

**WELFARE EFFECTS OF ECONOMIC INTEGRATION: THE CASE OF
COMESA**

By

**Gastone Omondi Otieno
X50/61254/2011**

**A Research Paper Submitted in Partial Fulfillment of the Requirement for the
Award of the Degree of Masters of Arts in Economics of the University of
Nairobi**

October, 2013

DECLARATION

This Research Paper is my original work and has not been presented for a degree in any other university

Signed _____ Date _____

Gastone Omondi Otieno

This Research Paper has been submitted for examination with our approval as university supervisors

Signed _____ Date _____

Dr. Mary Mbithi

Signed _____ Date _____

Dr. Daniel Abala

ABSTRACT

This paper looks at welfare effects of economic integration of COMESA regional bloc. More specifically the study seeks to find out whether COMESA RTA is trade creating or trade diverting. The analysis uses annual data from the year 2006 to 2010 of the Customs Union because it influence trade over a longer period of time amidst several agreements signed by developing countries. The study has used a panel data analysis of eighteen COMESA member countries and their major trading partners to determine the effects of regional trade arrangements using the augmented gravity model of trade. A random verses fixed effect models were used to estimate the model putting into consideration the time invariant variables. We use the hausman test to determine the choice of the model to be estimated. The results showed that the variables used are significant and determines the effects of bilateral trade on welfare. The estimated results showed that exporters GDP significantly improves export trade by more than 100%; while the importers GDP does less proportionately. The size (population) variable coefficients are positive and significant. The estimated results also shows that resistant factor (distance) as a proxy for transportation cost plays an important role in determining trade flows. In addition, the COMESA dummy variables also have their expected coefficients but only the importer dummy that are significant. In conclusion, COMESA RTA in overall shows that it's a building block; that is, it liberalizes trade more internally than it diverts trade from the rest of the world. This can translate into welfare improvements with proper mechanisms to monitor the equitable distribution of the national income to the citizens. It's therefore recommended that, member countries governments promote more active regional participation that promote welfare gain that can be distributed to the nationals in terms of development projects geared towards alleviating poverty in the region.

ACKNOWLEDGEMENT

I set to be in the middle spinning the wheel, but as I tried they came to my aid.

First and foremost, thanks giving to Almighty God for: protection, guidance, peace and joy during my academic sojourn. Secondly, I would like to profoundly thank Dr. Mary Mbithi and Dr. Daniel Abala for guiding me in path of welfare effects of economic integration. As my supervisors for the project, they allowed me to wonder with my thoughts and explore research issues through numerous formal and informal discussions that initially seemed hopelessness but muttered much to my need to contribute to the study. My research also benefitted a lot from the school of economics with assistance from Dr. Gor Seth, Dr. Wambugu, and Mr. Owen Nyangoro and to all lecturers in the school of economics who strongly equipped me with a lot of econometrics and current world economic issues.

I thank my brother Vincent Odhiambo who tirelessly assisted me financially throughout my study.

I also give my sincere gratitude and thanks to my wife, Betty Chepwogen who gave me the moral support and encouragements whenever faced with difficulties.

Last but not least, my thanks go to the entire friends and colleagues who also assisted me to carry on with my work. It is not possible to mention by names, however, to all of you I am deeply grateful and feel honored.

DEDICATION

‘There is no excuse for those who could be scholars and are not’ Way 332 by *Josemaria Escriva*

With great gratitude and profound humility, I dedicate this work to my late dad; John Otieno Otiato who never lived to see the fruits of his encouragement and inspirations.

I also dedicate this research work to my mum, my brothers and sisters, my wife Betty, and my children Oscar and Jouan, indeed you all inspired me to have a reason to study.

TABLE OF CONTENT

DECLARATION	i
ABSTRACT	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
TABLE OF CONTENT	v
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF ABBREVIATIONS	ix
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Background	1
1.2 The Nature of Cooperation in Africa	2
1.3 Statement of the Problem	9
1.4 Objectives of the study	9
1.5 Significance of the study	9
1.6 Scope and Organization of the Study	10
CHAPTER TWO	11
2.0 LITERATURE REVIEW	11
2.1 Introduction	11
2.2 Theoretical Literature Review.....	11
2.3 Empirical Literature Review	15
2.4 Overview of the Literature	21
CHAPTER THREE	23
3.0 METHODOLOGY	23
3.1 Introduction	23
3.2 Theoretical Framework	23
3.3 The Gravity Model for the Study	25
3.4 Choice of Estimation Method	28

3.5 Diagnostic Tests	29
3.6 Data Description, Sample Design and Analysis.....	31
CHAPTER FOUR.....	33
4.0 RESULTS AND DISCUSSIONS.....	33
4.1 Introduction.....	33
4.2 Descriptive Statistics.....	33
4.3 Correlation Analysis.....	34
4.4 Woodridge Test for Serial Correlation.....	36
4.5 Empirical Results	36
4.6 Further Discussion of the Results.....	38
CHAPTER FIVE	43
5.0 CONCLUSION AND RECOMMENDATIONS.....	43
5.1 Summary of key Findings	43
5.2 Conclusion.....	44
5.3 Policy Recommendations.....	45
5.4 Limitations of the Study.....	46
REFERENCES.....	47
APPENDIXES	53

LIST OF TABLES

Table 1.1: Economies of Intra-Regional Trade and their status.....	3
Table 4.1: Summary Results.....	24
Table 4.2: Correlation Analysis.....	25
Table 4.3: Random Effect Model.....	28

LIST OF FIGURES

Figure 1: Trade Creation and Trade Diversion.....	9
---	---

LIST OF ABBREVIATIONS

AEC	-	African Economic Commission
ACP	-	African, Caribbean and Pacific Countries
CEPII	-	Centre de'Etudes Prospective et de'Information Internationales
CES	-	Constant Elasticity of Substitution
CET	-	Common External Tariff
CGE	-	Computable General Equilibrium
COMESA	-	Common Market for Eastern and Southern Africa
CU	-	Customs Union
CUSFTA	-	Canada-United States Free Trade Agreement
EAC	-	East Africa Community
EBA	-	Everything But Arms Initiative
ECCAS	-	Economic Community of Central African States
ECOWAS	-	Economic Community of West African States
EPA	-	Economic Partnership Agreement
EU	-	European Union
FTA	-	Free Trade Area
GATT	-	General Agreement on Tariff and Trade

GDP	-	Gross Domestic Product
IGAD	-	Intergovernmental Authority for Development
IMF	-	International Monetary Funds
IOC	-	Indian Ocean Commission
LDC	-	Least Developed Countries
NAFTA	-	North American Free Trade Agreement
PTA	-	Preferential Trade Arrangement
REC	-	Regional Economic Cooperation
ROW	-	Rest of the World
RTA	-	Regional Trade Arrangement
SACU	-	South African Customs Union
SADC	-	South African Development Community
SSA	-	Sub-Saharan Africa
UEMOA	-	Union Economique et Monetaire Ouest Africaine
WTO	-	World Trade Organization

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Trade liberalization and regional integration are important drivers of economic growth. This is evidenced by the formation of worldwide, multilateral trade arrangements like World Trade Organization (WTO) with the objective of reducing trade barriers (tariffs, quotas and non-tariff measures). This triggered more emphasis in favor of the formation of Regional Trade Arrangements (RTAs) as an important element of global trade. As a result, global trade has been benefiting more from the Preferential Trade Arrangements (PTA). In general, most active participants of RTAs are developing countries, particularly in Sub-Saharan Africa yet these countries still form the largest part of the developing world. They have played key roles in the formation of RTAs, especially, the North-South and South-South basis after independence.

Measuring welfare effects of regional trade integrations is very challenging due to data limitations. Most scholars, have therefore, resorted to an alternative method of measuring the impacts of the regional trade arrangements on trade flows and welfare. They base their studies on ex-post analysis which analyzes trade flows after the implementation of the RTAs. This is then compared to the actual trade levels in the absence of RTAs. Others have used ex-ante analysis (analysis prior to joining the partnership) to estimate trade patterns by measuring trade elasticities and computing their general equilibrium. This is done in the absence of trade agreement to estimate the effects of trade barriers in attempting to measure welfare effects of the region.

However, these approaches have been criticized by a number of studies. According to Panagariya (2000), the empirical approach used pose problems of heterogeneity leading to unreliable results. The study findings concluded that ex-post studies (studies done after the formation of the RTA) should present factual evidence based on trade that would have taken place without the establishment of trade agreements. Clausing (2001) similarly noted that the success of measuring the impacts of trading blocs has always proved to be very difficult making researchers not conclude whether or not the formation of RTA is welfare enhancing.

The history of Africa's regional economic integration dates back to the period when South African Customs Union (SACU) was formed (1919), followed by the rising number of Regional Economic Cooperation (REC) within the continent. Currently, almost all countries in Africa belong to more than one regional economic grouping. Nonetheless, Forountan and Prichett (1993) noted the large intra-Africa trade in comparison to what was expected before. However, Johnson (1995) finds that the multi membership within regions is due to failures of the African union that lead to unwillingness of member states to relax and subject their macroeconomic policy making to that of the regional authority; particularly those related to consumption costs as well as accepting the unequal distribution of the losses and gains from trade; and breaking from cooperation with the non-member countries.

1.2 The Nature of Cooperation in Africa

In Africa, the most common regional groupings since colonialism and post independence that formed economic integration included ECOWAS for Western Africa; COMESA

which includes countries in the South and East of the Sub-Saharan, Eastern, Central and parts of Southern Africa; the SADC regional grouping drawing some of its members from COMESA and EAC. EAC also draws its members from COMESA and SADC.

