate the effect of regional trade agreements in COMESA region for the reason discussed above.

4.5 Zero-trade flows

The problem of zero-trade flows in gravity estimation has recently attracted much attention, and the use of sectoral or disaggregated trade data exacerbates the econometric issue of zero-trade flows William Power (2007). Zero trade and zero value trade which are less than reporting threshold appear frequently in sectorial and commodity trade data. Most studies on RTA effect using gravity model omitted zero trade flows since log of zero value is not defined. Helpman et al. (2006) ; Haveman and Hummels (2004);Sologa and Winters(2001) are among most recent studies examining zero trade are in their aggregate sectorial trade.

Santos Silva and Tenreyro (2006) argue convincingly that PPML estimation best controls for zero-trade flows, and Tenreyro (2007) has extended this approach to panel data.
This paper does not yet employ PPML. However, making the right hand side (RHS) of gravity equation within log of the form lnxijt=(1+xijt), used to control for zero trade flows. In levels, the zero-trade flows create a probability mass at zero. However, omitting zero trade flows results in biased result. Since trade in some of COMESA countries are zero neglecting zero trade will bias the result. In order to avoid the problem this study included zero trade in the gravity model.

4.6. **Summary statistics for Transformed data**

Table 4.1 Descriptive Statistics

	lnXij	Lnpopi	lngdpi	lnpopj	lngdpj	lndist
Mean	10.31086	16.57737	22.90715	16.58956	23.94841	7.683357
STD.DEV	5.320362	1.561948	1.456799	1.605463	2.585326	0.9864869
Variance	28.30626	2.43968	2.1222264	1.577512	6.683912	0.9731564
Coeff,CO(CV)	0.51599595	0.094221701	0.063595821	0.096775502	0.107953973	0.12839269
Skewness	-0.9205495	-1.472097	0.3727089	-0.9362164	0.4452123	0.2828363
Kurtosis	2.727298	5.162094	2.82397	4.206552	2.376001	2.719949

Results:

The descriptive statistics related to the dependent variable and independent variables are shown in Table 4.1The statistics are inclusive of mean, standard deviation, and variance, coefficient of variations (CV), skewness and kurtosis. The CV (standard deviation / mean) for a single variable seeks to describe the dispersion of the variable in a way that does not depend on the variable's measurement unit.

The higher the CV, the greater the dispersion in the variable is. The CV for a model aims to describe the model matching the terms of the relative sizes of the squared residuals and outcome values. The lower the CV, the smaller the residuals relative to the predicted value are. Almost all variable records smallest CV as shown in table 4.1 above. This is suggestive of a good model fit (UCLA, 2009). Except log of population all data in logarithms are normally distributed and skewed around zeros. The calculated kurtosis for these data is also around 3 except that of populations meaning there is no surplus kurtosis. Since there are low variability and no surplus kurtosis using the transformed log is better way in this study. See figure 1 for normality of the transformed data using stata plot.

5 Empirical Analysis and Discussion of Result

5.1 The augmented gravity Model

This study uses the augmented gravity model to hypothesize the bilateral trade flows between countries as of Cheng and J.Wall (2005). According to the augmented gravity model bilateral trade is proportional to the trading countries gross domestic (GDP) and negatively related to the trade barriers between trade partners. Empirically works have provided a number of alternative specifications for the gravity model. The equation to be estimated is assumed to be linear in logarithms. In context of international trade the basic formulation of gravity model equation is as follows:

$$X_{ijt} = A_{ij}^{\beta 0} GDP_{it}^{\beta 1} GDP_{jt}^{\beta 2} POP_{it}^{\beta 3} POP_{jt}^{\beta 4} D_{ij}^{\beta 5} \epsilon_{ij} \text{----------} (5.1)$$

Where:

X_{ijt} is export of agricultural goods by country i to country j at time t ,GDP_{it} and GDP_{jt} are the Gross Domestic product of country i and j at constant 2000 US dollar of the exporter and importer at time t respectively, POP_{it} and POP_{jt} are the populations of the exporter and importer at time t, D_{ij} is the distance between the capitals of two countries, G_{ij} represents any other factors influencing trade between the the two countries such as common languages common colony etc and u_{ij} is the error term. T=1,2.....10

For the purpose of estimation, the model in Equation (1) is expressed in log form as:

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln Dist_{ij} + \beta_6 Clang + \beta_7 clny + \beta_8 Ccnly + \beta_9 Adji + \beta_{10} FTA + \beta_{11} InCOMESA + \beta_{12} Excomesa + \beta_{13} SADC + \beta_{14} LL + \beta_{15} HRCA_{ijt} + \alpha_{ij} + \epsilon_{ijt} \text{ ---------- } (5.2)$$

Population GDP of both countries and bilateral distances Variables are in real figures and expressed in logs and the error terms can be expressed as

$$\epsilon ijt = \alpha_{ij} + U_{ijt} \text{----------} (5.3)$$

With α_{ij} is as (fixed or random) unobserved bilateral effects and U_{ijt} as the remaining error.

Where $\ln X_{ijt}$= Denotes the value of real COMESA agricultural exports to intra and extra as well as to SADC block in period t measured in real US dollars. It is equal to ln(1+Xijt),in order to capture zero trade considered in this model.

Clang= is a binary variable assuming the value 1 if countries i and j share a common language and 0 otherwise, *ADJ*ij is a binary variable assuming the value 1 if countries i and j share a common land border and 0 otherwise, FTA_{ijt} is a binary variable assuming the value 1 if countries i and j have a free trade agreement and 0 otherwise at time t, Dist is a bilateral great circle distance in kilometers between capitals of country i and j , HRCA is a binary assuming the value 1 if COMESA countries have relative comparative advantage greater or equal to one ,zero otherwise, agricultural trade with revealed comparative disadvantage have been omitted to avoid perfect multicollinarity. In-COMESA is a binary variable assuming value 1 if both country i and j are member of COMESA PTA 0 otherwise, Ex-COMESA is also a binary variable assuming value 1 if importer is not member of the COMESA PTA 0, otherwise, LLij is a binary variable assuming 1 if country i is a landlocked country,0 otherwise, SADC is a binary variable assuming 1 if importer is a member of the SADC 0 otherwise, ε_{ijt} is assumed to be the log-normally distributed error term.

5.2 Hypothesis

Flow of trade is estimated to be positively dependent on GDPs.A high level of GDP indicates a high level of production in the exporting country which increases the availability of exports, and a high level of income (GDP) in the importing country suggests high imports, hence $\beta 1$ and β 2 are expected to have positive signs. The signs expected for population coefficients are unambiguous, and the literature has not tended to find a consistent sign for B3 or B4.Therefore the coefficient estimate for population of the exporting country can be positive or negative depending on whether the country export more when it is large in economic terms or whether a large country export less than the smaller one. The population coefficient of the importing country can also be positive or negative for similar reasons (see Martinez-Zarzoso and Nowak-Lehman, 2003). A large population indicates a large domestic market, high level of self-

sufficiency and less need to trade. Alternatively, a large population promotes division of labor and this means that there are economies of scale in production and opportunities as well as desire to trade with greater variety of goods. This is also supported by Oguledo and MacPhee (1994) that the effect of the population variables (for importing and exporting country on trade is indeterminate. Population size can be trade-enhancing as well as trade-inhibiting. A large population on one hand may indicate large resource endowment, self sufficiency and less reliance on international trade. It is possible on the other hand that a large domestic market or population promotes division of labour and thus creates opportunities for trade in a wide variety of goods, and in this case the coefficient of the population variables can be positive.

The other testable hypothesis from the theory is that the probability of an FTA is higher if the distance between the countries' economic centers falls. That is the coefficient of distance is expected to be negative because it is a proxy for transport costs (β_5 is expected to be negative).

Frankel, Stein, and Wei (1995, 1996, and 1998) also showed theoretically in a world with symmetric economies that two countries that are "natural" trading partners (i.e., close in distance) will benefit more from an FTA than two countries that are "unnatural" partners (far apart).

Because common language common colony, colony, Adjacency etc country pair variables is meant to capture cultural and historical similarities between the trading pairs, which are thought to increase the volume of trade and their expected sign is positive

Landlockdness (LLij):The essence of the variable is to capture if being a landlocked economy can adversely affect export growth. The dummy variable takes the value of one if the country is a land locked country zero otherwise as classified by UNCTAD(2004).The dummy variable reveals being a land locked country adds significantly to the cost of trading internationally or can adversely affect the performance of agricultural export. Therefore, the sign of the variable LLij, β_{14} is expect to be negative referring that the volume of agricultural export is low if the country is land locked.

Being a member of FTA may have positive or negative effects on bilateral trade between countries. Finally, the time dummies as indicators of the extent of "globalization," which is define as the purported common trend toward greater real trading volumes, independent of the sizes of the economies.

