

Addis Ababa University
School Of Graduate Studies

***The Role of COMESA in Growth
and Development of Ethiopia***

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A Thesis Submitted to

The Department of Economics

Presented in Partial Fulfillment of the Requirements

for the Degree of Master of Arts in Economics

(Applied Trade Policy Analysis)

Addis Ababa, Ethiopia

June 2012

Addis Ababa University
School of Graduate Studies

This is to certify that the thesis prepared by Fikadu Mindaye, entitled: *The Role of COMESA in Growth and Development of Ethiopia* and submitted in partial fulfillment of the requirements for the degree of Degree of Master of Arts in Economics (Applied Trade Policy Analysis) compiles with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

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Addis Ababa University, 2012

Researches and different publications used to report that Africa in general and Ethiopia in particular has been registering economic growth in the past five to ten years. Most theories and literatures claim that growth comes either from trade through regional integration or sound macro-economic policies. The main reason to regional integration is to create and divert trade so that there will be considerable gains. Recently seen economic growth of Ethiopia has to be assessed by studying the case of COMESA (as a regional bloc) if it has any role in playing in this growth achievement. This study uses panel data analysis in all 19 member countries during 2003 – 2011 with static linear model regression over 171 observations. Crucial growth indicating variables are injected to the model. Different authors used different methodologies, like CGE and Gravity models to see the bilateral and multilateral effects of regional integration and conclude their findings. By this study the concern is to look into country specific policy and preference effects over the entire observation. So the role of COMESA to Ethiopia would be seen by the effects across variables and observations. Finally based on the analysis conclusions from general to specific scenarios has been derived and policy implications have been sited at the end.

ACKNOWLEDGEMNET

I thank GOD for satisfying my long term dream and his mother St. Mary. Dr Said Hassen receives my best gratitude for his kind support, advice and comment in finalizing this document. Stata software commands initiation and support has been another complement, in this regard I wish to thank Mussie Mindaye for giving me this motivation. This document needs to be considered as gift to my mother Tsigie Segni for her continuous encouragement to compose and successfully finalizing this M.A program.

CHAPTER ONE: INTRODUCTION

1.1. Back ground of the study

Regional trade integration contributes to economic growth and development either by trade creation or trade diversion. Economic development is an effort by policy intervention that aims economic and social wellbeing of the people that is perceived from changes *in terms of trade*, while economic growth is a rise in GDP, that is, an increase in the volumes of goods and services produced and exchanged. After 1970's closed world economy has been opened their border for the sake of free trade and comparative advantage which resulted to a world trade increase since 1975-2000 in the global market. (W.Sawyer and R.L. Sprinkle 2004).

Africans slower and stagnant stages of development for the past five centuries started to follow the suite developed countries. Africans won independence in the 1950s and 1960s that gradually created the idea of regional economic cooperation due to pan African solidarity. In 1965 UNECA convened a meeting to consider proposals for regional economic integration for independent states of eastern and southern African nations. (Encarta 2009 and COMESA website)

Then through process Common Markets for Eastern and southern Africa (COMESA) officially established in 1994 with 19 member states. This period has been a time that most African countries took reforms to liberalizing trade by removing barriers to trade since 1990 (Jones, Murrays 2000). These countries agreed to co-operate and work together to exchange natural and human resources in forming large economic and trading units to overcome barriers to individual states and has a strategy to economic prosperity.

In the developed economies regional integrations, for instance, in NAFTA and EU worked effectively and there was a considerable gain from trade while in Africa there are about 10

regional integration units in which none of them seems working effectively. COMESA as regional integration units have problems associated with backwardness, existence of high poverty level, lack of economic base, weak infrastructural development and communication, inability to use modern technology, the existence of global challenges, and lack of capacity to make decisions with regard to WTO membership, prevalence of war, internal conflicts and environmental issues. In line with removing barriers of trade reducing problems associated with individual member countries is a must.

COMESA has a large market potential with a population of over 443 million people, GDP of over 360 billion, annual import of around US\$ 138.2 billion and export of US\$ 114.8 billion that formed a major market place for both internal and external trading and have land area that covers about 12 million sq.km. According to Alemayehu and Haile, intra-African trade is not small compared to expectations. Moreover, much progress has been made since 2000 when 9 member countries reduced tariffs to 0%, but little has been made to integrate the remaining countries. The availability of this resource potential needs to be evaluated in terms of growth and development of individual countries.

To see the effect on individual countries the assessment has been carried-out individually and in comparison with the overall regional bloc. Ethiopia is a member of COMESA from 1981 with a population of 82.9 million is second most populous country in Sub-Saharan Africa. Since 1990's this country pursued a development strategy based on a mixed economy of both state and private enterprises. According to MOFED report, Policy changes pushed the economy to register economic growth in the past 8 consecutive years (2003-2011) with 11.4% annual average growth rate of GDP.

On the other hand, total export of Ethiopia has increased in the last eight years from 473.4 million USD to 2147.4 million USD from 1997 to 2010. The growth of this total export is 4.5 fold and export has been increasing by 20% every year. Ethiopia exported 12.5 billion dollar during 2003-2011, out of this total world export 1.4 billion USD has been exported to COMESA which has only 4%. Ethiopia import share from COMESA during this period has been 3.8%.

Finally, the above issues and other detailed investigations have been carried out in the consecutive pages of this paper. By employing panel analysis individual country effect is investigated. Chapter one contains introductory details, in chapter two Literature review, in chapter three Data, methodology and model specification are explained. Chapter four contains Econometric panel data output analysis and at the end of the chapter conclusions and recommendations are included for COMESA trade and for Ethiopia in particular.

1.2.Statement of the problem

It is well known that trade is created when countries form integration among themselves. This has been seen in developed countries trade integration like NAFTA, EU and other regional blocs. Through collaboration and coordination developed countries gained from trade because they have strong economic ties and bases. Having this bench mark developing countries have started to form regional integration and act as their developed countries counterparts. Africa regional integration has a long history that started in 1910 (SACU) and 1919 (EAC) and there are about 10 or so trade integration organizations. But success results have not been seen significant (Alemayehu and Haile, 2002).