COMESA, SADC and EAC are in the process of uniting to form a common regional bloc with common custom union and common external tariff. This will be a big leap to the south-south cooperation and the establishment of the proposed African Economic Commission (AEC). Furthermore, most of these countries are small in population but expansively big in terms of their geographical areas and their GDP per-capita indicates their low purchasing power and low social welfare.

Eastern and Southern Africa have also achieved a number of trade initiatives from their regional integrations. These include Intergovernmental Authority for Development (IGAD), the South African Customs Union (SACU) and the Indian Ocean Commission (IOC). Since its inception in 1980, IGAD has mainly focused on drought related issues of development such as promotion of food security within the Horn of Africa. It has also played a key role in the mediation processes, especially on security matters, within the region.

The argument by the Economic Commission for Africa (2001) was to ensure that regional integration allow for country diversification, industrialization and solution to the problem of marginalization that are geared towards welfare improvement. For instance; the provision of a conducive environment for investments and trade that can generate economies of scale; contribution to regional economic value addition through backward

and forward linkages; and promotion of economic diversification through trade with developed countries and trade specialization.

The ex-post analysis (analysis after the implementation of the RTA) of the African economy and systems of trade represents a 3% or less value of the world exports and 2% imports. This has been declining since the 1980s (Musila, 2005). The evidence of free trade “*a policy by which a government does not discriminate against imports or interfere with exports by applying tariffs to imports or subsidies to exports or quotas*” can be traced far back from the Ricardian comparative advantage to Nobel laureate, Paul Krugman; that there is more benefits from the gains from trade to an economy that far outweigh its cost. This is not the case in Africa since the trends have shown a low and small intra-regional and extra-continental trade figures because it trades much less with itself than most continents.

The WTOs register shows the rising numbers of newly formed RTAs especially in Africa (WTO, 2011). Table 1 gives a summary of the most active RTAs in Africa, the size and the establishments of their free trade area and customs unions. It is clear that both EAC and COMESA have an established and functioning FTA while EAC has fully launched their CU and is in full operation. However, COMESA launched their CU but due to the fear of loss of revenue by most member countries, they have not achieved much in its operationalization.

Table 1.1: Economies of Intra-regional Trade and their Status

Organization (RTAs)	GDP (US \$ billions)	Intra-regional exports 2007 (US \$ Millions)	Annual growth in intra-regional exports 2000-2007 (%)	Intra-regional export of total export in average 2000-2007 (%)	Free Trade Areas (FTA)	Customs Unions (CU)	Population (millions)
COMESA	445	4571	13	6.0	Established	Launched	330
EAC	75	1587	14	18.4	Established	In full operation	130
ECOWAS	300	7341	17	9.0	Established	In progress	288
SADC	477	11678	16	9.0	Launched	No plan in 2012	262

Source: Author; Created from Thonke (2012).

1.2.1 The Common Market for Eastern and Southern Africa (COMESA)

The Common Market for Eastern and Southern Africa (COMESA) was established in November 1993 in Kampala, Uganda. Currently, it has 19 member states that stretch from Egypt in the North to Swaziland in the South. Before its establishment in 1993, the regional bloc was known as Preferential Trade Area for Eastern and Southern Africa, established in September 1981 under a different treaty. Their main objective of trade liberalization cut across preferential trade area, free trade area through customs union to a common market for the region. The member countries were expected to reduce their tariffs to encourage intra-COMESA trade.

COMESA has a combined population and GDP of close to 330 million people and US \$445 billion, respectively. The total surface area is over 9 million square km, of which 60% is endowed with rivers and lakes with a potential for irrigation, fisheries, hydroelectric power generation capacity, etc. Less than 10% of the arable land in the region is under cultivation and only 5% of available water is used for cultivation. The region has used only 4% of its hydroelectric potential. The region is also a source of

wealth of minerals and hopes to offer many opportunities to its members and their development partners.

Apart from SADC, the formation of the Common Market for Eastern and Southern Africa (COMESA) in the 1994 treaty caused a great effect on the PTA. More important, COMESA achieved its FTA on 31 October 2000 when nine of its members agreed to eliminate their tariffs on products originating from the region. The objective of the tariff reduction was to allow the region to move towards a customs union. In addition, it was to help eliminate all barriers that hindered intra COMESA trade by implementing a common external tariff and the rules of origin. The member states were to first cut their tariffs by 60% in October 1993, by 70% in October 1994, by 80% in October 1996, by 90% in October 1998 and 100% in October 2000 (Musila, 2005). However, some of the member states declined to take part making the progress of its implementation very slow and behind schedule.

Some of the reasons for slow progress were that some countries suspected loss of revenue and protection of their domestic industries if the program was to be implemented. By 2006, six countries were yet to come out clearly on their interest to joining the FTA. Moreover, currently quite a number of countries have joined the integration and are active participants with a few still in fear of the loss of revenue and protection of their infant industries due to implementation of the Customs Union. Consequently, COMESA had to postpone its original plan of creating a common Customs Union in 2004 to 2008; but still this did not materialize as planned. The CU was to ensure trade liberalization within the region. However, despite the challenges faced by COMESA during this period,

remarkable progress was made in a number of trade related issues. These include regional insurance and the harmonization of transit charges. The member states earlier proposed the establishment of the COMESA fund to support the development of its infrastructures, in order to reduce the adjustment costs of trade liberalization in the weaker member states.

In addition, COMESA proposed a common external tariff (CET) of about 30% at the maximum, to be effective from 2004. On the contrary, this was delayed because most members requested for more time to consult since they considered the proposed tariff to be way above their normal tariff rates and could therefore lead to loss of revenue on their part. Following the May 2007 Summit in Nairobi, the proposed CET was later on set at 0%, 10% and 25% in order to align it with most member countries' tariff bands. Furthermore, they proposed a further reduction of the maximum value of the CET to be implemented at 20%.

Recently, COMESA has been an active participant in the multilateral and bilateral forums like WTO with developed and emerging countries such as US, EU, Asian countries, China and India. This is evidenced in its active participation in the US's Africa's Growth and Opportunity Act (AGOA) and the EU's Everything But Arms (EBA) offer as well as different economic discussions and negotiations meant to enhance its visibility and progress. In such forums, COMESA has emphasized the need to go beyond market access to making such relations have development content. This effort is gaining momentum as shown by the recent debt cancellation to its members; the global

commitment to Millennium Development Goals and the prospect of growth turn around in the continent.

1.2.2 The WTO and Emerging Issues in Africa

The Lomé IV Convention's major objective was to ensure an improvement in the African trade performance, as well as, the Caribbean and the Pacific countries (ACP groups of countries). The ultimate objective was shared in promoting economic growth and development among member countries. The convention made the European Community (EC) to provide non-reciprocal arrangements of trade preferences to the ACP countries product origin. The same proposal was supported by the Cotonou Agreement concluded on June 2000. It provided a different view from that of non-reciprocal trade preference, that is, Economic Partnership Agreement (EPA) which was completed in December 2007.

The EPA required the ACP to create a free trade area (FTA) in conjunction with the European Union (EU), implying that their domestic markets were to be open for trade on a number of imports from the EU member countries. Thus, the EU through the newly created trading arrangement was to ensure compatibility of the World Trade Organization (WTO) with the future ACP-EU trade relations. This was because of the exceptions of the WTO rules granted under special arrangements by the non-reciprocal trade preference of the Lomé IV Conventions. They argued that these were not available to all developing countries, especially, COMESA in Africa, nor were they only restricted to the Least Developed Countries (LCDs). The fourth WTO meeting in Doha, therefore, granted the

EU the last waiver to maintain a preferential tariff treatment for ACP countries' products in the market.

1.3 Statement of the Problem

Regional integration is an area extensively discussed in most African countries in attempting to resolve political and economic backwardness of most developing countries especially on economic growth. However, the issue of welfare enhancement has not been prioritized in addressing the impacts of RTAs on economic growth. Therefore RTAs while addressing trade liberalization has not been focused on welfare impact of the member countries but on factors that can improve trade amongst its member countries. The study seeks to ascertain whether COMESA RTA is justifiable on account of its contribution through trade creation or trade diversion, leads to welfare improvement or welfare loss.

1.4 Objectives of the study

The main objective of the study is to determine the effect of COMESA RTA on welfare of member states. The specific objectives are:

- 1.4.1 To determine whether COMESA is trade creating or trade diverting.
- 1.4.2 To use findings of 1.4.1 above to suggest policy recommendations.

1.5 Significance of the study

The study on regional trade agreement is very important to allow for smooth trade flows of the member countries. The smooth trade flow can eventually leads to a welfare

improvement and an increase in the consumption levels of the populace since they can import cheaply the commodities that were produced domestically at a higher production cost. However, welfare improvement depends on the net effect between trade creation and trade diversion.

Furthermore, the study seeks to offer detailed analysis of trade creation and trade diversion effects of COMESA RTA using the gravity model of bilateral trade to estimate trade flows of the partner countries. It also provides estimates of whether trade creation and trade diversion are lower among trading partners that signed the agreements than those that decline the option. The implications of this study, therefore, can be far reaching and projects the impacts of the RTA on the bilateral trade flows between countries.