5.3 Model Specification and Goodness of fit

Various ways of estimations are employed for panel data gravity model specification: Pooled Ordinary-least squares (POLS) Model, fixed effect model (FEM), random-effects model (REM), feasible generalized least-squares (FGLS) panel estimation, and Tobit estimation etc. The use of different panel data methods, such as random or fixed (within) effect estimators, allows for various assumptions regarding trade flows to be analyzed and tested. One can think of POLS, FEM, REM all can be of the same model, having different assumptions about Cov(β_i, X_{it}) . There are different tests available for the selection of best model that fit our model. These tests include Hausman test, Breusch-Pagan test-test etc

In order to select the most efficient model the following test will prove some guidance.

Testing for non zero correlation between the unobserved effect and the repressor(s): FE vs. RE; Testing for the presence of an unobserved effect: RE versus pooled OLS is needed.

5.3.1The Pooled OLS Model

The pooled OLS is the simplest approach to the estimation of models in which Individual effects are fixed and common across economic agents, such that $\alpha i=\alpha$,for all i = 1,...,N or we use this model under the assumption that all coefficients are constant across time and individuals, we assume that there is neither significant country nor significant temporal effects, so we could pool all of the data and run an ordinary least squares (OLS) regression model

The OLS estimator exploiting within and between but not efficiently determined as OLS in the original model. This will be consistent under the assumption of zero expected error term and no correlation between explanatory variable (x_{it}) and constant terms (e_{it}).

5.3.2 Fixed effect VS Random Effects

In order to discriminate between the two models this study test for null hypothesis that the explanatory variables and the individual effects are uncorrelated using a hausman test.

Since individual effects are included in the regressions a decision should be made whether they are treated as random or fixed.

5.3.2.1. The Fixed Effects Model

Fixed effects regression is the model to use when you want to control for omitted variables that differ between cases but are constant over time. It lets you use the changes in the variables over time to estimate the effects of the independent variables on your dependent variable, and is the main technique used for analysis of panel data.

5.3.2.2. Random Effects Model

A random effects model can be more appropriate when estimating the flows of trade between randomly drawn samples of trading partners from a large population. In this case we just focus on arbitrary individuals that have certain characteristics and when we are not interested in the particular value of some variable's constant terms (a_i). The random effects model requires the explanatory variables to be independent of both error terms, namely the individual-specific error term and the time variant error term. Gujrati (2003) points out that because the random effects model does not estimate over n cross-sectional intercepts as it is the case in the fixed effects model, the random effects model is more economical in regards to the degrees of freedom.

However, the fixed effects model is known to provide more robust results in estimating a gravity model. The disadvantage of a fixed effects model is that it is not able to estimate time-invariant effects such as common border, common language distance etc.

5.3.3 Breusch-Pagan Lagrange Multiplier (LM) Test

In order to choose between the POLS and REM, Breusch and Pagan Multiplier Test must be conducted. The Breusch–Pagan LM statistic, tests the null hypothesis that the pooled OLS estimator is adequate against the random effects alternative. The test statistics is:

H0:$\sigma T = 0$, H1:$\sigma T \neq 0$

The ML statistics is $LM=\frac{NT}{2(T-1)}\left(\frac{(\sum_i(\sum_t^T \widehat{eit}))2}{\sum_i \sum_t \widehat{eit}2} - 1\right)^2 \sim \chi 2$-------(5.4)

If the null hypothesis cannot be rejected, data will be analyzed using POLS. If the null hypothesis is rejected, REM is the solution.

5.3.4 Hausman Test

The generally accepted way of choosing between fixed and random effects is running a Hausman test. Test Hausman (1978) has suggested a test for the null hypothesis that there is no systematic difference between the two models. Whereas alternative hypothesis is ai and x_{it} are uncorrelated and therefore RE is the correct model.

$$y_{it} = \alpha_i + x_{it}\beta + \epsilon_{it}: \quad (5.5)$$

Therefore in carrying out the estimation, the primary concern of many researchers is whether αi can be treated as uncorrelated with x_{it}. As is well known, random effects estimation will produce an efficiency gain over the fixed effects estimation if αi is uncorrelated with x_{it}; however, if this condition does not hold, only fixed effects estimation will produce consistent estimates. Hausman (1978) provided a test of Random effects versus fixed effects which in principle resolves the dilemma for researchers.

Statistically, fixed effects are always a reasonable thing to do with panel data (they always give consistent results) but they may not be the most efficient model to run. Random effects will give you better P-values as they are a more efficient estimator, so we should run random effects if it is statistically justifiable to do so.

According to this hypothesis a significance difference between the two estimators indicates that the null hypothesis is unlikely to hold. In general the Hausman test looks likes this (Hosny 2009):

$H = [\hat{\beta}_{FE} - \hat{\beta}_{FE}]` \; [Var(\hat{\beta}_{FE}) - var(\hat{\beta}_{RE})]^{-1} [\hat{\beta}_{FE} - \hat{\beta}_{RE}]$ and $\sim \times^2_k$-1----------(5.6)

In order to test whether FE or RE is the correct model in this study null hypothesis (there is no a systematic difference between FE and RE model or no random country specific effects or random time specific effects) have been tested against alternative hypothesis

(the there are random country specific effects or random time specific effects). According to the Hausman test the null hypothesis is not true because the p-value (0.5020) is larger than 5% which is insignificant. The Hausman test suggested that the appropriate Model or efficient model in this study is the Random Effects not the fixed effects. The interpretation of this model selection is that all factors that affects the dependent variables(X_{ij}) or bilateral export of agricultural products between COMESA countries can be summarized by a random error terms. These random variables can be time invariant factors which are not included in this study such as land area, gender structure, consumption pattern agricultural technological differences, differences in land quality, country-specific policies in support of agricultural sectors, etc .Detail results are presented in table 5.1

Table 5.1 Specification Tests

Spec.Test	Chi^2	Chi2,d.f.	P-value	Tested	Selection
Hausman test	14.31	15	0.5020	H0:corr(ai,xijt)=0,FE H1:H0 is not true	The test is insignificant we reject H0 in favor of RE.
Breusch pagan (LM)test	0.18	1	0.3377	H0:no RE	P is insignificant. We Fail to reject H0 Select OLS
F-test	19.97	9	0.000	Time fixed effects	Time effect is need.
Heteroscedasticity	155.246	15		H0: homoscedasticity vs H1:is not true.	There is Heteroscedasticity.
Heterosc.Wald test	2.8e+32	-	0.000	H0: homosc. vs H1:is not true.	Reject the null. there is Heteroscedasticity
Autocorr.DW.test	0.18	1	0.3377	H0:var(u)=0,no autocorrelation	P is signif.we fail to rejct H0.
Autocorr.Wool dridge test	0.028	1	0.8676	H0: no1storder autocorr.	Fail to reject H0.no 1st order autocorrelation.
Endogeneity Test(Hausman ivrege glse)	85.18	15	0.000	H0: no systematic difference in coeff.	No endogeneity problem.

Hausman test: H0.No RE H1: There is RE. Low p-value (5%) suggest H0 is true, High p-value (p>5%) H1 is true.

Breusch pagan test H0: OLS pooled is adequate model, H1: RM is the corrected model. Large p value favor RM. So the REM is the appropriate model for this study.

5.3.5 Test for serial Autocorrelation

Ignoring serial correlation when it is present results the result is still consistent but inefficient estimates of the regression coefficients and biased standard errors. So in order to increase the efficiency of this model autocorrelation has been tested using Durbin Watson test and Wooldridge 2002 test. After carrying the test the DW test the result is (1.9270563) which is approximately equal to 2.Since the number of observation is greater than 1000 the test will suggest that there is no serial autocorrelation in the Random Effects model. In addition according to the most recent and power full Wooldridge 2002 test we also fail to rejects the null hypothesis that says there is no first order autocorrelation because the p-value of the test is not significant at 5% and 10%Table4.1 and for detail.

5.3.5 Testing for Endogeneity

A standard problem in cross-section empirical work is the potential endogeneity of right-hand side (RHS) variables Baier and Berg strand (2005). If any of the RHS variables in equation (5.1) or (5.2) are correlated with the error term, ϵ_{ij}, that variable is considered econometrically "endogenous" and OLS may yield biased and inconsistent coefficient estimates. Arguably the main advantage of panel data is that such data can be used to solve an endogeneity variables problem. Endogeneity can be occurred if there are omitted variable, measurement error, simultaneity of the variables in the model etc (of...Wooldridge, 2002). The 2SLS estimator is less efficient (i.e. larger variance) than OLS when the explanatory variables are exogenous. Therefore, it is important to test for endogeneity test, in order to avoid using an IV estimator the most famous test is Hausman (1978). Many others are described in Nakamura and Nakamura (1998). The method of instrumental variables (IV) uses two-stage least squares (2SLS). If there is no endogeneity, it is more efficient to use OLS. If there is endogeneity, OLS is inconsistent and so 2SLS is the best alternative. In this study two stage least square (2sls) method was

used to test the presence of endogeneity. But since the study used disaggregated panel data there is no endogeneity problem in the model .The result of test is presented in table 4.1 below.