Why African trade integration schemes are not successful to support and strengthen the growth of their individual economy? There are a lot of issues that could impede this integration process

in COMESA countries. African economy depends on agriculture that does not satisfy their own nation's need because of backward farming that does not incorporate technologies so as to have enough production. Due to this backwardness, highest poverty level and lack of economic base and infrastructural development remained the major characteristics problems of this bloc. The overall impact would be seen to influence the economic development to stay with lower living standards and slow contribution to growth due to absence of comparative advantage.

Similarly, out of 19 members of COMESA 10 countries are the poorest in the world and seven countries are the most distressing that cannot function as a modern nation. COMESA has not been effective since its formal establishment in the past 17 years. Much progress has been made since 2000, when 9 member countries reduced tariffs to 0%, but little has been made to integrate the remaining countries. In addition COMESA's slow speed of success lies on forcing African nations to liberalize their economies without any special incentives which discourage the development of an intra-African trading network. Besides similar structural adjustment programs that forces to reduce imports by one nation reduces exports of other nations.

The mono-crop economies of African nations affected COMESA's activity to create trade because they are offering the same product. Failure to implement signing agreement because of sending unqualified or unauthorized officials to COMESA meetings to make any decision on issues discussed has been found another problem. Other economic groupings are also problems for COMESA because half of members of COMESA are in SADC and two of COMESA's members are in EAU. So if COMESA liberalize trade between all member countries, then other sources of economic integration that have fewer members is irrelevant. Existence of war effects that compels them to reconstruction, unstable political institutions and unequal effect of regional

integration due to different sizes of economies invalidate past progress of COMESA. African nations support local industries until they are able to compete globally.

Finally, environmental issues like drought and weather variability also have a huge effect on integration in reducing the output from agriculture so that the integration result has not been successful. Therefore, those and other problems have contributed to COMESA's lower effectiveness. Some of the problems are unsolvable and some of the issues could be worked upon it through time. Thus regional integration has proven time and again to be helpful to countries involved. COMESA is not failing but progress has been made and nothing can be expected to happen overnight. Thus, to turn away from COMESA would be a mistake. Rather, the problems facing COMESA integration problems need to be recognized discussed and solved in order to achieve one of the objectives targeted.

Such questions as what are the trade flows of COMESA member countries? Is conventional determinants of bilateral trade flows are relevant in COMESA members? What is the role and benefit of COMESA to Ethiopia? These and other issues motivated me to undertake the study. Accordingly, the study examines the issue by using standard specification and fitting a panel data analysis model to evaluate the impact of COMESA intra trade on economic growth of members and evaluate the benefits and roles of COMESA to Ethiopia, in particular.

1.3. Objectives of the study

1.3.1. General Objective

The general objective of the study is to assess and analyze the economic role of COMESA to Ethiopia in comparison with other member countries growth and development by employing and panel data analysis.

1.3.2. Specific Objectives

- To find out and analyze the contribution of COMESA membership to economic development and growth of Ethiopia and other selected member countries.
- To see and determine the impact of this integration and cooperation and decide what problems prevailed?
- To examine trade policy issues with regard to COMESA countries.
- To interpret results and recommend possible trade policies based on findings.

1.4. Research questions

- What factors determine trade performance in COMESA?
- Did regional bloc benefit Africans as developed countries?
- Does this integration contribute to development and growth of Ethiopia and other member nation?
- Is COMESA, as a regional integration unit, successful?
- Are the existing problems does impede groups and individual countries face to foster their economy through integration on trade?

1.5. Hypothesis of the study

- i) There is a positive but insignificant growth of trade in COMESA countries and Ethiopia
- ii) In cross-section, the mean growth rate shows no variation with the level of per capita income
- iii) Growth in the volume of trade is positively correlated with growth in output/GDP
- iv) Population growth rates are negatively correlated with the level of income.

1.6. Methodology, Sampling and data source

1.6.1. Sampling Technique and the model

The sampling technique for the study has been conducted by the following model. Would be conducted by taking nine FTA involved COMESA member countries, from 2003-2011 out of 19 member countries. This nine countries are situated in eastern part of Africa; namely, Ethiopia, Sudan, Djibouti, Kenya, Madagascar/Mauritius. I collected data for all years on GDP, Population, total export and import of all countries, amount of exports and imports exported and imported to COMESA. Therefore, the model specification would be:

$$\text{GDP}_{it} = \beta_1 + \beta_2 \text{popn}_{it} + \beta_3 x_{it} + \beta_4 m_{it} + \beta_5 \text{comx}_{it} + \beta_6 \text{comm}_{it} + \beta_7 \text{comtot}_{it} + \beta_8 \text{gdppercapita}_{it} + \Sigma_{it}$$

gdp_{it} = gross domestic product of country i , at time t , $i=1-9$ and $1-10$ and $t=2003-11$

popn_{it} = population growth of country i at time t ; x_{it} = Total export of country i at time t ;

m_{it} = Total import of country i at time t ; comx_{it} = Export to COMESA by country i , at time t ,

comm_{it} = Import from COMESA by country i , at time t ,

comtot_{it} = Terms of Trade from COMESA trade for country i at time t

Σ_{it} = error term

GDP is measured in million dollars, population of each country in million, total export and total import value in million dollars. The variables GDP and population reflects anticipation of growth rate that comes out of trade integration. In this approach Ethiopians trade performance, benefits, the contribution to growth and development would be discussed.

1.6.2. data source

Secondary data is the main source for this paper. They are:

- Books, Articles, Publications, and magazines, Ministry of Trade, Ministry of Finance and Economic Development, National Bank and others.
- Different web sites like, Trade Map (website), WTO, OECD, UNCTAD, UNECA and others.

1.7. Significance of the study

This topic of study is significant because of the following reasons. First, scholars have not been said more about this issue in detail, second only very few researchers have tried to relate regional integration role in development and growth of nations. So filling the gap in this research is the other concern to this study. Thirdly, this study could help to be elaborated more and would be crucial to future career if those concerned applied it in real life actions.