1.6 Scope and Organization of the Study

The study is organized into five chapters. Chapter one deals with the introduction and provides background information on the RTAs in Africa. Chapter two reviews the relevant theoretical and empirical literature on the effects of RTAs and trade patterns. The data sources and the methodology used are discussed in chapter three. The empirical analysis and presentation of results are undertaken in chapter four. Chapter five provides summary, conclusions and policy implications of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Regional trade agreements involve a group of countries deciding to pursue free trade within the bloc, while maintaining tariffs against the rest of the world. Under customs union, the countries involved choose a common external tariff with the rest of the world, whereas under a free trade area the countries maintain different tariffs on imports from the rest of the world. This chapter therefore provides a theoretical and empirical review of literature on the impacts of RTAs on welfare development.

2.2 Theoretical Literature Review

Before Viner (1950), it was believed from the analysis of customs union that there can only be a welfare improvement if tariffs were allowed to fall. In general tariff is welfare reducing. He showed in his study of the customs union issue that it is not necessarily true that a customs union is welfare enhancing. This could be as a result of tariff reductions occurring as a second best option increasing trade and further leading to welfare improvement. The theory of second best was formalized by Richard Lipsey and Kelvin Lancaster in 1956. It primarily focuses on what happens when the optimal conditions are not satisfied in an economic model. Tariffs are therefore trade restrictions that do not allow free trade to take place.

Trade creation within regional blocs occur when tariffs are low allowing the countries trading to replace their high cost products that were produced domestically, hence leading to an improvement in their welfare. On the other hand, trade diversion occurs due to the

removal of a tariff causing trade to be channeled from the third party country to the partner country, on the assumption that if the countries were treated equally then the third country would have provided the low cost source of the imported goods within the region. Therefore, the Vinerian framework concludes that welfare will only depend on the extent and magnitudes of trade creation in relation to trade diversion.

A diagrammatical explanation of the theory of trade creation and trade diversion can give a deeper insight on how member countries can either benefit or lose by joining RTAs.

Removal of a tariff by RTAs can lead to an increase in the importation of goods and services in question if proper policy measures are in place. This translates to an increase in the domestic consumption of imported goods and a reduction in the domestic production of the substitute goods. For this to happen, the consumers gain should outweigh the loss that might occur. However, Viner points out that the analytical process is very complex in case the tariff reduction is only on the partner imports.

Figure 1: Trade creation and trade diversion

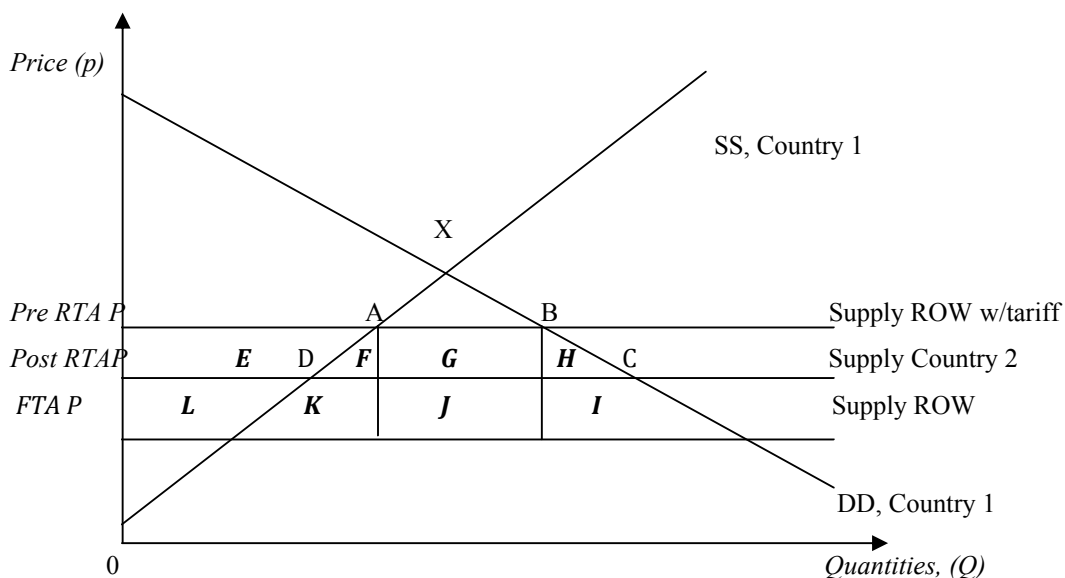


Figure 1 shows a good in country 1 that is protected by tariff. The import value is represented by the difference between domestic supply and domestic demand i.e. distances AB at a tariff inclusive price. From the suppliers of country 2, it shows that there is no competition before trade liberalization. Once we eliminate tariffs on country 2's goods, its imports will therefore replace those ones from the rest of the world (ROW). This means that it has a lower duty free price than the tariff inclusive of the world price. This increases country 2's demand while reducing country 1's domestic production. The new imports, therefore becomes CD. The local consumers will gain areas represented by EFGH while their domestic production lose the area E, and the tariff revenue collected falls by the area GJ. There is trade creation represented by the area FH and trade diversion represented by a loss of area J. This means that country 2's imports replace the lower cost imports from the ROW.

Trade creation allows partners to shift their trade from a high cost domestic production of goods to a low cost production of imported goods. The converse is trade diversion where member countries now consume the high cost production of member countries as opposed to the previous low cost imports of the non-member countries.

According to Flynn (2008), both trade creation and trade diversion have different effects to the economy, and depends on the magnitude of the net effects. It's from the net economic gain from trade creation that countries tend to be motivated to engage in trade. This is due to the differences in the domestic prices compared to the import prices. The economic loss of trade diversion is a result of the high prices charged by the member countries due to high costs of production, compared to non-member countries.

There have been debates on the effects of the rising number of RTAs, their impacts on trade, and whether the arrangements are relevant (Sarker & Jayasinghe, 2007). The main problem, according to Amposah (2002) is whether the tradeoff between trade creation and trade diversion would bring any welfare gain to the economy. Therefore, countries will join regional blocs if and only if trade creation is greater than trade diversion. Meaning, the intensity of trade creation and trade diversion will start dropping as the economies that participate in the regional trade become highly integrated (Flynn, 2003).

The static effects depend on the assumption that production efficiency can be enhanced if the member state gives considerations to the production points where they have a relative advantage. This means rationalizing on the cost of production, as well as, the pricing of goods and services. In addition, the static effects treat both tariffs and quotas as barriers to free trade. Once the effects are realized, the state always resorts to the formation of regional schemes in order to minimize trade distortions as a result of tariffs and quotas. On overall, the static effect, can lead to trade creation or trade diversion depending on the state of the equilibrium in the market price and quantities of the regional bloc.

However, dynamic effects are more gradual and take place over a long period of time. It entails the competition effects due to free movements of imports; the investment effect as a result of new investments that require a regional trade integration; the entire market is large and this offers an opportunity to exploit the new economies of scale created; the effects of capital formation and its influence on the terms of trade by the members. The dynamic effects therefore generate annual benefits as opposed to the static effects that

may include the rising growth rate of a country that can occur even after the withdrawal of a member country.

2.3 Empirical Literature Review

Several methodological approaches have been used in examining the impacts of regional economic integration on trade flows. Some of the most commonly used analytic tools include: Computable General Equilibrium (simulation approach), descriptive approach, or econometric approach (partial equilibrium analysis) and the gravity model. These methods have been employed with different types of data including cross-sectional data, time series, and panel data either at an aggregate or sectoral level.

Studies that have employed the use of simulation approach tend to use either a static or dynamic computable general equilibrium (CGE) or inter-temporal general equilibrium model. The framework of simulation approach models the structure and behavior of agents giving details on their economic effects of the regional blocs. In addition, it's more relevant in showing the potential gains between RTA members in trade liberalization. Basically, the CGE model is best served with studies that employ ex-ante analysis i.e. analysis done before trade between two countries takes place. Studies by Brown et al, (1992); Brown and Stern, (1989); Haaland and Norman, (1992) are some of the examples of empirical work that employed CGE model in their study.

In the recent past, Hertel et al, (2006) also used CGE in his analysis to evaluate the outcomes of the North American Free Trade Area (NAFTA). They found that there was an increase in imports in all regions of the world due to NAFTA which was robust in the trade elasticities. However, they concluded that CGE analysis should be conducted with

appropriate econometric tools in order to enrich results for appropriate and satisfactory policy and decision making.

However, CGE studies have a major weakness in that the results generated are highly sensitive to the assumptions made, the parameters to be measured and the data used in the model in terms of their interpretations. According to Krueger (1999), CGE models do not allow for analysis of the specific designated markets in regional blocs. Moreover, CGE methods are believed to be more data demanding and therefore do not need to use data levels that are highly disaggregated (Mengesa, 2009).

Effects of regional economic integrations have also been analyzed using descriptive approach (Anderson and Norheim, 1993). These studies employ different indicators to allow for the measurement of the concentration of regional trade. Additionally, the approach assumes that there will be no change in the share of trade within the regional bloc as well as with the partnering nations. Its dependence on the static approach restricts the results to be highly determined by the level of aggregation. On the contrary, Jayasinghe and Sarker, (2004) concludes that the descriptive approach cannot measure the effects of trade creation and trade diversion appropriately because it can create welfare problems to RTAs.

The gravity model of trade analysis has been frequently used together with studies that involve ex-post analysis (analysis after trade has taken place) to show the extent of trade under free trade agreement or where customs union has proved to be difficult to implement (Cernat, 2003). In connection to that, Tinbergen (1992) and Poyhonen (1993) were the first scholars' to apply the gravity model in analyzing international trade flows

in the 1960s. Since their studies, a number of authors have used the gravity model as an empirical tool in the analysis of international trade data sets. Their justification was that the model gives a better picture and results to the majority of the regions (Matyas, 1998; Cheng and Wall, 2005; Ramos, 2007).