5.3.5 **Testing for Heteroscedasticity**

We can recall that OLS makes assumption that variance of error terms must equal, $V(\varepsilon i) = \sigma$ for all i. That is the variance of the error term is constant (Homoscedasticity).If this assumption do not meet there is a problem of Heteroscedasticity in the model. The problem of Heteroscedasticity arises from the violation of different assumptions, misspecification and omitted variables. If there is Heteroscedasticity the OLS estimator no longer BLUE. As Allison puts it: The reason OLS is not optimal when Heteroscedasticity is present is that it gives equal weight to all observations when, in fact, observations with larger disturbance variance contain less information than observations with smaller disturbance variance. In addition, the standard errors are biased when Heteroscedasticity is present. This in turn leads to bias in test statistics and confidence intervals. The Heteroscedasticity test for this study (Breusch-Pagan test for Heteroscedasticity: test value: 155.2464; p-value: 0.000) show that problems Heteroscedasticity is present. The null hypothesis (homoscedasticity) has been rejected in favor of Heteroscedasticity.

All models have been estimated using the Robust Variance -Covariance Matrix of White Huber "Sandwich" in order to correct for Heteroscedasticity and to obtain robust standard errors.

When Heteroscedasticity is present, the better solution proposed by different econometrician is robust standard error tending to be more trustworthy. As Allison points out, the use of robust standard errors does not change coefficient estimates, but (because the standard errors are changed) the test statistics will give you reasonably accurate p - values. The use of Weighted Least Squares will also correct the problem of bias in the standard errors, and will also give you more efficient estimates (i.e. WLS will give you estimates that have the smallest possible standard errors). But, WLS requires more assumptions and is more difficult to implement, so robust standard errors seem to be a more common and popular method for dealing with issues of heteroskedasticity.Based on

the above theoretical back ground the result presented in this study for analysis in all tables is rousted in order to solve the problem of Heteroscedasticity.

5.4 Results Analysis and Discussions

This study examines the effects of regional trade area or free trade area on trade in agricultural products within intra- COMESA countries and extra-COMESA countries using a panel data for the period (2001-2010). A panel framework has many advantages vis-à-vis the cross-section approach. First of all it allows disentangling country-specific and time-specific effects. In order to analysis the impacts this study employed random affects GLS model. .

As already explained under the model selection topic in this study paper there are both time fixed effects and random effects .According to Hausman test Random effects is an appropriate model to estimate the result for the augmented gravity model in this study. The result of the study presented in three different tables for appropriateness of discussions.

Table 5.2 presents final result of random affects GLS with robust std.errors variables including trend (all years as one variable trend) as follows

Table 5.2. Result of the Random Effects GLS Robust std.errors

Variables	Aggregate	Live.Animals	Dairy pr	Coffee&Tea	Cererals	Vegtable &fruits
CONSTAN	-290.9032 *** (34.47978)	-454.9661 *** (121.4379)	-698.2438 *** (133.5979)	-111.9484 (77.98622)	-260.2042*** (87.56305)	-462.5136*** (77.63372)
LNPOPI	-.0495308 (.0537267)	.2657614 (.2646419)	-.1906452 (.231101)	.05668 (.1895229)	5874355 *** (.2024071)	.1088648 (.1653191)
LNGDPI	.3185422*** (.0631227)	-.0286104 (.2390275)	.0782534 (.3125268)	1.190888 *** (.2200426)	.7349646 *** (.2658146)	.4282265 *** (.1460253)
LNPOPJ	-.138253 *** (.0509044)	.2101665 (.2304486)	-.0754826 (.2188756)	-.5757471 *** (.1472607)	-.1791172 (.1286868)	-.176137 (.1184049)
LNGDPJ	.410787 *** (.0499648)	.1892416 (.2253023)	.042054 (.2161148)	.9562447*** (.1533744)	.2812077 *** (.1044668)	.6453182*** (.1066984)
LNDIST	-.9699106 *** (.075634)	-.9924912 *** (.3522507)	-.8556538** (.3917341)	-1.339438 *** (.1879175)	-1.612409 *** (.1907609)	-1.345848*** (.1683316)
COMLAG	.6341715*** (.1020926)	.1588979 (.4259852)	-.2297599 (.4287325)	.8224648 *** (.2504892)	.7028333 ** (.276901)	1.064342 *** (.2582638)
COLNY	.5959427** (.2342579)		5.037018 *** (1.508825)	1.277885 ** (.5581432)	.2826486 (.6472334)	-.8373494 * (.4754746)
COMCOL	.8781688 *** (.1275037)	-.6244782 (.470565)	1.694243*** (.4221311)	.9544716*** (.3241536)	1.721032 *** (.3862918)	1.132277 (.315385)
ADJI	1.000309 *** (.1449583)	.0448075 (.4785083)	1.831825*** (.4999007)	-.145199 (.3842621)	1.94612 *** (.4015423)	.7306439** (.3621772)
FTA	.317133 ** (.1428502)	-.1564362 (.547851)	-.7200381 (.4722182)	.7297969 * (.3852485)	.7165705 * (.4081194)	-.1660422 (.3447819)
INTRACOMES	-2.017689 *** (.2372632)	-1.59456 ** (.8120935)	-1.72872 ** (.8117508)	-2.892288*** (.5879249)	-2.253104 *** (.6592988)	-2.293279*** (.5518279)
EXTRACOMESA	.7894436*** (.2598236)	-.3136891 (1.06177)	-3.602932 ** (1.436088)	-.8963094 (.5828111)	1.592516 ** (.7963112)	1.379228 ** (.6329422)
LANDLOCKED	-.2464929* (.1314354)	-.5304764 (.4863408)	-1.688699 *** (.5370024)	.783239 ** (.3286569)	-.3163136 (.5380994)	-.543344* (.2970885)
SADC	-.9738692 *** (.1562473)	.1310804 (.5761855)	-1.042023 ** (.5068034)	-2.065725 *** (.4147766)	-.8127649* (.4390173)	-.6700991* (.3782044)
HRCA	3.688531*** (.092767)	3.699836 *** (.4066873)	3.433697*** (.552459)	3.432792 *** (.4280565)	2.399962 *** (.3989633)	3.732021 *** (.3943825)
Trends	.1459789 *** (.0173559)	.2326097 *** (.0609568)	.3569667 *** (.0668187)	.0453052 (.0392356)	.1344689 *** (.0443549)	.2278825 *** (.0389429)
R^2-- --Within	0.2286	0.1735	0.2798	0.338	0.2835	0.3672
R2 Between	0.1903	0.1796	0.1761	0.341	0.2935	0.3540
R2 Overall	0.2299	0.1693	0.2021	0.349	0.2861	0.3581
Wald chi2	4076.59	149.3	225.720	1156.23	789.16	1099.23
P-Value	0.000	0.000	0.0000.000	0.000	0.000	0.000

- Note

- All results are robusted to control Heteroscedasticity
- *,**,***, are levels of significance at 10%,5%,1% levels.
- Robust standard errors are reported in parentheses

The variables includes GDP, population of both importers and exporters four regional dummy, dummies for cultural and political similarities such as colonial ties, common border or adjacency, dummy for revealed comparative advantages (HRCA),common colony Contiguity FTA, SADC, intra and extra COMESA and landlockedness, adjacency. Column (2) reports aggregated result, column (3) to column (7) report disaggregate results.. Table 5.3 reports results in the same fashion but including all significant time series dummies .The coefficient for population of exporter country is negative in sign but it is statistically as well as economical insignificant both at aggregated and disaggregated level except for cereals. Ceteris paribus a 1% change in population of COMESA leads to circa 0.59% increase in export of cereals. In the same way Keeping other variables constant if population of importers grows by 1% export of agricultural products of COMESA countries on average falls significantly by circa 14% at an aggregate level as well as it falls significantly by 0.58% for coffee and tea at disaggregate level but insignificant for others. The justification may be as population grows per capita income importing country's population will reduces consequently demand for export good will may reduces. Theoretically the sign for population is ambiguous that means the sign of coefficient for population can be positive or negative. Martinez-Zarzoso and Nowak-Lehman,(2003) have found the same result.