1.8. Limitation and scope of the study

Any study has limitations and critics either in methodology, source and method of data usage, analysis and interpretation. This research is exposed to data inconsistencies, shortages and methodology. In addition, the countries selected in this study may have different macro-economic policies, level of participations in economic integration and monetary unions. As a result generalization might have some draw-backs.

Chapter Two: Literature Review

2.1 Theoretical Review

Regional integration is a process in which states enter into a regional agreement in order to enhance regional cooperation through regional institutions and rules. Philippe De Lombaerde and Luk Van Langenhove defined regional integration as a worldwide phenomenon of territorial systems that increase the interaction between their components and create new forms of organization, co-existing with traditional forms of state-led organization at the national level. It is a process by which states within a particular region increase their level of interaction with regard to economic, political, security, and social and cultural issues depending on the willingness and commitment of independent sovereign states to share their sovereignty.

2.1.1 Regional Economic Integration

The issue of international trade and economic growth has gained substantial importance with the introduction of trade liberalization policies on the globe following the formation of General Agreement on Tariffs and Trade (GATT), the present World Trade Organization (WTO), in 1945. Since its formation, the developed and developing countries have experienced various economic integration to boost their economic growth from the benefit that international trade bring. The degree of economic integration is categorized into five stages: Preferential trade area (PTA), Free Trade area (FTA), Customs Union (CU), Common Market, and Economic and monetary union. In a PTA members grant tariff preferences amongst them while in an FTA, members move towards zero or near-zero tariff level amongst them on substantially all trade. In a Customs Union, members, in addition, have a common external tariff on products coming from outside the union. Even movement of factors of production is allowed in the case of common

market. In the case of economic and monetary union, harmonization of various economic policies, including monetary policies, are also effected.

Theoretically, the stage of regional integration is adopted in sequence depicting deeper economic integration process. In reality, however, countries have embarked up on regional integration without, at times, following the strict sequence of different stages of integration. The main reason behind regional trade integration is absorbed in the theories of *trade creation* and *trade diversion*.

2.1.2 Regional Trading Blocs as Promoters of Global Trade

It is estimated currently that almost three-fourth of global trade is conducted under RTA, (RIS 2005). About 250 regional trading agreements (RTAs) have been notified to the GATT/WTO up to the year 2002. It is this sense that regional trading blocs have emerged as promoters of global trade. RTAs improve the welfare of a country if the positive effect of trade creation outweighed the negative effects of trade diversion. To highlight the differences in theories and practice of a RTA, it would be worthwhile to analyze some of the cases of regional trading agreements in different parts of the world.

- i. **European Union (EU):** The EU is considered to be the most telling example of a customs union as well as monetary and economic union.
- ii. **North American Free Trade Agreement (NAFTA):** NAFTA is successful regional trading bloc which has brought welfare gains to the participating countries through the effects of trade creation.
- iii. **Asian Pacific Economic Cooperation (APEC):** Although APEC appears to be high on its Agenda, the actual progress has been invisible in terms of trade and investment integration primarily due to disparate membership and very wide agenda.
- iv. **Association of South East Asian Nations (ASEAN):**
The comprehensive economic integration of ASEAN reveal that it is a successful regional trading bloc in developing world taking the advantages of trade creation.

v. Southern Common Market (MERCOSUR)

MERCOSUR, which is a customs union and a common market is one of successful regional trading blocs in developing world. Moreover, it is more deeply integrated than ASEAN.

2.1.3. The Historical Origin of COMESA

2.1.3.1 Overview

The history of COMESA can be traced as far back as the mid-sixties. During this period, the United Nations Economic Commission for Africa (ECA) proposed the division of the continent in to four sub-regions: Eastern and Southern, Central, West, and North Africa. in October 1965, the ECA convened a ministerial meeting of the then politically independent states of eastern and southern Africa to consider proposals for the establishment of a mechanism for the promotion of sub-regional economic integration in Lusaka, Zambia. The meeting recommended the creation of an Economic Community of Eastern and Southern African states and recommended, also, an Interim Council of Ministers to achieve the objective. In May 1966 in Addis Ababa, Ethiopia, the Terms of Association to govern the interim arrangements before the signing of the formal Treaty were adopted and signed by Burundi, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Somalia, Tanzania, and Zambia.

The collapse of the federations in Eastern and Central Africa, the destabilization of the economies of the Southern African states by apartheid, and the recognition of Eastern and Southern African states to adopt self-sustaining development measures in all sectors, in 1970's, increase the need for a sub-regional economic arrangements. After preparatory work had been completed, the Heads of States and Government was convened in Lusaka on December 21, 1981 and established the Preferential Trade Agreements (PTA). The PTA Treaty envisaged its transformation into a Common Market and the Treaty established COMESA was signed on 5th

November 1993 in Kampala, Uganda. It was ratified a year later in Lilongwe, Malawi on 8th December 1994.

The process of economic integration in Eastern and Southern Africa has, therefore, not been episodic, but rather systematic, following a logical progression on step by step basis. Firstly, a Preferential Trade Area was established and operated for over a decade, which then transformed into a common market. The third phase will evolve the eventual establishment of the Economic Community.

2.1.3.2 COMESA's Objectives

- to attain sustainable growth and development of the member States by promoting a more balanced and harmonious development of its production and marketing structures;
- to promote joint development in all fields of economic activity and the joint adoption of macro - economic policies and programs; to raise the standard of living of its peoples, and to foster closer relations among its member States;
- to co-operate in the creation of an enabling environment for foreign, cross-border and domestic investment, including the joint promotion of research and adaptation of science and technology for development;
- to co-operate in the promotion of peace, security and stability among the member States in order to enhance economic development in the region;
- to co-operate in strengthening the relations between the Common Market and the rest of the world; and
- to contribute towards the establishment, progress and the realization of the objectives of the African Economic Community.

The COMESA agenda is to deepen and broaden the integration process among member States through the adoption of more comprehensive trade liberation measures such as the complete elimination of tariff and non-tariff barriers to trade and elimination of customs duties through

- the free movement of capital, labor, goods, and the right of establishment; by promoting standardized technical specifications, standardization and quality control;

- the elimination of controls on the movement of goods and individuals; by standardizing taxation rates, and conditions regarding industrial co-operation, particularly on company laws, intellectual property rights and investment laws;
- the promotion of the adoption of a single currency and the establishment of a Monetary Union; and
- the adoption of a Common External Tariff (CET).