However, the model lacks a theoretical foundation but it has a long history and fits the data remarkably well. In addition, the model can employ the use of RTA dummies and population of the member countries to accentuate the model to its justification. As noted by Cernat (2001), despite its use in many early studies of international trade, the model was considered suspect in that it could not easily be shown to be consistent with the dominant Heckscher–Ohlin model in explaining net trade flows in terms of differential factor endowments (Cernat, 2001).

Balassa (1967, 1975) examined the changes that might occur in trade in the absence of the European Integration by finding their pre-integration of income elasticities that were to continue during the post-integration period. The study found pre and post integration elasticities to vary substantially between these periods affecting the sampling techniques of the periods to be covered. However, others such as (Frankel and Wei, 1995; Frankel and Kahler, 1993; Frankel, 1997; Willmore, 1976) also used the gravity model to determine the impacts of RTAs in a preferential trade arrangement.

The study by Schwanen (1997) on the impact of increased continental integration on trade, investment, and jobs in Canada focused on changes within the Canadian trade patterns. The comprehensive study looked at the effects of the CUSFTA and NAFTA between the periods of 1989 and 1995. In addition, the study involved a comparison of

trade between the liberalized sectors and the non-liberalized sectors. The finding shows that there was growth in trade in the liberalized sectors of the United States than the rest.

Several authors like Clausing, (2001), Ghosh and Yamarik (2004), Cernat (2003), Sarker and Jayasinghe (2007) and Coulibaly (2004) have made use of the regional dummies with the gravity model especially in the ex-post analysis to capture effects of trade creation and trade diversion on welfare. Their estimated coefficients captured several policy issues and effects allowing the gravity model to measure trade flows at an aggregate level of the regional arrangements.

However, most researchers have tended to use the gravity model with data at an aggregate level, but there are contradictory findings that estimations that are done at aggregate data could also capture and include changes that occur at a disaggregated data level. More important, the disaggregated data level allows the researchers to exploit the variation in tariff liberalization within the regional block. Sarker and Jayasinghe (2007) find from their study on regional trade agreements and trade in agri-food products that there is a significant increase in agri-food trade within the EU at the expense of trade involving non-members.

Clausing (2001) further realized the existing deficiency in the literature on his analysis of trade creation and trade diversion of the Canada-United States Free Trade Agreement and employed data at the commodity level in the demand and supply analysis of trade. The results revealed that CUSFTA have a substantial trade creation and little evidence of trade diversion. He argued that, disaggregated data is important in analyzing the actual effects of a tariff change to the trade flows.

According to the World Bank (2009) on regional trade agreements gateway, south-south RTAs are more trade diverting, especially, when external tariffs are set high. Similarly, Park (1995) and Yeat (1998) do not see much meaningful intra-trade in Africa's RTAs that can generate significant impacts on their economic gains. This can have negative impacts on industrialization and economic growth, since imports will be diverted from low cost to high cost production points. Furthermore, it makes the non-member products to cost high due to the high tariffs worsening off the welfare of the citizens. Africa's RTAs have very small intra-regional trade due to lack of comparative advantage and production of similar products for trade that can be more trade diverting. However, Cernat's (2001) empirical study on assessment of regional trade arrangements concludes that south-south RTAs can fundamentally lead to trade creation, while others might have trade diversion effects irrespective of their sizes.

In Africa, there are a number of empirical studies that have employed the gravity model in analyzing the impacts of regional integrations. A bilateral study of trade flows within COMESA by Alemayehu and Haile (2002) shows that the insignificant effects of regional groupings could only be explained by the conventional gravity model on the standardized variables involved. They further proposed some of the factors that have attributed to these insignificant effects on performance of African regional blocs as including non-commitments by politicians, issues of compensation, overlapping membership, and lack of policy harmonization and ignored private sector participation.

According to Kwentua (2006) from the sample of 39 countries, the analysis showed that the investigations of trade creation and trade diversion effects within the EU-SA

agreement increased, both between members of the EU-SA and the non-members of the EU-SA agreements indicating that there was trade creation. Moreover, the increase in trade between the EU-SA members and the rest of the world is as a result of the income effects.

The study on intensity of trade creation and trade diversion in COMESA, ECCAS and ECOWAS has also been estimated using the gravity model (Musila, 2005). The study used annual data for the years 1991 to 1998, and found that the intensity of trade creation and trade diversion varies from one region to another and from period to period. Indeed, empirical results showed that ECOWAS countries recorded an intense trade creation followed by COMESA countries. However, the finding of ECCAS area was not empirically corroborated. In addition, the estimated results also suggest that the effects of trade diversion were weak in the three regional organizations.

Ogunkola (1998) conducted a comparative analysis of the determinants of sub regional trade by considering an ex-ante period (1970–1972) and ex-post integration period (1978–1980) of ECOWAS. The estimated results showed a weaker intra-ECOWAS trade in spite of the integration efforts considerations.

Longo and Sekkat (2004) on economic obstacles to expanding intra-African trade, obtained similar results that the different integration schemes did not produce effects of trade creation or trade diversion and therefore were not able to lead to a growth in intra-African trade that could lead to welfare improvement.

In conclusion, an in-depth analysis of COMESA RTA would be necessary because the existing survey of the empirical and theoretical literature shows that trade flows within regional economic integrations may vary from one region to another.

2.4 Overview of the Literature

This chapter points out the impacts of joining regional bloc due to trade creation and trade diversion. In trade, a CU is superior to other forms of integrations such as FTA and PTA. The formation of a CU is therefore important as it leads to an improvement of the welfare gains due to trade creation effects. Viner (1950) highlighted that CU can only be welfare improving if tariffs were allowed to fall. In conjunction to that, COMESA has made several attempts to reduce their CET as low as possible to allow for the smooth flow of trade within the region.

The theoretical and empirical literature points out a number of commonness in analyzing the extent of trade creation and trade diversion caused by the formation of RTA. Some, like NAFTA, CUSFTA and EU-SA, have concluded that formation of RTAs leads to trade creation that is welfare enhancing to the member states. This is achieved if the tradeoff between trade creation and trade diversion becomes positive leading to economic growth. However, others disagree and do not see the positive impacts of RTA formations. The empirical literature also highlights different methodological approaches used in analyzing the impacts of RTAs on welfare such as the CGE, descriptive, econometric and the gravity approach.

Studies have been conducted in the SSA region to determine the effects of economic integrations within the region. However, little or no study at all has been done to establish

the welfare effects of the COMESA RTA. This study therefore uses a gravity model developed by Tinbergen (1962) and Poyhonen (1963) to analyze the welfare effects of COMESA RTA on the member countries' economy as a result of trade creation and trade diversion. However, an improvement is made use of by the addition of RTA dummy variables and other explanatory variables like the economic sizes, population and economic/geographical distance between the trading partners.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

The study of regional integration has been explained in three broad categories based on the methodological approaches used. Some studies have employed the use of multi sectoral computable general equilibrium (CGE) models in their analysis of the welfare impacts of the RTAs. However, the CGE models have been criticized over a number of issues. First, they are prospective rather than retrospective in nature i.e. their analysis is based on ex-ante analysis (Krueger, 1999). Second, the aggregation at the sector level does not allow for specific market analysis. The CGE models also relies on the assumption that there is perfect competition and constant elasticity of substitution (CES) and a system of market clearing mechanism that are not realistic (Alemayehu, 2002).

Others have used descriptive approach to analyze the impacts of RTAs on trade creation and trade diversion. However, the approach depends on the static framework of analysis and hence its results are determined by the level of aggregation. They are therefore important in the analysis of RTAs in the short run. The method also lacks the ability and capacity to analyze trade creation and trade diversion effects in the long run.

The gravity model helps solve the above problems by using the regional dummies in analyzing trade flows within regional blocs.

3.2 Theoretical Framework

The study of bilateral trade flows has been explained by a number of authors using the gravity model. The origin of the gravity model is traced from the period of Sir Isaac

Newton in 1687 when he discovered the Law of Universal Gravitation as stated in equation 1. ¹

Since then the model has so far been applied in the field of social science including sectors like migration, foreign direct investment and tourism.

Economists led by Tinbergen (1962) and Poyhonen (1963) applied the gravity model in the field of international economics in analyzing trade flows. Further, quite a large number of empirical studies have used the gravity model to analyze the effects of RTAs on trade creation and trade diversion. The model proposes the flow of exports to be measured by their respective economic sizes i.e. the GDP or GNP, population and direct geographical distances between the nations. The relationships of all the above variables, is directly related to their economic sizes and inversely related to the distance between them. They specified a multiplicative form of a model as follows;

$$Trade_{ij} = A \cdot \frac{(GDP_i \cdot GDP_j)^{b_1}}{Distance_{ij}^{b_2}} \dots\dots\dots 2$$

¹ Following Newton’s (1687) “Law of Universal Gravitation”, classical gravity theory states that the attractions force, F_{ij} , between two entities i and j is proportional to their respective masses M_i and M_j and inversely proportional to the squared distance D^2_{ij} between these entities. This law is formalized as:

$$F_{ij} = G \cdot \frac{M_i \cdot M_j}{D_{ij}^2} \dots\dots\dots 1$$

Where;

- F_{ij} is the attractive force.
- M_i and M_j are the masses.
- D_{ij} is the distance between the two objects.
- G is a gravitational constant depending on the unit of measurement for mass and force.