On the other hand GDP of both exporter and importers captures the effects of economic size are strongly significant and with expected positive sign at aggregate and disaggregates level .It can be interpreted as ceteris paribus 1% change in GDP of exporting country will increases .32 percents in agricultural export in COMESA countries at aggregate level with statistically significant at 1% level and coffee, cereals and vegetables are also strongly significantly at disaggregate level see also figure 2(a) and (b) in appendix for positive relationship of GDP and growth in agricultural export. In the same way 1% in GDP of importer increases aggregate agricultural products by about .41 percents at aggregate level. The result is also positive at disaggregate level for

all products and significant for column (5)-(6) items at disaggregate level, reflecting economically larger countries are expected to trade more.Figure 2(a) and (b) shows the positive relationship of GDP and agricultural exports .

As it is already explained in literature distance is commonly referred to as a 'friction to trade. Therefore it is both expectation ally and theoretically should be negative coefficient in any econometric equations. In this study the elasticity of distance with respect to trade is negative as expected because it is a proxy for transport costs($\beta 5$ is negative as expected) and therefore are consistent with Anderson and van Wincoop (2003) and Feenstra (2004) Grossman's (1996) Frankel, Stein, and Wei (1995, 1996, and 1998) showed theoretically in a world with symmetric economies that two countries that are "natural" trading partners (i.e., close in distance) will benefit more from an FTA than two countries that are "unnatural" partners (far apart)and with a vast standard gravity models. The real magnitude of distance effect is (-0.97) percent in this specific study can be expressed as the lager is the distance between COMESA countries and their trade partners the less will be agricultural trade between them. The real effect was export of agricultural product within COMESA and extra COMESA falls by 0.97 percent for every 1% increase in distance between COMESA and Trading partners included in this study for aggregated agricultural products. The effects on disaggregated products are also negative but with high magnitude for certain products such as negative (-1.33) for coffee and tea, negative (-1.6) for cereals etc. The result is consistent with theoretical analysis of vast literatures. T. Bayoumi and B. Eichengreen have also found the same result in distances and other variables.

The variable landlocked is also negative as it is expected for all agricultural goods and it is statistically significant at aggregate level. Landlockedness is one of the main problems of COMESA countries. Eight of 20 COMESA countries are landlocked. COMESA countries are often difficult to access either because they are landlocked and/or due to lack of infrastructure between destinations, and border crossings are often time-intensive, leading to prohibitive time constraints since large number of borders have to be crossed.

The estimated result for sharing common border or contiguity common language colonial ties reflecting similarity among country is expected to have a positive relationship. Accordingly the result of this study reported in table 5.2 and table 5,4 all the variable familiarities are positive as expected and their coefficients are economically significant at 1% level suggesting that similarity between countries lead to more trade in agriculture. According to the finding of this paper COMESA countries are trading more coffee cereals and vegetables and fruits and live animals with each others with counties speaking the same languages. The percentage effects of the dummy variables are calculated following Halvorsen and Palmquist (1980). The model was estimated in logs. Thus the percentage equivalent for any dummy is: [exp(Dummy coefficient)-1]*100. Where, EXP. is the natural exponential functions. Thus for illustrative purpose , the coefficient estimated for the common language ($\beta 6$) in equation (5.2) and its coefficient in table 5.2 column (2) can be expressed as [(EXP($\beta 6$)-1)*100].Thus sharing common languages leads to rise trade in agriculture between COMESA countries and its partners by 88 percent[=(EXP(0.6341715)-1)*100 ≈88] .According theory common language reduces communication problems, thus boosting trade .Adjacency also reduces trade cost among neighbor countries .Adjecency(Ajit) dummy variables are found to be associated with higher trade[3]. If two COMESA countries are sharing common land border bilateral agricultural trade between them increases by about 172 percent [exp(1.000309) -1) ≈ 172 percent].The coefficient for Adjit(1.000309) is derived from table 5.2 column(2). This implies trade within COMESA is predominantly between countries that have a common border. The elasticity of adjacency is greater than one i.e. the variable is very sensitive and power full for border agricultural trade in this block or border matter for trade between

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3.Crossing a border involves not only fees but also other transaction costs, implying that countries that do not have a common border may incur a higher cost of trading with each other, as they have to ship goods through third Countries.

COMESA countries. These result is consistent with the findings of other studies such as Korinek and Melatos (2009), Jayasinghe and Sarker (2007) etc. In the same fashion common colony and colony both dummies have the expected sign at all estimation i.e.at aggregate and disaggregate level and statistically significant for most of the products traded.

The most common and straightforward method for estimating the effects of RTA in a gravity model is to include dummy variables for each RTA block in place during the sample period (for example, Frankel, 1997). Each of these dummies takes the value of 1 for an observation for which the two countries are members of the block, with the expectation that the coefficients on these dummies are positive.

Depending on the same convention in order to answer the important questions raised in introductory part of this study is that whether regional trade agreements or free trade area is a building blocks or stumbling blocks in the reform of agricultural trade in COMESA is to be answered here depending on the coefficients of dummies for Regional blocs such as FTA, intra-COMESA , Extra-COMESA and SADC .According to the vast literature on regional trade if coefficients of FTA is significantly positive we can conclude trade is created within the free trade area. According to the gravity model estimation presented in table 4.3 the coefficient (0.317133) is positive and agricultural trade increased by approximately 37 percents [(EXP(0.317133)-1)*100 ≅ 37] .The possible explanation for this finding may be that the tariff liberalization of FTA of COMESA countries made FTA members traded 37% more with each other than with non FTA members. This empirical evidence shows also that trade in agricultural products have diverted from non FTA to FTA members. Finally the finding of this study is that FTA is building block not stumbling blocks in agricultural trade in FTA of COMESA.

Table 5.3 . Random Effects Robust Estimation Result for Regional Agreements including trends

Variables (1)	Aggregat (2)	Live animal (3)	Dairy products (4)	coffee and tea (5)	Cereals (6)
FTA	.317133	-.1564362	-.7200381	.7297969 *	.7165705 *
	(.1428502)	(.547851)	(.4722182)	(.3852485)	(.4081194)
Intra- comesa	-2.017689	-1.59456 **	-1.72872 **	-2.892288***	-2.253104***
	(.2372632)	(.8120935)	(.8117508)	(.5879249)	(.6592988)
extra-comesa	.7894436	-.3136891	-3.602932**	-.8963094	1.592516 **
	(.2598236)	(1.06177)	(1.436088)	(.5828111)	(.7963112)
SADC	-.9738692	1310804	-1.042023**	-2.065725***	-.8127649*
	(.1562473)	(.5761855)	(.5068034)	(.4147766)	(.4390173)

Note:

- Standard errors are in parentheses,*,**,*** are 10%,5%,1% level of significance.
- Independent variable is log of Xijt=ln(1+Xijt)
- Result for som disaggregate is not reported here fot space consideration.

The positive effects of FTA imply that trade in agriculture shifts from non FTA COMESA members to FTA due to the reduction of tariff between FTA members. On the other hand the coefficient of Intra-COMESA dummy is negative and its real magnitude is approximately (-87) percent [(EXP(-2.017689)-1)*100≈-87 %].According to this result the agricultural trade within former preferential trade area reduced by 87% where as it increased by more than 37 % within newly formed FTA. Obviously most of the former PTA have becomes FTA members 13 of 20 PTA members are currently a member of FTA. Only 7 of former PTA countries (Ethiopia Uganda Swaziland Seychelles Democratic Republic of Congo etc) are left out newly formed FTA of COMESA countries. Therefore the diversion of agricultural trade is terms empirically and logically acceptable.

The other regional dummy is Southern African Development Community (SADC) has negative sign and statistically significant almost in all sub sectors in the result reported in

table 4.3. This dummy is included in this study paper to capture the problems of membership overlapping in region .About half of the countries in COMESA are also members of SADC block table 2.1 and 2.2 in the appendix. Due to the existence of this overlapping of membership trade in agricultural was reduced by more than (-62) percent [=(EXP(-0.9738692)-1)*100 ≈62.24] from COMESA countries to SADC regional block. Therefore overlapping of membership is one of the main problems of regional trade agreements in Africa.

Finally the empirical result for extra-COMESA trade in agriculture is positive and statistically significant for agricultural trade in aggregate but it is negative at disaggregate level for such as for live animals, dairy products, coffee and tea .According to this study Extra –COMESA trade in agriculture have increased by more than 120 percent [=(EXP(0.7894436)-1)*100 ≅120]. The study indicates that COMESA countries have more trade with non COMESA member countries. And it is consistent with realty of COMESA countries .Mostly COMESA countries produces and exports similar agricultural products. This condition forced them to trade more with non COMESA countries like Europe, USA and China etc.