2.1.3.3 COMESA Achievements

COMESA, as well as its predecessor the PTA, has achieved a lot in the area of trade, customs, transport, development finance and technical co-operation. Impressive progress has also been made in the productive sectors of industry and agriculture.

- Trade facilitation and trade liberalization measures are bearing fruit. Intra-COMESA trade has grown from US\$834 million in 1985 to US\$ 1.7 billion in 1994, with an annual growth rate of 14%,
- As a result of COMESA traffic facilitation measures, transport costs have been reduced by a factor of about 25% and efforts are underway to reduce them further.
- In the sector of telecommunications, special emphasis has been placed on network development to enable direct telecommunication links through more reliable infrastructure in order to avoid third country transit systems, which prove to be very costly.
- COMESA has established several important institutions including the PTA Trade and Development Bank (Kenya), the COMESA Clearing House (Zimbabwe), the COMESA Re-insurance Company (Kenya), COMESA Association of Commercial Banks (Zimbabwe), and the COMESA Leather and Leather Products Institute (Ethiopia).
- COMESA now recognizes that in order to increase levels of intra-regional trade, there is a need to address the regulatory and policy aspects of transport and communications to make the movement of goods, services and people between countries in the region easier and cheaper; to create a legal framework and enabling environment within which private sector business can operate effectively in the region, and to harmonize macro- economic and monetary policies.
- COMESA also recognizes the need to promote investment in the region and addresses this issue through facilitation of bilateral agreements; promoting export drives by individual member

States, and identifying specific projects which have the potential to act as growth poles between two or more member States.

2.1.4. Theoretical Specification of Growth and Development of Regional Trade.

Adam Smith and David Ricardo, the pioneer classical economists, proposed countries would gain from trade through specialization, comparative and absolute advantage. Since then, particularly after the formation of the WTO, trade has acted as an important engine of growth for countries at different stages of development, not only by contributing to a more efficient allocation of resources within countries, but also by transmitting growth from one part of the world to another.

The proliferation of regional trade agreements has raised concerns regarding the prospects of multilateral trade liberalization. The 1990s, particularly, have seen the progressive globalization of economic activity and an increased economic interdependence between countries. Sustainable economic growth is achieved through trade liberalization and regional integration. Integration tends to promote higher growth through such channels as improved resource allocation, greater competition, technology transfers and learning, and improved access to foreign capital.

In literature, there are various theoretical specification of regional trade, its relation with economic growth, and trade analysis models. Some of them are highlighted below:

a) The Gravity Model

The traditional gravity model drew on analogy with Newton's Law of Gravitation. A mass of goods or labor or other factors of production supplied at origin i , Y_i , is attracted to a mass of demand for goods

or labor at destination j , E_j , but the potential flow is reduced by distance between them, d_{ij} . Applying the analogy,

$$X_{ij} = \frac{Y_i E_j}{d_{ij}^2}$$

gives the predicted movement of goods or labor between i and j , X_{ij} . Tinbergen (1962) was the first to use gravity to explain trade flows. The model applies more naturally to disaggregated goods and factors. The extension to disaggregated goods, indexed by k , is straightforward.

$$X_{ij}^k = \frac{Y_i^k E_j^k}{Y^k} = s_i^k b_j^k Y^k$$

Here $s_i^k = Y_i^k / Y^k$ is country i 's share of the world's sales of goods class k and $b_j^k = E_j^k / Y^k$ is country j 's share of the world spending on k , equal to world sales of k , Y^k . The notation and logic also readily apply to disaggregation of countries into regions, and indeed a prominent portion of the empirical literature has examined bilateral flows between city pairs or regions, motivated by the observation that much economic interaction is concentrated at very short distances. From above equation a number of useful implications can be generated.

- big producers have big market shares everywhere,
- small sellers are more open in the sense of trading more with the rest of the world,
- the world is more open the more similar in size are countries and the more specialized are countries,
- the world is more open the greater the number of countries, and
- world openness rises with convergence under the simplifying assumption of balanced trade.

The Gravity model explains the size of bilateral international trade between countries. It models the flow of international trade between a pair of countries as being proportional to their economic mass (read national income) and inversely proportional to the distance between them. It has a remarkably consistent history of success as an empirical tool.

b) The CGE Model

Computable general equilibrium (CGE) models explicitly capture all of the flows of factors and commodities in an economy. Unlike Input-Output Analyses, which focus on the production side of the economy and rely on exogenous multipliers to estimate demand effects, CGE models include income flows, distributional effects, and changes in behavior. By modeling both producer and consumer behavior, CGE models are able to estimate how policy effects will ripple through the entire economy in a manner consistent with economic theory.

The “general equilibrium” component of CGE modeling requires a comprehensive market coverage in which all sectors in the economy are in balance and all economic flows are accounted for. Every commodity that is produced must be purchased by firms or consumers within the country or exported to foreign consumers. Prices of these goods reflect all costs of production. In aggregate, all markets must clear, meaning that supplies of commodities and factors must equal demand, and the income of each household must equal its factor endowments plus any net transfers received.

2.1.5. Conceptual Analysis of Regional Trade, Growth and Development

Trade theory deals with national units with a single difference – whether each one is capable of affecting international relative prices. Low levels of development imply limited productive basis, hence limited capacity to generate savings, to produce foreign currency and therefore limited availability of resources to invest. The area in trade theory that deals more closely with these issues is the theory of protection, in its complementary dimensions of positive theory, normative prescriptions and the political economy of protection. Nevertheless the actual treatment of the effects of trade for output growth is not as exhaustively dealt with as the effects of growth on trade.

Orthodox reasoning would argue that there is no first-best argument for maintaining trade barriers, as productive efficiency would be maximized when factors are allocated in accordance to the presumed (static) comparative advantages. Yet there is no totally open economy: the world does not correspond to 'first-best' presumptions. Orthodoxy would also argue that there is no case for trade preferential agreements, since multilateral opening would provide the best price signaling. Yet one sees an increasing number of agreements and an intensification of regional trade flows. (ECLAC, 2000).