Where, $Trade_{ij}$ is the trade value of country i and j , GDP_i and GDP_j represent the national incomes of country i and j respectively, $Distance_{ij}$ is the geographical or economic distance (distance between the major economic hubs of the trading partners) between country i and j 's capital cities while A represents a constant of proportionality.

Its multiplicative nature therefore allows us to take the logarithms of equation (2) in order to obtain a linear relationship between the variables as follows;

$$\log(Trade_{ij}) = A + b_1 \log(GDP_i \cdot GDP_j) - b_2 \log(Distance) + \varepsilon_{ij} \dots\dots\dots 3$$

Where; b_1 and b_2 are the coefficients to be estimated and A is a constant. However, ε_{ij} represent the error term and captures any other factor that might affect trade flows between countries. Equation (3) predicts trade between countries to be positively related to their GDPs and negatively related to distance (which is time invariant) between their economic centers.

3.3 The Gravity Model for the Study

The assumption of the gravity model equation is that trade is proportionately related to gross domestic product (GDP) and is inversely related to the barriers, like distance and tariffs, of trade between trading partners.

The basic gravity model for estimating trade flows within regional blocs is a multiplicative form of an equation described as follows;

$$X_{ij} = \beta_0 GDP_i^{\beta_1} GDP_j^{\beta_2} POP_i^{\beta_3} POP_j^{\beta_4} D_{ij}^{\beta_5} U_{ij} \dots\dots\dots 4$$

However, the estimated gravity equation can only be gotten by taking the natural logarithms of the variables in equation (4) as follows;

$$\ln X_{ij} = \ln \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln D_{ij} + \mu_{ij} \dots\dots 5$$

Where; X_{ij} = the total trade between country i to country j

GDP_i = the GDP of country i

GDP_j = the GDP of country j

POP_i = country i's population

POP_j = country j's population

D_{ij} = the distance between two countries i and j

μ_{ij} = the normal error term

\ln = the natural log operator

Equation (5) is an inclusion of the core variables that determine trade flows within a trading bloc. This is supported by the trade theories proposed by Heckscher-Ohlin models and models of imperfect competition.

The augmented gravity model therefore includes factors that can facilitate or impede trade causing either trade creation or trade diversion, and is specified as follows;

$$\ln X_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln Dist_{ij} + \beta_6 COMESA_{ij}^1 + \beta_7 COMESA_{ij}^2 + \beta_8 COMESA_{ij}^3 + \mu_{ij} \dots\dots\dots 6$$

Where X_{ij} is the exports from country i to country j ; GDP_i is the real gross domestic product of country i ; GDP_j is the real gross domestic product of country j ; POP_i is the population of country i , POP_j is the population of country j ; $Dist_{ij}$ is the geographical or economic distance between the two countries measured in kilometers between the capital cities. It shows a negative relationship between trading partners and the volumes of trade because it increases the cost of transport; $COMESA^1$ captures intra-bloc trade and is a dummy variable which takes the value 1 if both partners are COMESA members and, 0 otherwise; $COMESA^2$, captures the effects of COMESA on members' imports from non-members. It takes a value of 1 if only the importing country is a member of COMESA. A negative coefficient on this dummy variable indicates import diversion. $COMESA^3$ captures the effects of COMESA on members' exports to non-members. It takes a value of 1 if only the exporting country is a member of COMESA. A negative coefficient on this dummy variable indicates export diversion.

GDP_i and GDP_j represent the economic size of the countries and are positively related to trade; hence their coefficients β_1 and β_2 are expected to be positive. Gross Domestic Products ($GDP-i$ and $GDP-j$) represents the GDPs for exporting and importing country's i and j respectively. Based on the gravity model theory, GDP represents one of the economic size variables and is positively related to trade. These acts as a proxy measure for a country's demand for imports and supply for the exports. Countries with high GDP output provide chances for high export potentials. Therefore country- i 's exports are expected to vary positively with the size of GDP for both exporting and importing countries.

The estimated coefficients of the population's natural log can either take a positive or negative sign. It represents the size of the country's consumption and production levels. However, this depends on the tradeoff between absorption level of the country and economies of scale effects. A country with big population commands big domestic market and controls significant endowments in resources implying that the high absorption effect reduces dependence on international trade: this leads to a negative coefficient in our model. However a large domestic market allows for the full realization of the gains from economies of scale especially in terms of trade with foreign partners, hence justifying a positive coefficient.

3.4 Choice of Estimation Method

A number of specification tests are conducted to establish the most appropriate model formulation that fits the data well. This is necessary in order to obtain consistent empirical results and draw correct policy recommendations and conclusion.

3.4.1 Breusch-Pagan Random Effects Test

This test is a Lagrange Multiplier (LM) test for the random effects model based on the OLS residuals (Greene, 2003). The LM statistic is chi-square (χ^2) distributed with one degree of freedom under the null hypothesis.

We assume that the estimation of the Random Effect Model (REM) is a weighted average of the fixed and between estimates, and that the goal is to estimate variables that are constant with units. The REM estimation method thus requires residuals to be treated as random variables that follow the normal distribution. The Breusch-Pagan Random Effects is conducted to assess the validity of the distributional assumption by testing

whether the variance of the residuals is constant or not. If the null hypothesis is true, then there are no significant random effects in the data. Rejection of the null hypothesis implies within-unit correlation and that there are significant random (individual) effects in the data. This test is normally conducted to complement the Hausman specification.

3.4.2 Hausman Specification Test

The Hausman test is performed to determine the choice between the Fixed Effect Model - FEM (LSDV) and the Random Effect Model - REM (GLS). Fixed effects model always give statistically consistent results, however, sometimes the results may not be efficient. The random effects give better p-values as they are a more efficient estimator, and ought to be the best choice of model if found to be statistically justifiable. The Hausman test is based on the hypothesis of no correlation, where both OLS in LSDV model and GLS are consistent, but OLS is inefficient. The null hypothesis tests whether the coefficients estimated by the efficient random effects are the same with the ones estimated by the consistent fixed effects model.

Rejection of the null hypothesis leads to the conclusion that the REM is not appropriate, while the FEM is the appropriate estimation technique. Acceptance of the null hypothesis leads to the conclusion that the random effects estimator is efficient (Greene, 2003).

3.5 Diagnostic Tests

This section strives to ensure that model framework satisfies the various econometric assumptions in order to derive reliable coefficient estimates. These include Woodridge's correlation test for serial correlation and Likelihood ration test for panel level Heteroscedasticity.

3.5.1 Heteroscedasticity across Panels

Equation (6) assumes that the standard error of the regression is homoscedastic with the same variance across individuals and time. This assumption can be viewed to be restrictive considering that countries involved in the study differ in a lot of aspects as such the results may exhibit differences in variations. Failure to correct for homoscedastic disturbances results in consistent but inefficient estimates of the regression coefficient.

Likelihood-Ratio Test for Heteroscedasticity

In this test the homoscedastic model is pooled together in the heteroscedastic model. This type of nest is superior to the general approach for testing for heteroscedasticity whereby the test is based on the behavior of the residuals (Greene, 2003). Under the null hypothesis, the LR Statistic follows an asymptotic χ^2 distribution.

3.5.2 Autocorrelation in Panel Data

According to Baltagi (2000), the disturbance term presented in (6) assume that the only correlation over time is due to the presence of the same unit across a panel. This assumption is restricted in the practice as unobserved shock in any given time period affects the behavioral relationships over the next few time periods. Ignoring correlation leads to consistent but inefficient estimates of the regression coefficients, as well as standard errors.

Wooldridge Test for Serial Correlation in Panel Data

According to Woodridge (2002), the test is conducted given a pooled OLS residuals from the regression equation. Under the null hypothesis, the test follows an F-distribution with N-1 degrees of freedom and the hypotheses are as follows:

H₀: No first order serial correlation

H₁: First order serial correlation

3.6 Data Description, Sample Design and Analysis

Most of the empirical literature on gravity model uses total bilateral trade flows as the dependent variable. However, Cernat (2001) suggests the use of bilateral export flows arguing that for a given pair of countries, with total bilateral trade one cannot distinguish the impacts of RTAs on exports from non-member to member countries. For the present study, bilateral export flow (proxy for total bilateral trade) is used as dependent variable. Data on the countries added in the sample for the current study before 1999 are not available. Thus, the scarcity of data for most countries in the sample forces this study to use panel data for the periods 2006 to 2010.

However, eighteen member countries of COMESA (Appendix 1) are included as partner countries in the sample taken for this study to examine level of intra regional trade. From EU, ten countries, which are the top export market destinations, are taken because they are amongst the major trading partner within the SSA regions. These are UK, Germany, France, Italy, Netherlands, Austria, Portugal, and Belgium, Luxembourg and Spain. Next to EU are the Asian countries, the second important trading partner bloc for the region. As a result, five countries are chosen from Asian countries: India, China, Japan, Hong

Kong and Indonesia. USA is also included in the sample since it takes the third position of their export destination.

On the dependent variable data description (export value), this study uses COMTRADE data base, developed by the United Nations Statistics Division, data from the World Bank and IMF. Data on distance is sourced from Bali Online portal (<http://www.endo.com>) and Centre d'Etudes Prospective et d'Informations Internationales (CEPII). In addition, the population data is obtained from the United Nations Demographic Yearbook. The descriptive statistics, econometric analyses and diagnostic tests are conducted using STATA 12.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

The chapter presents descriptive and empirical results of the analysis of variables estimated in the model. Descriptive statistics reports the mean, the standard deviation and the number of observations while the empirical analysis gives the regression results of the estimated model.