The other coefficient of interest in this study is B15 (HRCA) which captures High Revealed comparative Advantages of agricultural products for COMESA countries. The data for this variable is extracted from UNCOMTRADE database 2012(www.wits.worldbank.org) in its index Forms. Since it is not the actual number using this data with others leveled percentage data can misled the result and inferences of the study. Accordingly this study divides the index in to two according to definition of revealed comparative advantages by Yeat1(998) which is discussed under the topic Revealed comparative advantages. The two dummies created to differentiate revealed comparative disadvantages and comparative advantage NRCA and HRCA respectively and finally NRCA is dropped to avoid multicollinarity. The aim of this variable is to measure the effects of RCA on agricultural products of COMESA countries and its consistence with the theory of Ricardian theory of comparative advantages.

The empirical result of this study for HRCA dummy is shown in table 4.2 and 4.4 and its coefficients is positive as expected and strongly significant at one percent for each agricultural sectors included in this study and it is positive and significant at an aggregate level too. According to the study comparative advantages in agriculture have increased by more than 3898 percent [=(EXP(3.688531)-1)*100 ≈3898.606] the study periods in general. For example the comparatives advantage of live animals has increased by more than 3944. % [=(EXP(3.699836)-1)*100≈3944.067] during this period, and by more than (2999.1) percent for Dairy products, more than (4076.343)percents for Vegetables and fruits etc. According to this flinging COMESA countries are advantageous if they trade agricultural good in which they have revealed comparative advantages (welfare of COMESA will increase if they do so.). Alternatively the result is negative if they trade agricultural goods with revealed comparative disadvantages. There will be little change in coefficients of all variables if time series are included (table 5.4 for detail).

The result reported in table 5.4 is another ways of reporting the result using random affects GLS with robust std.errors which includes statistically significant time dummies. The estimated results of independent variables reported in the table 5.4 are not much different from the reports in the first results table 5.2, both in magnitude and level of significance. But time dummies are reported individually to examine the effects of globalization on agricultural trade volume.

What is more interesting is that the regression result suggests a there is positive relationship between time trends and exports of agricultural trade products during the period intervals.

The time dummies in the study as indicators of the extent of "globalization," which can define as the purported common trend toward greater real trading volumes, independent of the sizes of the economies Cheng and Wall (2005); Christopher S. P. Magee

The interpretation is straight forward as other dummies interpretations .The study use first year as a base line for coma prism of effects. The impact of globalization was negative at the beginning of the FTA establishments (short run effect is negative).Year 2002 and 2003 are not economically significant. Therefore it is not reported in the table for space consideration. Generally globalization has a positive effects on the volume of

agricultural trade in COMESA regional block except in year 2005 and 2009.The negative effects in 2009 is clearly due to the world economic crises of 2008.As obviously known most developed countries have been followed a protection mechanism just aftermath. Surprisingly due to this crises agricultural export of COMESA countries have decreased by more than 250% compared to the 2008 (see Figure 5.1(a) and (b)).

Table 5.4 Random Effects GLS Result(including time series dummies)

Indep. Var	**Aggregate**	Live Animals	**Coffee and tea**
CONSTANT	.8556716 *** (1.334346)	-23.52341 (5.148462)	-22.20999*** (3.491232)
LNPOPI	-.042423 (.0531193)	-1.14681 *** (.2646557)	.0297584 (.1902669)
LNGDPI	.3172784 (.0629173)	1.489842*** (.2941846)	1.224196*** (.221532)
LNPOPJ	-.1416664 *** (.0508484)	.2287201 (.2496561)	-.5785634*** (.1480418)
LNGDPJ	.4134624 *** (.0497731)	1.000112*** .2615206	.9601153*** (.1534867)
LNDIS	-.9732474 *** (.0749665)	-1.652783*** (.4028148)	-1.342028*** (.1855431)
COMLANG	.6294245 *** (.1019474)	-.0032511 (.4803198)	.8210519*** (.2483813)
COLONY	.60674 *** (.2309086)	-.7221431 (.8448894)	1.27984** (.5600086)
COMCOL	.8806488 *** (.1265422)	.8072003 (.4691386)	.9630096*** (.3234004)
AJI	.9823489 *** (.1442385)	-.6752598 (.5798409)	-.1501804 (.3837579)
FTA	.2806896 ** (.1424871)	-1.411338 (.5004488)	.7083216* (.3858598)
INTRA-COMESA	-2.021295 *** (.2359492)	2.064705 (1.031593)	-2.897129 *** (.5851455)
EXTRACOMESA	.7556269 *** (.2589216)	-.0223356 (1.396913)	-.9222027 (.5810376)

LANDLOCKED	-.2487274 ** (.1303379)	-.5377327 (.5127203)	.7960739** (.328907)
SADC	-.9889112 *** (.1564582)	-.5402207 (.5404844)	-2.082567** (.4146703)
HRCA	3.673934 *** (.0918596)	3.761762 (.4550523)	3.517669*** (.431981)
YR3	-	1.710275 (.8333056)	-
YR4	1.408937 *** (.2005364)	1.578842 (.8316703)	1.324634*** (.4448914)
YR5	1.153776 *** (.1925763)	1.199472 (.8223136)	1.037838** (.4655789)
YR6	1.529206 *** (.1867915)	1.438262 (.7895638)	1.35823* (.4794428)
YR7	1.581644 *** (.1981615)	1.843268 (.8410248)	1.402982* (.4535296)
YR8	1.580739 *** (.2076089)	1.268943 (.8964466)	.8861447* (.4935449)
YR9	.8573696 *** (.2209995)	1.266615 (.8277467)	.3989367 (.517719)
YR10	1.273529 *** (.21527410)	1.266396 (.8872163)	-
WALD CHI2(24)	4284.49	289.23	1216.68
P VALUE	0.000	0.0000	0.0000

- All results are rousted to control Heteroscedasticity.
- As tricks *,**,***,are the level of significances at 10%,5%,1%respectively.
- yr 1 is dropped to avoid multicollinarity. Yr 2 to yr 4 is not reported because they are in significant.
- Reports in parenthesis are robust std.error

6 Conclusion and Policy implication

6.1 Conclusion

This study examines the impacts of regional trade area or free trade area on trade in agricultural products within intra- COMESA countries and extra-COMESA countries using a panel data at disaggregate level for the period (2001-2010) including zero to avoid biased results from neglecting it in the contexts of augmented gravity model. The estimated impacts of FTAs are different if zero trade observations are considered. A panel data framework has many advantages vis-a-vis the cross-section approach. It allows to disentangling country-specific and time-specific effects. In order to analysis the impacts this study employed random affects GLS model. This was demonstrated by the Hausman x^2 -test and was motivated by the explanation of country effects as widely predetermined because of geographical, historical, or political contexts.

A particular emphasis is given to the analysis of gross trade creation and trade diversion effects, resulting from the creation of FTA across sectors. The empirical findings of the study suggest that being the membership of FTA in COMESA region results in a better trade between FTA memberships against non FTA membership. Trade was created in FTA and trade is diverted from PTA of COMESA block due the formation of FTA since establishments of FTA. The study concludes that the FTA is a building block on agricultural trade in COMESA countries and not stumbling block to intra as well as extra trade in agricultural products.

Another finding of this study is that overlapping of membership is one of the main problems in the region. Due to the existence of this problem trade with SADC have decrease with statistically significant level for each and every agricultural sectors during the study period. On other hand extra-COMESA trade in agriculture have been increase during the study periods .The extra trade includes trades with middle east, European, Asia and USA. Since the comparative advantages of COMESA country lays in agricultural products than the capital goods the probability of trading with the rest of world especially with those well developed country is expected.

Revealed comparative advantage (RCA) is positive as expected and statistically significant in all level of agricultural sectors. This means COMESA countries are more specialized on agricultural products in which they have a comparative advantages due to relative abundance of natural and human resources in the region. Reflect COMESA regional block have relatively better factor endowment in agricultural products and one of the specialization area for the region according to the Hecksher-Ohlin theory. Shortly To this period COMESA countries comparative advantages are not shifted from agricultural products.

The result of the study in other variables like common languages colonial ties sharing common border (economic and historical) dimension are also statistically and economically significant at both disaggregate and aggregate levels with expected results as it is in the vas literatures did using gravity models. This is also consistent with the theory of Frankel (1997), Egger (2004) and Rose (2000) assumes that countries those are familiar have more trade with each other.

Bilateral distances also affects trade of agriculture in COMESA negatively as explained under the theoretical frame works of gravity model in section four. This implies the same holds for agricultural trade in COMESA countries. The elasticity of distance in the study is approximately equals to unity for aggregate agricultural goods where as greater than unity for coffee and tea, cereals and vegetables and fruits (i.e. the effects are greater for these products).