Closer integration of neighboring economies is seen as a first step in creating a larger regional market for trade and investment. This works as a spur to greater efficiency, productivity gain and competitiveness, not just by lowering border barriers, but by reducing other costs and risks of trade and investment. Bilateral and sub-regional trading arrangements are advocated as development tools as they encourage a shift towards greater market openness. Such agreements can also reduce the risk of reversion towards protectionism, locking in reforms already made and encouraging further structural adjustment.

2.1.6. Determinant of Growth and development

i) Theoretical Perspective

The starting point of conventional economic growth theorization is the neoclassical model of Solow (1956). The model highlights the savings or investment ratio as important determinant of short-run economic growth. Technological progress, though important in the long-run, is regarded as exogenous to the economic system and therefore it is not adequately examined by this model. Regarding convergence/divergence, the model predicts convergence in growth rates on the basis that poor economies will grow faster compared to rich ones.

Endogenous growth theories put in scrutiny the role of technological progress as a key driver of long-run economic growth, propose that the introduction of new accumulation factors, such

as knowledge, innovation, etc., will induce self-maintained economic growth. Triggered by Romer's (1986) and Lucas' (1988) seminal studies highlighted three significant sources of growth: new knowledge, innovation, and public infrastructure. As a result, and in contrast to the neoclassic counterpart, policies are deemed to play a substantial role in advancing growth on a long-run basis. As convergence/divergence is concerned, the model suggest that convergence would not occur at all mainly due to the fact that there are increasing returns to scale.

Another strand of literature is the growth theory of *cumulative causation* developed by Myrdal (1957) and Kaldor (1970). The theory argued that initial conditions determine economic growth of places in a self-sustained and incremental way. As a result, the emergence of economic inequalities among economies is the most possible outcome. Similarly, the New Economic Geography (NEG) asserts that economic growth tends to be an unbalance process favoring the initially advantaged economies (Krugman, 1991).

From a more macro perspective, other theoretical approached have emphasized the significant role of non-economic factors play on economic performance. Thus, *institutional economics* has underlined the substantial role of institutions (Jutting, 2003), *economic sociology* stressed the importance of socio-cultural factors (Knack and Keefer, 1997), *political science* focused its explanation on political determinants (Lipset, 1959) and others shed light on role played by **geography** (Gallup, 1999) and **demography** (Kalemli-Ozcan, 2002)

ii) *Determinants of Economic Growth and Development*

Investment is the most fundamental determinant of economic growth identified by both neoclassical and endogenous growth models (Mankiw. 1992). *Human capital* is another

important source of growth in several endogenous growth models. *Innovation and R&D* activities can play a major role in economic progress increasing productivity and growth. In the economic growth literature *openness to trade* has been used extensively as a major determinant of growth performance. Openness is usually measured by the ratio of exports to GDP (Dollar, 1992; Edwards, 1998).

Other determinants of economic growth and development include: The relation between political factors and economic growth has come to the fore by the work of Lipset (1959) who examined how economic development affects the political regime. At the most basic form, political instability would increase uncertainty, discouraging investment and eventually hindering economic growth,

- **Economic policies and macroeconomic conditions** (Kormendi & Meguire, 1985),
- **Foreign Direct Investment (FDI),**
- **Institutional framework,**
- **Geography** the important role of geography on economic growth has been long recognized. (Armstrong and Read, 2004) affirming that natural resources, climate, topography and 'landlockedness' have a direct impact on economic growth affecting productivity, economic structure, transport costs, and competitiveness.
- **Demographic Trends:-** such as population growth, population density, migration and age distribution, seem to play the major role in economic growth (Kormendi and Meguire, 1985). such as population growth, population density, migration and age distribution, seem to play the major role in economic growth (Kormendi and Meguire, 1985).
- **Composition of the population:** - it has important implications for growth. A large working-age population is deemed to be conducive to growth, whereas population with many young and elderly dependents is seen as impediment.

Various *social-cultural factors* may also affect growth (Barro and McCleary, 2003). *Trust* is an important variable that belongs to this category. Trusting economies are expected to have

stronger incentives to innovate, to accumulate physical capital and to exhibit richer human resources, all of which are conducive to economic growth; *ethnic diversity*, in turn, may have a negative impact on growth by reducing trust, increasing polarization and promoting the adoption of policies that have neutral or even negative effects in terms of growth (Easterly and Levine, 1997). Other social-cultural factors include *ethnic composition and fragmentation, language, religion, beliefs, attitudes and social/ethnic conflicts*, but their relation to economic growth seems to be indirect.

2.2 Empirical Literature Review

2.2.1 Analysis RECs in Developing Countries

The general experience of regional trade agreements in developing countries has been disappointing because they have been highly inward-looking and protectionist, with trade diversion exceeding trade creation. Typically, the existing ratio of trade to GDP has been high in the member countries and the ratio of trade with the rest of the world has also been high so that the scope for trade creation has been minimal and the potential for trade diversion has been great. Forouton (1993) concludes his study of regional integration in sub-Saharan Africa (SSA) by saying “the structural characteristics of the SSA economies, the pursuit of import-substitution policies, and the very uneven distribution of costs and benefits of integration arising from economic differences among the partner countries, have thus far prevented any meaningful trade integration in SSA”.

Recent empirical work across developing countries as a whole supports this pessimistic conclusion as far as regional trade agreements are concerned, but finds that broad trade

liberalization does lead to faster growth. Vamvakidis (1999) takes 109 cases of participation in 18 regional trade agreements over the period 1950 to 1992 and concludes that their impact on the growth rate of members has been negative. Vamvakidis also takes 51 cases of broad liberalization and finds that countries have grown faster after liberalization.

Concerning COMESA, and in contrast to the above findings, the AU reported substantial growth increases in intra-regional trade in the region from US \$3.1billion in 2000 to US \$ 13.7 in 2008. This study has further documented an increase in the three RECs' share of African trade in which the EAC share rose from 15.6% in 1995 to 21.7% in 2005 and to 33.4% in 2009. The corresponding figures for COMESA are 14.8%, 21.2% and 23.2% in 1995, 2005 and 2009 respectively. (ECA, 2011)

2.2.2 Review of Studies on COMESA

A. "Quantitative Assessment on the COMESA customs union" by Dimaranan

This study deals with the potential impacts of the COMESA customs union on intra-regional trade, trade with third countries and on real income impacts of member countries based on common external tariffs. The analysis has been carried out following the actions of economic growth from trade liberalization by regional trading agreements after African trade reforms has been made since 1990 and the launch of customs union by Dec. 2008.