4.2 Descriptive Statistics

This section gives a summary of the main variables used in the estimation of the model. This is shown in Table 4.1.

The results in Table 4.1 indicate that the data was a balanced panel with 5195 observations. The mean average of the dependent variable *lnexport* in COMESA stands at 15.88 with the highest level of variability and a dispersion around the mean of 6.35. The high standard deviation indicates a variation of intra and extra-COMESA trade among the sampled countries.

Table 4.1 Summary Results

Variable	Mean	Std. Dev.	Min	Max	Observations
lnexport overall	15.87717	6.347257	0	26.371	N = 5195
between		6.195398	0	26.1932	n = 1039
within		1.390783	4.762567	27.98197	T = 5
lngdp_i overall	25.29107	2.840704	19.817	30.305	N = 5195
between		2.83759	20.0174	30.2722	n = 1039
within		.1545347	24.84207	25.64447	T = 5
lngdp_j overall	25.26381	2.865435	19.817	30.305	N = 5195
between		2.862401	20.0174	30.2722	n = 1039
within		.1539102	24.81481	25.61721	T = 5
lnpop_i overall	17.01285	2.029997	11.35	21.017	N = 5195
between		2.030644	11.3712	21.007	n = 1039
within		.0234118	16.94765	17.07765	T = 5
lnpop_j overall	16.96747	2.061834	11.35	21.017	N = 5195
between		2.0625	11.3712	21.007	n = 1039
within		.0230023	16.90227	17.03227	T = 5
lndist~j overall	8.485611	.8537917	5.081	9.777	N = 5195
between		.8541206	5.081	9.777	n = 1039
within		0	8.485611	8.485611	T = 5
comesa1 overall	.2473532	.4315153	0	1	N = 5195
between		.4316816	0	1	n = 1039
within		0	.2473532	.2473532	T = 5
comesa2 overall	.5091434	.4999645	0	1	N = 5195
between		.5001571	0	1	n = 1039
within		0	.5091434	.5091434	T = 5
comesa3 overall	.5072185	.499996	0	1	N = 5195
between		.5001887	0	1	n = 1039
within		0	.5072185	.5072185	T = 5

4.3 Correlation Analysis

The correlation test was run to test for the existence of correlation between the variables at 5% level of significance. The correlations of interest are contained in the non-diagonal elements of the matrix.

Table 4.2 Correlation Analysis

	lnexport	lngdp_i	lngdp_j	lnpop_i	lnpop_j	lndist~j	comesa1	comesa2	comesa3
lnexport	1.0000								
lngdp_i	0.6042	1.0000							
lngdp_j	0.4798	-0.0452	1.0000						
lnpop_i	0.3912	0.6727	-0.0353	1.0000					
lnpop_j	0.2915	-0.0288	0.5841	-0.0221	1.0000				
lndist_ij	0.0608	0.1863	0.1962	0.1254	0.1879	1.0000			
comesa1	-0.2423	-0.0533	-0.4569	0.0028	-0.2474	-0.1646	1.0000		
comesa2	-0.0148	-0.1075	0.0383	-0.0749	0.0189	-0.0399	0.5629	1.0000	
comesa3	-0.3829	0.0409	-0.8051	0.0320	-0.4293	-0.1709	0.5651	-0.0436	1.0000

From the Table we see that trade and GDP have a strongly positive correlation that are significant at 95% level. This finding supports the basic intuition that bigger countries tend to trade more. By contrast, we find a weak positive correlation between trade and distance: country pairs that are further apart tend to trade less. Again, this finding is significant at 1% level and is in line with the basic intuition of the gravity model. A high correlation (0.8) is seen between *comesa3* and *lngdp-j*. This may be due to the fact that *comesa3* captures the effects of COMESA on members' exports to non-members from the rest of the world. Most of the variables have the expected sign of correlation with the dependent variable except *lndist-ij*. It shows a positive relationship with the dependent variable on the contrary, and may be attributed to due to collinearity.

The covariance matrix is used to show the average of the product of deviations of data points from their respective means. It displays the matrix of relationship between two ranges of data. We can therefore infer whether two ranges of data are moving together. That is whether large values of one set are associated with large values of the other (positive covariance), or small values of one set are associated with large values of the other (negative covariance) or values in both set are unrelated (near zero covariance).

4.4 Woodridge Test for Serial Correlation

The results presented in appendix 3.6 leads to the acceptance of null hypothesis of no first order serial correlation. The hypothesis of no first order serial correlation is accepted at 1% significance level. The calculated F-statistics of about 8.18 yield a low probability of 0.0048 therefore significantly accepting the null hypothesis at 1% confidence level.

4.5 Empirical Results

The results from the analysis were estimated using OLS, Fixed Effect and Random Effect models as shown in the appendixes.

Appendix 3.2 shows the results by running a simple pooled OLS. The pooled OLS estimator ignores the panel structure of the data while treating individual observations as being serially uncorrelated with homoscedastic error term. The p-value results show high significance at 5% level except for *comesa1* and *comesa3*. The standard gravity model variables are expressed in natural logs hence they are interpreted as elasticities. The coefficient of determination (the line of best fit) for the model is 65.11% which shows that the variables used explain up to 65% in the variation of exports.

Diagnostic Tests

The augmented version of the model for Fixed Effect (FE) and Random Effect (RE) fits the data remarkably well in explaining the variation in bilateral trade in COMESA. However, “the crucial distinction between fixed and random effects is whether the unobserved individual effect embodies elements that are correlated with the regressors in the model, not whether these effects are stochastic or not” (Green, 2008). Therefore, the

choice between the two models depends on the hausman test for specification. The hausman test statistics shows that under the null hypothesis of no correlation between individual effects and the explanatory variables, the FE estimator is consistent while RE is efficient while FE are not. However under the alternative hypothesis of individual effects being correlated with the explanatory variables and following a random walk, the FE is consistent while the RE estimates are inconsistent. The chi-square statistics from the hausman test statistics is 81.30 and is significant at 1% level of confidence. This means we accept the null hypothesis that the difference in coefficient of the estimated model is not systematic. It therefore signifies that we estimate a fixed effect model.

A further confirmation is made by running a Breush-Pagan Lagrange Multiplier (LM) test for random effect. This was done to confirm if there is any presence of random effect. The resulting chi-square statistics was is significant at 1% confidence level. The likelihood-ratio (LR) test displayed is testing on the boundary of the parameter space. We are probably testing whether the estimated variance component (something that is always greater than zero) is different from zero. This further means we reject the null hypothesis that there is no random effect. Hence random effect model is the most appropriate.

Fixed Effect (FE) versus Random Effect (RE)

Appendix 3.4 gives a summary of the FE estimated model. The FE model allows us to analyze the impacts of variables that change over time by controlling for time invariant differences between the individuals leading to unbiased estimates. It treats variables as individual entities with distinct characteristics in influencing the predictor variable. The

variables *lndist*, *comesa1*, *comesa2* and *comesa3* were omitted due to collinearity. The coefficients of the estimated equation 6 by fixed effect model are significant at 5% confidence level except *lnpop-i* rejecting the null hypothesis that each coefficients estimated is zero. The explanatory variables have their expected signs of the coefficients and magnitudes. However, the fitted line only explains 13.81% of the model as shown by the overall R-squared value. Intra-class correlation (rho) shows that 96.07% of the variance is due to differences across panels.

In the presence of differences across entities having significant influences on the dependent variable, we estimate using random effect. It allows us to include time invariant variables as shown in the estimated model in appendix 3.3. The coefficients estimated by RE model have their expected signs and are significant at 1% confidence level except *lnpop-i*, *comesa1* and *comesa2*. The baseline variables *lndist* and *lngdp* provides the most explanatory power in all the independent regressors used in the model as seen by the predicted coefficients. However, the model explains 64.87% (overall R-squared) of the fitted regression.

4.6 Further Discussion of the Results

The estimated coefficient of GDP variables in our model specification is positive. The coefficient of the exporting country's GDP (*lngdp-i*) is 1.39 and that of the importing country (*lngdp-j*) is 0.93 and both are all statistically significant at 1% level. This shows that an increase in the national income by 1% will increase the exports of the country more proportionately by 1.39% while their imports will only change by 0.93%. This shows that countries with similar levels of output will tend to trade more than those with

dissimilar levels since trade volumes should increase proportionately with the increasing level of national income.

Table 4.3 Random Effect Model Results

```

Random-effects GLS regression           Number of obs   =   5195
Group variable: centry                 Number of groups =   1039

R-sq:  within = 0.0131                 Obs per group:  min =    5
      between = 0.6817                   avg =   5.0
      overall = 0.6487                   max =    5

Wald chi2(8) = 2181.54
corr(u_i, X) = 0 (assumed)             Prob > chi2     = 0.0000

```

lnexport	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lngdp_i	1.385129	.050196	27.59	0.000	1.286746	1.483511
lngdp_j	.9327972	.0648305	14.39	0.000	.8057317	1.059863
lnpop_i	.0289459	.0718185	0.40	0.687	-.1118158	.1697076
lnpop_j	.1846584	.0649537	2.84	0.004	.0573514	.3119653
lndist_ij	-1.197397	.1338276	-8.95	0.000	-1.459694	-.9350994
comesa1	.1519643	.4400987	-0.35	0.730	-1.014542	.7106133
comesa2	.4043092	.3130317	1.29	0.196	-.2092216	1.01784
comesa3	-.8124192	.4135551	-1.96	0.049	-1.622972	-.0018661
_cons	-35.94142	2.107195	-17.06	0.000	-40.07144	-31.81139
sigma_u	3.4252384					
sigma_e	1.5441162					
rho	.83109936	(fraction of variance due to u_i)				

Source: Authors Computation

The RE model in Appendix 3.3 provides a positive sign on the population coefficient (*lnpop-i* is 0.03; insignificant and *lnpop-j* is 0.19; significant at 1%) indicating a large domestic market and gains from economies of scale. However, the FE model generates both negative (*lnpop-i* is -0.62 but insignificant at all levels) and positive (*lnpop-j* is 0.32 significant at 1% level of confidence) coefficients. The negative sign indicates that large countries tend to be more self sufficient. The insignificant coefficient on *lnpop-i* shows that it did not play an important role in influencing bilateral trade.