Population and economic seizes also affects agricultural trade in the block as expected significantly. The growth of population in COMESA country affects agricultural trade negatively(more consumption due to growth) but it is economically insignificant one.GDP growth and export growth are positively related in this study but not proportional because as explained in empirical analysis .The same finding have been reported by Lin Sun and Michael R. Reed using OLS and Poisson Pseudo-Maximum-Likelihood (PPML)

The effects globalization is also influential in this study paper. Analysis of time fixed effects shows that there is positive relationship between volume of agricultural trade and

globalization except in 2005 and 2009.The negative effects in 2009 is contributed by the world crises of 2008.

Generally the findings indicate that COMESA agricultural trade flows follow the Linder hypothesis while the bilateral trade is associated with Heckscher-Ohlin- Samuelson theorem and the result have important policy implications for COMESA countries those are not sill liberalizing their agricultural sectors or still not a members of FTA of OMESA countries such as Ethiopia, Uganda etc.

6.2 **Policy implications**

The results of this study indicated that despite the negative effects on non FTA members and SADC region trade in agricultural products have been increased within COMESA free trade area (FTA) over the past ten years since its establishments in Oct, 2000. The reason of this progress could be a full liberalization of agricultural products by FTA members. On the other hand the reasons for adverse effect could be high tariff barriers and non tariff barriers maintained by non member countries.

Therefore reduction in tariff barriers and non-tariff barriers within the region establishment of custom union could raise intra-regional trade within COMESA region as whole. Elimination of structural rigidities originating from adverse political relationship could also lead to substantial increase in intra-COMESA trade.

Even though the reality of RTA in most African regions are characterized by their multiple and overlapping membership problems and lack of commitment. Regional trade Agreements (RTAs) can be important tools to assist COMESA member countries in increasing their current low level of trade links and integrating with global markets and can reap potential benefits of regional trade agreements if it properly designed and effectively implemented.

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Appendixes

Appendix A

Table 2.3 COMESA economic performances in 2010.

Country Code	Land Area(sq.K.m	POPULn.	G DP(Current US$)	GDP (constant 2000 US$)	GDP growth (annual %)
AGO	1,246,700.00	19081912	84,390,572,976.74	25,901,052,470.5	2.30
BDI	25,680.00	8382849	1,610,544,922.06	966,494,857.67	3.90
COM	1,860.00	734750	541,097,513.04	247,231,030.87	2.10
ZAR	2,267,050.0	65965795	13,145,120,704.88	6,850,715,769.47	7.24
DJI	23,180.00	888716			
EGY	995,450.00	81121077	218,894,280,919.7	160,258,746,161.	5.15
ERI	101,000.00	5253676	2,117,008,130.08	692,457,271.63	2.20
ETH	1,000,000.0	82949541	29,717,009,195.63	18,322,929,015.1	10.14
KEN	569,140.00	40512682	31,408,632,915.34	18,938,389,508.6	5.30
LBY	1,759,540.0	6355112			
MDG	581,540.00	20713819	8,720,543,553.67	5,026,822,442.59	1.57
MWI	94,280.00	14900841	5,106,263,006.66	2,743,896,911.01	7.10
MUS	2,030.00	1281214	9,728,729,228.53	6,630,525,388.65	4.04
NAM	823,290.00	2283289	12,170,331,921.87	6,089,324,238.31	4.80
RWA	24,670.00	10624005	5,627,667,377.43	3,593,742,140.40	7.50
SYC	460.00	86525	936,609,214.45	749,428,459.07	6.20
SDN	2,376,000.0	43551941	62,045,783,132.53	22,819,076,997.7	4.45
SWZ	17,200.00	1186056	3,645,267,040.02	1,845,684,557.52	1.10
UGA	199,810.00	33424683	17,010,765,766.70	12,614,923,289.5	5.18
ZMB	743,390.00	12926409	16,192,857,209.29	5,587,389,858.07	7.61
ZWE	386,850.00	12571454	7,474,000,000.00	4,081,749,005.99	9.00
Total	13,239,120.	464,796,346.0	530,483,084,728.7	303,960,579,374.	96.87

Appendix B.

Table 2.1. The Five Core African RTAs and their Member States

Regional Economic Communities	Member States
Arab Maghreb Union (AMU)	Algeria, Libya, Mauritania, Morocco, and Tunisia
Common Market for Eastern and Southern Africa (COMESA)	Burundi, Comoros, Congo (DRC), Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, and Zimbabwe
Economic Community of Central African States (ECCAS	Angola, Burundi, Cameroon, Central African Republic, Chad, Republic of Congo (Congo), Democratic Republic of Congo (DRC), Equatorial Guinea, Gabon, Rwanda, and Sao Tome and Principe
Economic Community of West African States (ECOWAS)	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia , Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo
Southern African Development Community (SADC)	Angola, Botswana, Congo (DRC), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe

Appendix C

Tabe 2.2 Membership overlapping

Countries	COMESA	SADC	CBI	SACU
Angola	*	*		
Burundi	*		*	
Botswana		*		*
Comoros	*		*	
Djibouti	*			
DRC	*	*		
Egypt	*			
Eritrea	*			
Kenya	*		*	
Lesotho		*		*
Malawi	*	*	*	
Mauritius	*	*	*	
Madagascar	*	*	*	
Mozambique		*	*	
Namibia	*	*	*	*
Seychelles	*	*		
Swaziland	*	*	*	
Soth Africa		*		
Zambia	*	*	*	
Zimbabwe	*	*	*	

Sources: Comp ailed from COMESA and SADC web sites.

Appendix D

Table 4.2 COMESA countries included in the study and its abbreviation and its code		
Cntry code	Abbreviation	countries
1	AGO	Angola
2	BDI	Burundi
3	COM	Comoros
4	ZAR	Congo, Dem. Rep.
5	DJI	Djibouti
6	EGY	Egypt, Arab Rep.
7	ERI	Eritrea
8	ETH	Ethiopia
9	KEN	Kenya
10	MDG	Madagascar
11	MWI	Malawi
12	MUS	Mauritius
13	NAM	Namibia
14	RWA	Rwanda
15	SYC	Seychelles
16	SDN	Sudan
17	SWZ	Swaziland
18	UGA	Uganda
19	ZMB	Zambia
20	ZWE	Zimbabwe

Appendix- E

Table 4.3

Extra COMESA Countries included in the study

code	Av	Countries full name			
21	AFG	Afghanistan	48	GRC	Greece
22	ALB	Albania	49	HKG	H/Kong
23	ARE	A/Emirates	50	IDN	Indonesia
24	ARG	Argentina	51	IRL	Ireland
25	AUS	Australia	52	IRQ	Iraq
26	AUT	Austria	53	ISR	Israel
27	BEL	Belgium	54	ITA	Italy
28	BGR	Bulgaria	55	JOR	Jordan
29	BHR	Bahrain	56	JPN	Japan
30	BRA	Brazil	57	KWT	Kuwait
31	BWA	Botswana	58	LBN	Lebanon
32	CAN	Canada	59	MAR	Morocco
33	CHE	Switzerland	60	MEX	Mexico
34	CHN	China	61	MOZ	Mozambique
35	CIV	Cote d'Ivoire	62	MRT	Mauritania
36	CMR	Cameroon	63	NLD	Netherlands
37	CYP	Cyprus	64	OMN	Oman
38	CZE	Czech Republic	65	PRT	Portugal
39	DEU	Germany	66	QAT	Qatar
40	DNK	Denmark	67	ROM	Romania
41	DZA	Algeria	68	RUS	Russia
42	ESP	Spain	69	SAU	Saudi Arabia
43	FIN	Finland	70	SEN	Senegal
44	FJI	Fiji	71	SGP	Singapore
45	FRA	France	72	SYR	Syrian Arab Republic
46	GBR	United Kingdom	73	TCD	Chad
47	GHA	Ghana	74	TUN	Tunisia
79	YEM	Yemen, Rep.	75	TUR	Turkey
80	ZAF	South Africa	76	TZA	Tanzania

Appendix-F

Able 4.4 Classification of Agricultural products included in the study According to (SITC) Version 3