The authors recognized great heterogeneity in COMESA in terms of economic characteristics (in land area, economic size, performance and dependence on trade) in trade and protection patterns. They saw high degree of dependence on third countries trade, low intra-regional trade, and higher average protection compared with the rest of the world. For instance physical areas ranges from Small Island to large countries, the inclusion of 12 LDCs of which 6 are land-locked and with 7 middle income countries. Regional per capita GDP ranges from US\$593 in Burundi to US\$14329 in Seychelles in 2005. And

economic performance in terms of GDP growth from 2001-2005 shows negative growth rate for Seychelles and Zimbabwe while Ethiopia, Libya, Rwanda, Sudan and Uganda grew by more than 5% annually.

Finally, they employ **gravity equation models and partial/general equilibrium** models to provide ex-ante assessment of free trade get that **intra-COMESA trade is not significantly different from trade with non-member countries**. The other finding is a result made by a detailed import and tariff data for 1000 commodities found that Uganda's imports from member countries between 1994 and 2003 has not been considerably increased by the preferential tariff liberalization under COMESA.

2.2.3 **Review of “Regional Economic Integration in Africa: A Review of Problems and Prospects with a Case Study of COMESA”. Dr. Alemayehu and Kibret study.**

The study starts from standard trade theory to explain regional integration rationale by stating that free trade is superior to all other trade policies. It's claimed that free trade among two or more countries will improve the welfare of the member nations by creating trade but regional agreements do not guarantee an improvement of welfare of members unless minimal trade diversion and trade creation tilts the balance. Welfare gain/losses comes from specialization, economies of scale, changes in terms of trade, forced changes in efficiency owing to increased competition and due to changes in economic growth. Finally they used gravity model to see if conventional determinants of bilateral trade flows are relevant in Africa and evaluate the impact of regional groupings by the following model.

$$T_{ij} = \beta_0 + \beta_1(Y_i Y_j) + \beta_2[(Y_i / Y_j) + (Y_j / Y_i)] + \beta_3 \text{Dist}_{ij} + \beta_4(\text{Area}_i, \text{Area}_j) + \beta_5 / (Y_i - Y_j) + [\beta_i \sum Z_i + \beta_j \sum Z_j]$$

Where T is bilateral trade between country i and j; Y is GNP; YC is GNP per capita and Zi and Zj are other relevant variables grouped under 'Infrastructure' (such as Road length per 1000 people, number of

telephone per 100 people), Policy (such as FDI, Parallel market premium, financial deepening), political (occurrence of war, coup, revolution), 'Cultural and geographic' (language, sharing border, landlocked).

The model is estimated both for bilateral imports and exports, separately. In general, the two versions essentially offer similar results and performed well except the language dummies, which have negative coefficients. They explained a previous report of negative coefficients for Arabic, and the existing empirical work for Africa reported a positive coefficient for English and French. According to this paper, the Language dummies are found to be highly correlated with the standard gravity model variables, in particular area, GDP and GDP per capita. When the model is estimated excluding these standard variables, English and French have the theoretically expected positive signs while Arabic and Swahili render theoretically implausible negative signs.

Almost all the standard gravity model variables have plausible and statistically significant coefficients. Another important result shows that good macro-economic policies (such as financial deepening and infrastructural development) are important determinants of bilateral trade in Africa. The results also show that all the proxies used to measure political instability (except war) have the expected signs. But regional integration arrangements failed to positively affect intra-regional trade. In fact, intra-COMESA trade is not significantly different from its trade with non-member countries. This is the case whether imports or exports are used to measure bilateral trade.

CHAPTER THREE: Data and Methodology

3.1. Data Description

The study consists of GDP, GDP per capita and Population data obtained from World Bank, Trade map and WTO website, Export, Import and terms of trade data's are gathered from www.trademap.org for nineteen individual COMESA countries. The data collected for 19 COMESA members represents:

Burundi, Comoros, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe.

Nominal GDP, Exports and imports are additions of all products and services are valued and adjusted in million USD. and Population for each country is measured in millions number.

Nine countries are categorized as those engaged in FTA on one hand and 10 countries are those groups refrained from FTA. The necessary tests have been conducted based on rules of panel data analysis to choose between fixed effect and random effects.

3.2. Model Specification

3.2.1. Specification of Growth Function

A wide range of studies has investigated the factors underlying economic growth and development. Using differing conceptual and methodological viewpoints, these studies have placed emphasis on a different set of explanatory parameters and offered various insights to the sources of economic growth.

a) The basic Model of the study

Therefore, based on the above condition, growth model of the individual countries due to multilateral trade among and within COMESA is specified as follows in a linear model.

Based on this initial theoretical specification, the model is specified as:

$$GDP_{it} = \alpha_1 + \beta_1 popn_{2it} + \beta_2 x_{3it} + \beta_3 m_{4it} + \beta_4 Comx_{5it} + \beta_5 com_{6it} + \beta_6 comtot_{6it} + \beta_7 gdppercapita + \epsilon_{it} \dots\dots\dots(Eq.1)$$

GDP_{it} gross domestic product of country i at time t,
 $Popn_{2it}$ population a country at time t,
 x_{3it} is total Exports of a country at time t,
 m_{4it} is Total Import of a country at time t,
 $Comx_{5it}$ Export to COMESA by a country at time t,
 $Comm_{6it}$ Import from COMESA by a country at time t, and
 TOT_{6it} Terms of trade obtained from COMESA trade by a country at time t.

b) Panel Data Analytic Models

According to an article entitled “a primer panel data analysis”, by R.Yaffee, 2003, there are several panel data analytic models, they are **constant Co-efficient models, fixed effects model, and random effects model**. Among these types of models are dynamic panel, robust and covariance structure models.