There is a negative relationship between trade and transportation cost. The study has used the lateral distance as a proxy to measure the effects of transport cost on the bilateral trade. This is attributed to the fact that the larger the distance between country *i* and *j*, the higher the transportation cost and the more time involved while delivering the goods to the partner country more so when the good in question is perishable. The estimated coefficient of distance (*Indist-ij*) is significant at 1% confidence level and has the expected negative sign and is slightly over one (1.20) from the RE model, indicating that trade between pairs of countries falls by a little over 1% for every 1% increase in the distance between them. The greater the distance between the trading partners the more transport cost paid which further reduces the volume of trade. This impacts negatively on welfare of the citizen as the market equilibrium price becomes high due to high transportation costs.

The formation of an economic integration and the common membership of RTA provide an explanation to some amount of bilateral trade as compared to the basic gravity model variables like economic size, distance, GDP and population. In the case of RE model and the pooled regression the estimated coefficients of the COMESA dummies have their expected signs. However, only the negative coefficient of *comesa3* is statistically significant at 5% confidence level. The dummy variable *comesa1* was to capture intra-regional trade. The variable has the expected positive sign of the coefficient but its insignificant at all levels. It shows that the formation of RTA is trade creating and improves a little intra-COMESA trade of about 16% ($e^{0.15} = 1.16$). The variable *comesa2* captures the effects of COMESA on members' imports from non-members. The positive sign in its coefficient shows that there is import creation within the region. Further, it

indicates that COMESA members import volumes comprises a lot from the non-members than within the regional block. The dummy variable *comesa3* captures the effects of COMESA on members' exports to non-members. The negative sign of the coefficient indicates that COMESA members prefer exporting to their partners than from the rest of the world.

4.6.1 Welfare Implications

The overall effect of the RTA shows that COMESA is trade creating than trade diverting indicating a positive net welfare gain of the citizen. The net welfare effect of the RTA is arrived at by summing the consumer and producer surpluses as a result of trade creation and trade diversion. This is evidenced by the estimated coefficients of the RTA of about 16% for intra-COMESA trade and 40% for the positive coefficient of the blocs import creation. However, trade diversion was seen in the members export diversion of about 81% since most of the members have small economic size and are faced with the challenge of similar products for exports.

The net welfare effect can therefore lead to an improvement of the member countries if proper mechanisms of sharing the national gain are properly administered. This can help eradicate poverty as citizens will be able to consume products at a reduced price due to imports from the member partners. However, the economic argument for protection implies that in the short run the uncompetitive sectors would adjust their costs to allow them compete with their bloc rivals leading to the short run loss of economic welfare due to restricted trade. But this will be matched by the long term welfare gains by allowing

the slow adjustment process to take place. The finding further shows that there is trade openness within the region to the rest of the world.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Summary of key Findings

This paper has analyzed the welfare effects of COMESA RTA form of economic integrations on its member countries vis-à-vis the major trading partners. The paper uses the augmented gravity model to analyze the effects of gross trade creation and trade diversion as a result of the formation of COMESA RTA. The result shows that the effect of COMESA RTA is positive though insignificant but points out the importance of trade agreements in generating trade among its members that can lead to welfare gain. The results further shows that COMESA region is trade creating and do not necessarily divert trade with the rest of the world hence leading to a welfare gain. The rationale behind this is therefore to ensure that trade creation of a regional bloc increases their demand and consumption to the extent that the overall income effect outweighs the overall trade diverting effects as a result of the agreement. Therefore the economic benefits should be large enough for the member countries to actively participate than to the non-member countries.

The standard gravity model variables also presented their expected signs highlighting the roles played by both intra and extra-regional trade. The positive sign on the GDP coefficients represents the role played by economic growth in promoting bilateral trade and have very strong elasticities. It is also clear that countries have developed more foreign trade relations with countries with big economic growth and population sizes. The negative population coefficient in the FE model shows that large countries tend to be

more self sufficient – absorption effect. This is true as most COMESA member countries largely depend on agricultural sector for their produce and most of these are consumed domestically leaving few for export. Distance is one of the main barriers of export and bilateral trade between nations and reflects the complex effects of transportation cost between the trading partners. Compared to the earlier study by Musila (2005), he found that trade agreements in African countries (COMESA, ECCAS and ECOWAS) does not show any considerable impacts in trade creation and trade diversion.

5.2 Conclusion

From the findings of this study it is concluded that:

- i. COMESA RTA is not a stumbling block to the multilateral trading system since it does not divert much trade to non-member partners' similar to the proposition by Bhagwati (1993). It therefore creates much trade that can lead to an increase to the domestic income. This can translate into welfare improvements when there are proper mechanisms to monitor the equitable distribution of the national income to the citizens.
- ii. The change in trading partners GDP positively affects the ability of the trading partners to supply imports and consume exports. This confirms the important factor played by the demand side of the RTA in influencing the supply of import from their trading partners.
- iii. The population size was seen to affect trade either negatively or positively since it entails changes in the member countries market demand.

- iv. The resistance variable i.e. distance play an important role in determining the flow of exports amongst trading partners. It has a negative and statistically significant coefficient at 1% level showing that investment in transportation and communication can help reduce the cost of trade hence expanding the international trade within the region.

5.3 Policy Recommendations

The findings from the study are useful in advocating for economic policies that can lead to the expansion of trade activities within the region. The results points out the important need for co-existence between the COMESA member governments. There is need for trade liberalization within the region due to members' economic sizes and characteristics of the products that they have comparative advantage over. An increase in trade within COMESA imply either a reduction of protectionism on their sensitive export products like agricultural commodities or an increased openness of the regions market due to specialization. Furthermore, there is need to strengthen institutions within the region that can overcome obstacles for promoting greater trade. This will help in facilitating the implementation processes of trade protocols of the region at the appropriate scheduled time. In addition, they should strengthen their political relationships to eliminate trade barriers and structural rigidities to enhance intra-COMESA trade activities within the region. For example, the negative sign of the distance variable shows the importance of investment on transport and communication that can reduce the transportation cost for the expansion of the international trade. It is therefore recommended that member countries formulate policies on infrastructure and transport services that will enable them improve and facilitate more trade within the region. More emphasis can be made on air transport

by improving member countries airports to the international levels standards as this will allow a faster and smooth flow of trade even to the member countries that are landlocked.

The results showed that due to trade creation that has outweigh trade diversion leading to the net effect of welfare gain, it is therefore advisable for member countries governments to promote more regional participation since the welfare gain can be distributed to the nationals in terms of development projects that are geared towards alleviating poverty in the region.

5.4 Limitations of the Study

The study shows that regional trade arrangements can promote trade between countries due to trade creation effect causing demand that can increase the income effect that far outweigh the trade diversion effect with the rest of the world. However, the study has faced some limitations that need to be highlighted. The study has used the gravity model with aggregated panel data posing challenges in making conclusions at sectoral level (specific commodity data) that demands the use of a disaggregated data set. There was also the challenge on how the zero trade values were to be factored in the data set. This is because some countries do not report their trade values or the figures are below zero for particular time periods, hence recorded as zero trade values.

REFERENCES

- Alemayehu, G. (2002). *Finance and Trade in Africa: Macroeconomic Response in the World Economy Context*, Palgrave McMillan.
- Alemayehu, G. (2006). *Theory of Customs and Economic Integration in Africa: Trade Policy II*.
- Alemayehu, G. and Kibret, H. (2002). *Regional Economic Integration in Africa: A Review of Problems and Prospects with a Case Study of COMESA*. Working Paper, Addis Ababa University, Department of Economics, Addis Ababa.
- Amponsah, W. A. 2002. Analytical and empirical evidence of trade policy effects of regional integration: implications for Africa, downloaded 8 June 2012, <http://www.uneca.org>.
- Anderson, J., and E.V. Wincoop (2003). "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review* 106.
- Balassa, B. (1967), Trade Creation and Trade Diversion in the European Market. *The Economic Journal*, 77(305), 19-24
- Balassa, B., and Stoutjesdjk, A. (1975). Economic Integration Among Developing Countries. *Journal of common market studies*, 14(1),25-27
- Bhagwati, J. (1993), "Regionalism and Multilateralism: An Overview," *In Jaime De Melo and Arvind Panagariya (eds.) New Dimensions in Regional Integration*, Cambridge: Cambridge U. Press: pp. 22-51.