HSCode	Agricultural Category	Description
+00	Live animals except fish	Live animals except fish
+01	Meat and preparations	011 beef,fresh/child/frozone
		012 meat nes,fresh/child/frozone
		016 meat/offal preserved
		017 meat/offal pres.
+02	Dairy products &eggs	022-milk pre exc.butter/cheese
		023-Butter& cheese
		024-cheese curd
		025-eggs,albumin
+03	Fish/shell fish/etc	034-fish,live/fresh/child/froz.
		035-fish dried/salted/smocked
		036-crustaceans mollucs etc
		037-fish/shell fish,prep/pres.
+04	Cereals/cereals preparation	040-UN special code
		041-wheat/mestin
		042-Rice
		043-Barely grain
		044-Maize except sweet corn
		045-cereal grains n.e.s.
		046-Flour/meat wheat/muslin
+05	Vegetables and Fruits	054-vegetables fresh/child/fron.
		056-veg.root/tube prep.
		057-fruit/nuts fresh/dried
		058-fruit pres.
		059 fruit/veg juices
+06	sugar/Sugar prep/honey	061 sugar/molasses
		062-sugar confectionery
+07	Coffee/tea/cocoa/spices	071-coffee/coffee substitute
		072-cocoa
		073-chocolate/coca prep.
		074-tea and mate
		075-spices
+11	Beverages and tobacco	011-Beverages
		012-Tobacco
+41	Animal /Vegt.oil /fat	041-animal oil/fat
	Source :UNCOMTRADE	042-fixed vegetables oil/fat
		043-animals/veg.oil/fat

Appendix-G

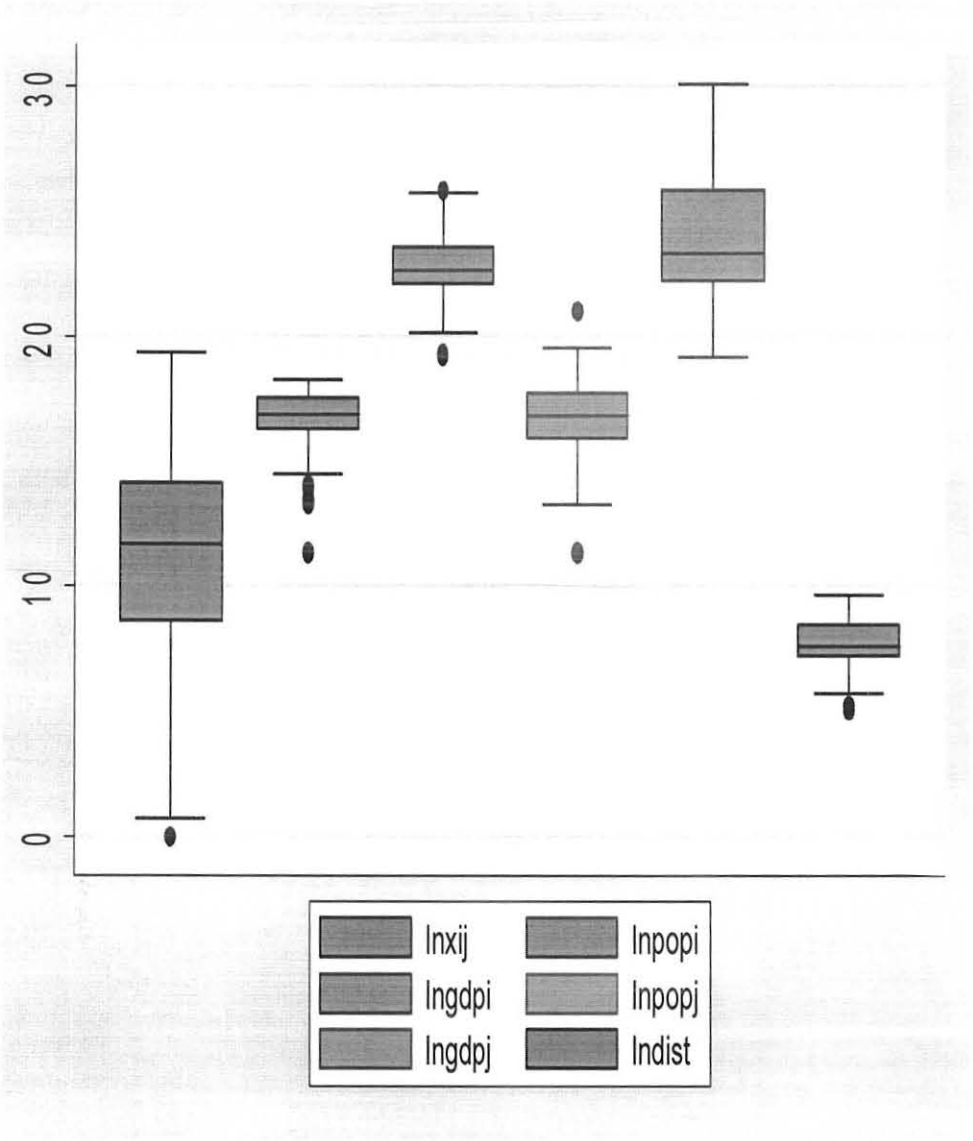


Figure 1: graph for transformed data in log form

Source: Compiled from Stata output

Appendix-H

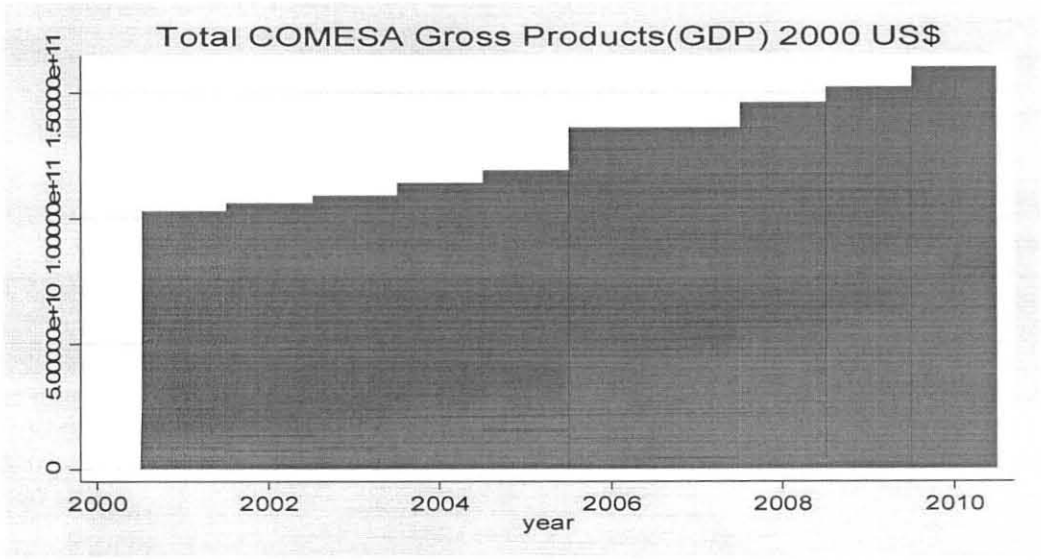


Figure 2(b)