- 1) **The Constant Coefficients Model**
- 2) **The Fixed Effects Model (Least Squares Dummy Variable Model)**

Another type of panel model would have constant slopes but intercepts that differ according to the cross-sectional (group) unit—for example, the country. Although there are no significant temporal effects, there are significant differences among countries in this type of model. While the intercept is cross-section (group) specific and in this case differs from country to country, it may or may not differ over time.

$$G_{it} = a_1 + a_2 group_1 + a_3 group_2 + \beta_1 GDP_{1it} + \beta_2 Popn_{2it} + \beta_3 TX_{3it} + \beta_4 TM_{4it} + \beta_5 ComX_{5it} + \beta_6 Comm_{6it} + \beta_7 TOT_{6it} + \epsilon_{it} \dots\dots\dots eq. 2$$

Group 1: of COMESA Countries are Nine member states that formed a **free trade area** in 2000 (Djibouti, Egypt, Kenya, Madagascar, Malawi, Mauritius, Sudan, Zambia and Zimbabwe),

Group 2: with **Rwanda** and **Burundi** joining the FTA in 2004 and the Comoros and Libya in 2006 including non FTA countries (Ethiopia, DRC, Eritrea, Libya, Seychelles, Swaziland and Uganda) are categorized for this research purpose.

Another type of fixed effects model could have constant slopes but intercepts that differ according to time. In this case, the model would have no significant country differences but might have autocorrelation owing to time-lagged temporal effects. The residuals of this kind of model may have autocorrelation in the process. In this case, the variables are homogenous across the countries. They could be similar in region or area of focus. For example, technological changes or national policies would lead to group specific characteristics that may effect temporal changes in the variables being analyzed. We could account for the time effect over the t years with t-1 dummy variables on the right-hand side of the equation. In Equation 3, the dummy variables are named according to the year they represent.

$$G_{it} = a_1 + \rho_2 \text{year 2001} + \rho_3 \text{year 2002} + \dots + \rho_{10} \text{year 2010} + \beta_1 \text{GDP}_{1it} + \beta_2 \text{Popn}_{2it} + \beta_3 \text{TX}_{3it} + \beta_4 \text{TM}_{4it} + \beta_5 \text{ComX}_{5it} + \beta_6 \text{TOT}_{6it} + \epsilon_{it} \dots\dots\dots(\text{Eq.3})$$

There is another fixed effects panel model where the slope coefficients are constant, but the intercept varies over country as well as time. In Equation 4, we would have a regression model with i-1 country dummies and t-1 time dummies. The model could be specified as follows:

$$G_{it} = a_0 + a_1 \text{country}_i + a_2 \text{Country}_2 + \rho_0 + \rho_2 \text{year 2001} + \rho_2 \text{year 2002} + \dots + \rho_{10} \text{year 2010} + \beta_1 \text{GDP}_{1it} + \beta_2 \text{Popn}_{2it} + \beta_3 \text{TX}_{3it} + \beta_4 \text{TM}_{4it} + \beta_5 \text{ComX}_{5it} + \beta_6 \text{TOT}_{6it} + \epsilon_{it} \dots\dots\dots(\text{Eq.4})$$

Another type of fixed effects model has differential intercepts and slopes. This kind of model has intercepts and slopes that both vary according to the country. To formulate this model, we would include not only country dummies, but also their interactions with the time-varying covariates (Eq. 5).

$$G_{it} = \theta_1 + \theta_2 \text{Country}_2 + \theta_3 \text{Country}_3 + \dots + \theta_n \text{Country}_n + \beta_2 \text{GDP}_{2it} + \beta_3 \text{Popn}_{3it} + \beta_4 * \text{Country}_2 * \text{GDP}_{2it} + * \text{Country}_3 * \text{GDP}_{2it} + \beta_6 * \text{Country}_2 * \text{Popn}_{3it} + \beta_5 * \text{Country}_3 * + * \text{Popn}_{3it} + \dots + \epsilon_{it} \dots\dots\dots(\text{Eq.5})$$

In this model, the intercepts and intercepts vary with the country. The intercept for Country₁ would be a₁. The intercept for Country₂ would also include an additional intercept, a₂, so the intercept for Country₂ would be a₁+a₂. The intercept for Country₃ would include an additional intercept. Hence, its intercept would be a₁ + a₃. The slope for GDP_{2it} with Country₂ would be b₂ + b₄, while the slope for GDP_{2it} with Country₃ would be b₂ + b₅. One could similarly compute the slope for Popn_{3it} with Country₂ as b₃ + b₆. In this way, the intercepts and slopes vary with the country.

Fixed Effect Hypothesis Testing

We may wish to hierarchically test the effects of the fixed effects model. We use the pooled regression model as the baseline for our comparison. We first test the group (country) effects. We can perform this significance test with an F test resembling the structure of the F test for R² change.

$$F_{\text{group effects}} = \frac{(R^2_{\text{fixed}} - R^2_{\text{pooled}}) \div (n-1)}{(1 - R^2_{\text{LSDV}}) \div (nT - n - K)} \dots\dots\dots \text{eq(6)}$$

Here T=total number of temporal observations. n=the number of groups, and k=number of regressors in the model. If we find significant improvements in the R², then we have statistically significant group effects.

If the cross-sectional effects are correlated with the regressors, then the cross-sectional effects will be correlated with the group means. Ordinary least squares estimation on the pooled sample would be inconsistent, even though the within-groups estimator would be consistent. If, however, the fixed effects are uncorrelated with the regressors, the within-groups estimator will not be efficient. If there is only variation between the group means, then it would be permissible to use the between-groups estimator, but this would inconsistent if the cross-sectional errors are correlated with the group means of the repressors' (Davidson and MacKinnon, 1993).

3.2.2. Specification Tests: the difficulty of choosing between Random and Fixed Effect Models

The Hausman specification test is the classical test of whether the fixed or random effects model should be used. The research question is whether there is significant correlation between the unobserved person-specific random effects and the regressors. If there is no such correlation, then the random effects model may be more powerful and parsimonious. If there is such a correlation, the random effects model would be inconsistently estimated and the fixed effects model would be the model of choice.