- Brown, Drusilla, Alan Deardorff, and Robert Stern, (1992), "A North American Free Trade Agreement: Analytical Issues and a Computational Assessment," *World Economy* 15, 11-29.
- Cernat, L. (2001), Assessing Regional Trade Arrangements: Are South-South RTAs More Trade Diverting? *Global Economy Quarterly*, 2(3), pp. 235-59.
- Cernat, L. 2003. Assessing South-South regional integration: same issues, same metrics. Policy Issues in International Trade and Commodities Study Series, No. 21.
- Cheng, I. H., Wall, H. J. (2005). Controlling for Heterogeneity in Gravity Model of Trade and Integration. *The Federal Reserve Bank of St. Louis Review*, 87(1), 49-63.
- Clausing, K. A. (2001). Trade Creation and Trade Diversion in the Canada-United States free trade agreement. *Canadian Journal of Economics*, 34(3):677-696
- Coulibaly, S. (2004). "On the Assessment of Trade Creation and Trade Diversion Effects of Developing RTAs," Paper Presented at the Annual Meeting 2005 of the Swiss Society of Economics and Statistics on Resource Economics, Technology, and Sustainable Development.
- Endoh, M. (1999), Trade Creation and Trade Diversion in the EEC, the LAFTA and the CMEA 1960-1994, *Applied Economics*, (31), 207-16.
- Flynn, S. I. 2008. Trade Creation and Diversion. Ebsco research starters, viewed 19 June 2012, <http://web.ebscohost.com>.

- Foroutan, F. (1993), *Regional Integration in Sub-Saharan Africa: Past Experience and Future Prospects*.
- Frankel, J. (1997). *Regional Trading Blocs in the World Economic System*. Institute for International Economics, Washington, DC.
- Frankel, J.A., and M. Kahler (1993). *Regionalism and Rivalry: Japan and the U.S. in Pacific Asia* (Chicago: University of Chicago Press).
- Ghosh, S., Yamarik, S. (2004), "Are Regional Trading Arrangements Trade Creating? An application of Extreme Bounds Analysis", *Journal of International Economics*, 63(2), 369-395.
- Greene, W.H. (2003), *Econometric Analysis 5th Ed.*, New York University, Prentice Hall.
- Haaland, J., and Norman, V. (1992). Global production effects of European integration, in *Trade Flows and Trade Policy after 1992*, ed. L.A. Winters (Cambridge: Cambridge University Press).
- Jayasinghe, S. and R., Sarker, (2008), "Effects of Regional Trade Agreements on Trade in Agri-food Products: Evidence from Gravity Modeling Using Disaggregated Data", Working Paper 374, *Review of Agricultural Economics*, 30 (1), 61-81.
- Jayasinghe, S. and Sarker, R. (2004). Effects of Regional Trade Agreements on Trade in Agri-food Products: Evidence from Gravity Modeling Using Disaggregated

Data. Center for Agricultural and Rural Development Iowa State University
Ames, Iowa 50011-1070, Working Paper 04-WP 374.

Krishna, P. (1998). Regionalism and Multilateralism: A Political Economy Approach. *Quarterly Journal of Economics* 113 (1), 227 – 251.

Krueger, A. (1999). Trade Creation and Trade Diversion under NAFTA. *NBER Working Paper No. 7429* (National Bureau of Economic Research: Cambridge).

Kwentua, G. E. (2006), Trade creation and trade diversion effects in the EU-South Africa free trade agreement. Unpublished master's thesis. Louisiana State University.

Limao, N., and A. J. Venables (2001). “Infrastructure, Geographical Disadvantage and Transport Costs,” *World Bank Economic Review* 15, 67-77.

Longo, R. and K. Sekkat, 2004. “Economic obstacles to expanding intra-African trade”. *World Development*, 32(8), 1309–21.

Matyas, L. 1998. The gravity model: some econometric considerations. *The World Economy*, 21(3), 397-401.

Musila, J. W. (2005). The Intensity of Trade Creation and Trade Diversion in COMESA, ECCAS, and ECOWAS: a comparative analysis. *Journal of African Economies*, 14(1), 117-141.

Mutharika, B.W (1972). Towards Multinational Economic Cooperation in Africa. New York, Praeger Publishers.

- Ogunkola, E.O. 1998. *An Empirical Evaluation of Trade Potential in the Economic Community of West African States*. AERC Research Paper No. 84. African Economic Research Consortium, Nairobi.
- Panagariya, A. (2000), Preferential Trade Liberalization: The Traditional Theory and New Developments. *Journal of Economic Literature*, 38(2), 287-331.
- Poyhonen, P. (1963). A Tentative Model for the Volume of Trade between Countries, *Weltwirtschaftliches Archiv*, (90), 93-99.
- Sarker, R., Jayasinghe, S. (2007). Regional trade agreements and trade in agri-food products: evidence for the European Union from gravity modeling using disaggregated data. *Agricultural Economics*, (37), 93-104.
- Schwanen, D. (1997). 'Trading up: The Impact of Increased Continental Integration on Trade, Investment, and Jobs in Canada,' C.D. Howe Institute Commentary.
- Soloaga, I and Winters, L.A. (2001). 'How has Regionalism in the Nineties Affected Trade?' *North American Journal of Economics and Finance*, (12), 1-29.
- Stahl, H.M. (2005) "East African Community Customs Union Tariff Liberalization: Impacts in perspective", EAC 2005. EAC Secretariat, Arusha, Tanzania.
- Tinbergen, J. (1962), *Shaping the World Economy: Suggestions for an International Economic Policy*, New York, NY: Twentieth Century Fund.

United Nations Statistics Division. 2009a. Commodity trade statistics database (COMTRADE), accessed 24 July 2012, <http://comtrade.un.org/db>.

United Nations Statistics Division. 2009b. Millennium Development Goals, accessed 24 July 2012, <http://mdgs.un.org/unsd/mdg>.

Viner, J., 1950. *The Customs Union Issue* (Carnegie Endowment for International Peace: New York).

Willmore, L.N. (1976). Trade Creation, Trade Diversion and Effective Protection in the Central American Common market. *Journal of development studies*, 27(3), 18-25

World Trade Organization. 2009b. Regional trade agreements gateway, viewed 21 June 2012, <http://www.wto.org>.

Yeats, A.J. (1997). "Does MERCOSUR's Trade Performance Raise Concerns about the Effects of Regional Trade Arrangements?" *World Bank Economic Review*, 12(1), 112-148

APPENDIXES

Appendix 1

COMESA member countries included in the sample are; Burundi, Comoros, D.R Congo, Djibouti, Egypt, Ethiopia, Libya, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Sudan, Seychelles, Uganda, Zambia and Zimbabwe.

Appendix 3

Appendix 3 presents all the tests and regressions that were run on the final data for the study.

Appendix 3.1: Descriptive Statistics

```
cntry: 1, 2, ..., 1039          n =      1039
yr:    2006, 2007, ..., 2010    T =         5
Delta(yr) = 1 unit
Span(yr)  = 5 periods
(cntry*yr uniquely identifies each observation)
```

Distribution of T_i: min 5% 25% 50% 75% 95% max
 5 5 5 5 5 5

Freq.	Percent	Cum.	Pattern
1039	100.00	100.00	11111
1039	100.00		XXXXX

Appendix 3.2: OLS model

Source	SS	df	MS			
Model	136238.873	8	17029.8591	Number of obs =	5195	
Residual	73015.2793	5186	14.0793057	F(8, 5186) =	1209.57	
Total	209254.152	5194	40.2876689	Prob > F =	0.0000	
				R-squared =	0.6511	
				Adj R-squared =	0.6505	
				Root MSE =	3.7522	

lnexport	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lngdp_i	1.516813	.0251815	60.24	0.000	1.467446	1.566179
lngdp_j	1.134791	.0342641	33.12	0.000	1.067619	1.201963
lnpop_i	-.0702134	.034799	-2.02	0.044	-.1384341	-.0019927
lnpop_j	.1210245	.0313711	3.86	0.000	.059524	.1825251
lndist_ij	-1.273028	.0639473	-19.91	0.000	-1.398392	-1.147665
comesa1	.0833256	.2098438	-0.40	0.691	-.4947079	.3280566
comesa2	.4092107	.1492299	2.74	0.006	.1166572	.7017643
comesa3	-.0660828	.2052658	-0.32	0.748	-.4684902	.3363246
_cons	-41.36455	1.065767	-38.81	0.000	-43.4539	-39.2752

Appendix 3.3: Random Effect Model

Random-effects GLS regression	Number of obs =	5195
Group variable: centry	Number of groups =	1039
R-sq: within = 0.0131	Obs per group: min =	5
between = 0.6817	avg =	5.0
overall = 0.6487	max =	5
	Wald chi2(8) =	2181.54
corr(u_i, X) = 0 (assumed)	Prob > chi2 =	0.0000

lnexport	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lngdp_i	1.385129	.050196	27.59	0.000	1.286746	1.483511
lngdp_j	.9327972	.0648305	14.39	0.000	.8057317	1.059863
lnpop_i	.0289459	.0718185	0.40	0.687	-.1118158	.1697076
lnpop_j	.1846584	.0649537	2.84	0.004	.0573514	.3119653
lndist_ij	-1.197397	.1338276	-8.95	0.000	-1.459694	-.9350994
comesa1	.1519643	.4400987	-0.35	0.730	-1.014542	.7106133
comesa2	.4043092	.3130317	1.29	0.196	-.2092216	1.01784
comesa3	-.8124192	.4135551	-1.96	0.049	-1.622972	-.0018661
_cons	-35.94142	2.107195	-17.06	0.000	-40.07144	-31.81139
sigma_u	3.4252384					
sigma_e	1.5441162					
rho	.83109936	(fraction of variance due to u_i)				

Appendix 3.6: Wooldridge Test for Autocorrelation

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 1038) = 8.175

Prob > F = 0.0043