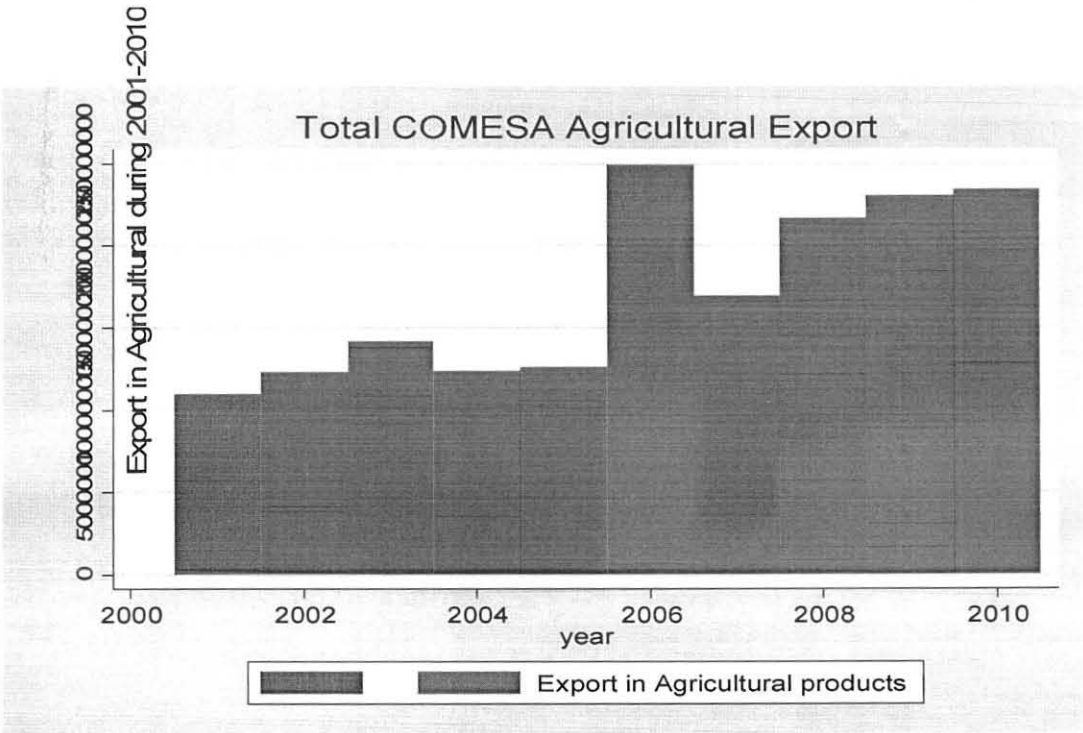
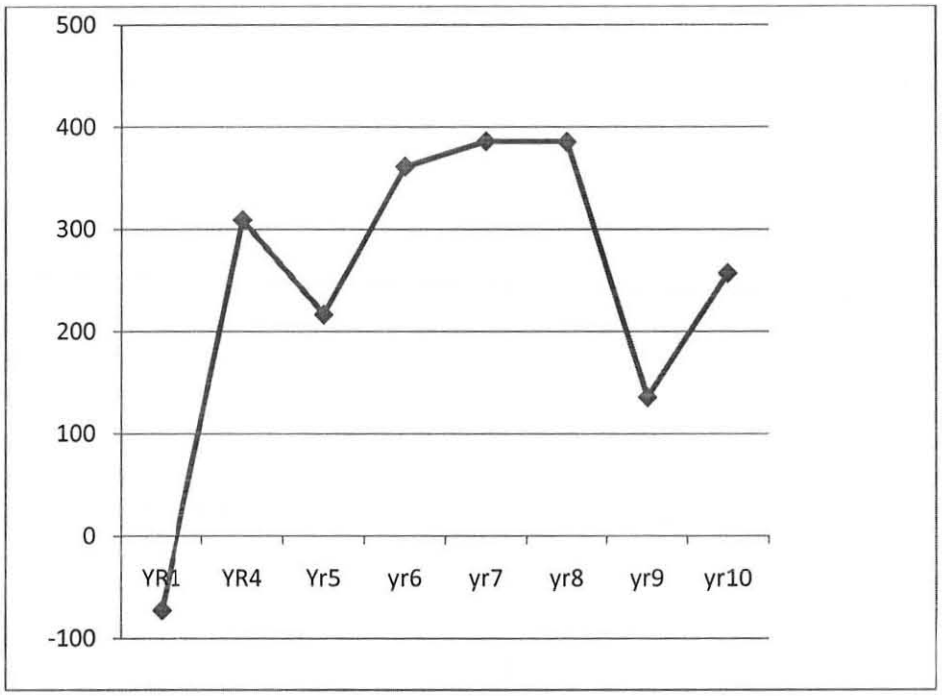


figure 2(b):Agricultural export.

Sources : Compiled from stata software output

Appedix-I

Figure 3:(a) the impacts of Globalization on volume of agricultural trade in COMESA.



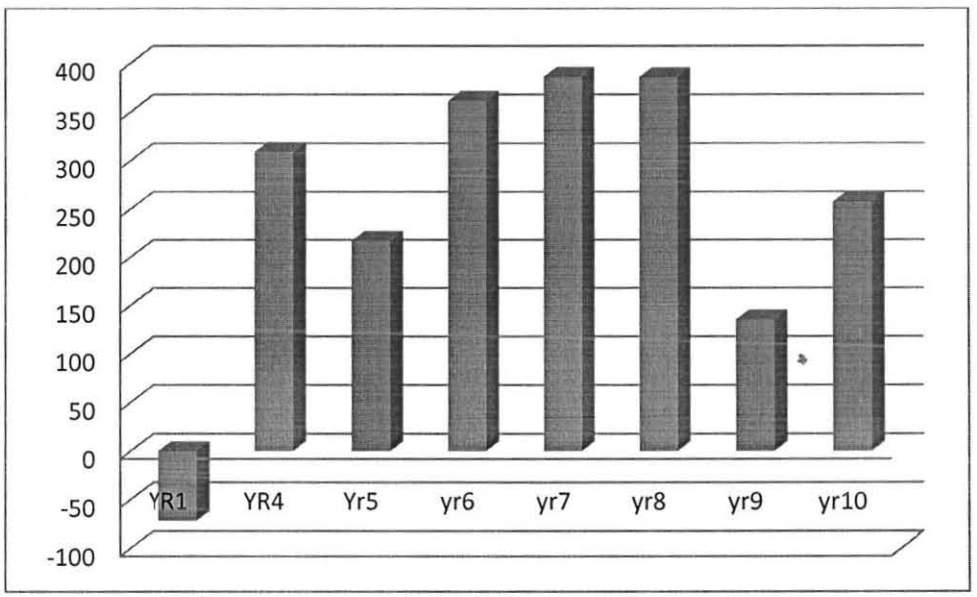


Figure 5.1 (B) impacts of globalization on agricultural trade

Appendix-J

Figure 4: Map of Africa, the colored region represents COMESA region.

Source: COMESA web site (www:\comesa.int.)

Appendix -K

Table 5.5 Correlation Test

```
. correlate lnxij lnpopi lngdpi lnpopj lngdpj lndist comlag colny comcol adji fta intracomesa extracomesa lanlocked sadc HRCA
(obs=10781)
```

	lnxij	lnpopi	lngdpi	lnpopj	lngdpj	lndist	comlag	colny	comcol	adji	fta	intrac~a	extrac~a
lnxij	1.0000												
lnpopi	0.1072	1.0000											
lngdpi	0.1020	0.7261	1.0000										
lnpopj	0.1332	0.0246	-0.0584	1.0000									
lngdpj	0.2273	-0.0312	-0.0413	0.6460	1.0000								
lndist	0.0429	0.0079	0.0746	0.2234	0.6184	1.0000							
comlag	-0.0133	-0.1044	-0.1364	-0.1774	-0.2194	-0.2907	1.0000						
colny	0.0649	-0.0892	-0.1184	0.1272	0.2795	0.2230	0.1019	1.0000					
comcol	-0.0364	-0.1321	-0.1939	-0.0933	-0.3612	-0.3747	0.2877	-0.1267	1.0000				
adji	0.0242	-0.0203	-0.1104	0.1763	-0.2493	-0.5331	0.1297	-0.1123	0.4207	1.0000			
fta	-0.1687	-0.0123	0.0340	-0.2109	-0.4485	-0.2650	0.1523	-0.1363	0.1467	0.0364	1.0000		
intracomesa	-0.2625	0.0294	-0.0082	-0.2990	-0.7497	-0.4039	0.2041	-0.2200	0.3909	0.2728	0.6197	1.0000	
extracomesa	0.2573	0.0737	0.1223	0.2342	0.7523	0.5767	-0.2242	0.2669	-0.3696	-0.4073	-0.5107	-0.8241	1.0000
lanlocked	-0.0390	0.0095	-0.4561	0.1147	-0.0699	-0.2578	0.0219	-0.0393	0.1665	0.2467	-0.0775	0.0920	-0.1807
sadc	-0.1513	-0.1994	-0.1543	-0.3030	-0.3301	-0.2968	0.0892	-0.1307	0.1612	0.1226	0.3083	0.2043	-0.4897
HRCA	0.3153	0.1979	0.1090	-0.0013	0.0332	0.1414	-0.1619	-0.0352	-0.0994	-0.0914	-0.0461	-0.0298	0.0737

	lanloc~d	sadc	HRCA
lanlocked	1.0000		
sadc	0.0837	1.0000	
HRCA	0.0033	-0.0431	1.0000

Appendix-L

Table 5.6 :Hausman Test

. hausman fixed

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnpopi	-.094516	-.0885677	-.0059483	.0174587
lngdpi	.4263076	.4017111	.0245965	.02125
lnpopj	-.156289	-.1588688	.0025798	.0175814
lngdpj	.4382224	.4498605	-.011638	.0163842
lndist	-.9696318	-.9824081	.0127763	.0254239
comlag	.682167	.6360724	.0460946	.0347282
colny	.5702456	.634904	-.0646584	.0911025
comcol	.8519368	.9113059	-.0593691	.0410532
adji	1.007163	.9931063	.0140567	.0497686
fta	.3906102	.4078513	-.0172411	.0440719
intracomesa	-2.111462	-2.055911	-.0555507	.0789135
extracomesa	.5785084	.6605528	-.0820444	.0917016
lanlocked	-.1547751	-.1267798	-.0279953	.044662
sadc	-1.056922	-1.013877	-.0430447	.0463383
HRCA	3.674959	3.696065	-.0211058	.0320864

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(15) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 14.31
Prob>chi2 = 0.5020

Appendix-M

Table 5.7:Breusch pagan Multiplier Test

. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

lnxij[id,t] = Xb + u[id] + e[id,t]

Estimated results:

	Var	sd = sqrt(Var)
lnxij	28.30626	5.320362
e	22.01188	4.691682
u	.1263468	.355453

Test: Var(u) = 0

chibar2(01) = 0.18

Prob > chibar2 = 0.3377