The test for this correlation is a comparison of the covariance matrix of the regressors in the LSDV model with those in the random effects model. The null hypothesis is that there is no correlation. If there is no statistically significant difference between the covariance matrices of the two models, then the correlations of the random effects with the regressors are statistically insignificant. The Hausman test is a kind of Wald X^2 (Chi square) test with $k-1$ degrees of freedom (where k =number of regressors) on the difference matrix between the variance-covariance of the LSDV with that of the Random Effects model. SAS, SPSS and LIMDEP all contain the Hausman specification test. LIMDEP also contains the Bhargava and Sargan Test (1983).

3.2.3. Model Estimation

Models have to be estimated by methods that handle the problems afflicting them. A constant coefficients model with residual homogeneity and normality can be estimated with ordinary least squares estimation (OLS). As long as there is no GroupWise or other heteroskedastic effects on the dependent variable, OLS may be used for fixed effects model estimation as well. For OLS to be properly applied, the errors have to be independent and homoskedastic. Those conditions are so rare that is often unrealistic to expect that OLS will suffice for such models.

Heteroskedastic models are usually fitted with estimated or feasible generalized least squares (EGLS or FGLS). Heteroskedasticity can be assessed with a White or a Breusch-Pagan test. For the most part, fixed

effects models with groupwise heteroskedasticity cannot be efficiently estimated with OLS. If the sample size is large enough and autocorrelation plagues the errors, FGLS can be used. Random sampling and maximum likelihood iterated by generalized least squares have also been used. Beck and Katz (1995) reportedly found that if the sample size is finite or small, the total number of temporal observations must be as large as the number of panels; moreover they reportedly found that OLS with panel corrected errors provided more efficient estimation than FGLS. Robust estimation, when one has heteroskedasticity, autocorrelation, or outliers to contend with, may be performed with the general methods of moments and combination of White and Newey-West estimators to obtain robust panel standard errors.

Chapter Four: Econometric Analysis Description of Results

The objective of Trade integration is to induce countries grow and develop through comparative advantage and resource sharing. This study divides 19 COMESA countries into FTA and Non-FTA groups to test separately. FTA countries groups agreed to reduce tariff to 0% since 2000 with 9 member countries. Non-FTA groups are 10 Ethiopia group countries refrained to reduce tariff to 0%. COMESA is one of the regional integration schemes with 19 member countries including Ethiopia. The objective of this regional bloc is to foster economic growth and development. Growth could be measured through the growth of Gross Domestic Product in line with population growth, Total Export, Total Import. Besides individual countries exports and imports to COMESA (intra-COMESA trade), Terms of Trade gain (TOT) from intra-COMESA trade and GDP per capita. These are the most important variables for the model this study is to analyze.

Does regional integration increase trade between countries in COMESA because of FTA? Does FTA countries benefit from trade because of taking action by reducing tariff to 0% than those who refrained from doing so? Does this action improved individual countries, like Ethiopia, trade and GDP growth? This and other questions are addressed first the overall situation COMESA as a region and then grouped countries by FTA involved and those who refrained from taking part FTA signings.

4.1. Fixed Effects and Test Result Analysis for Overall COMESA Trade

Table 4.1 and Table 4.2 shows the fixed effects and random effects statistical results of within regression over 171 observations in 19 countries from 2003 up to 2011, R^2 within is better than R^2 between and overall to show that any treatment or policy preference to improve multilateral trade is better fitted with the model. In table1 below growth of GDP is significantly related with

population, total export and total import, and GDP per capita. But on the other hand terms of trade gained from intra-COMESA trade, export of and import from each country to and from COMESA shows insignificant result. In theory, growth of GDP should come in line with growth of population and total export and import rise due to trade between/among COMESA countries.

This has been proofed from the panel results of all COMESA countries that population, total export and import has significant results to GDP growth. Another growth indicator is GDP per capita of COMESA countries which are positively related with real GDP growth. Economic development can be measured by terms of trade increase for each country. By intuition, we can say that terms of trade is good when a country price of export over price import is increasing.

The fixed effect overall regression result of the observed data during the period is:

$$\text{gdp}_{it} = -56637.71 + 3012.7\text{popn}_{it} + 1.114\text{X}_{it} + 0.73\text{m}_{it} - 5.131\text{comx}_{it} - 7.008\text{comm}_{it} + 2.837\text{comtot}_{it}$$

(8664.453) (416.38) (0.193) (0.198) (2.898) (1.98) (1.78)

$$+ 2.37\text{gdppercapita}_{it}$$

(0.857)

R^2 within= 0.7559, R^2 between=0.6594

R^2 overall= 0.6210

Figures in parenthesis are standard errors.

Where; popn_{it} = population of overall countries in COMESA during 2003-2011, X_{it} and m_{it} is total world export and import, comx_{it} is export of each country to COMESA, comm_{it} is import of each country from COMESA, comtot_{it} is terms of trade from COMESA trade and gdppercapita_{it} is GDP over population.

This total COMESA regression result shows that when population of COMESA countries increases by one million GDP grows by 3.01 billion significantly. This indicates that those countries with large population would benefit from trade. When exports and imports increases by 1 million dollar GDP total grows by 1.1 and 0.73 million dollar respectively. Export to COMESA (comx) by each country is insignificant but have positive relationship while import

from COMESA by each country (Intra-COMESA trade) is less significant than total world imports to add to GDP growth. As a result, Intra – COMESA trade increases real GDP by 2.84 million dollar when there is a one million dollar increase in Terms of Trade (i.e. comtot). And another significant role of COMESA has been seen as a one million dollar increase in GDP per capita increases real GDP growth by 2.37 million dollar.

Therefore, COMESA in general have GDP of 477.4 billion dollar, with a population of 443.3 million people 5.7% of world population, total world export of 151.6 billion dollar and total world imports of about 170 billion dollar in 2010. This huge potential for market access and specialization have the advantage to increase production and trade. The statistical result also shows the existence of positive economic growth prospects in this integration scheme. Growth of GDP in the bloc is positively and significantly related with growth of population, total export and import, and GDP per capita. On the contrary, role of COMESA to growth seems unlikely that the statistical output shows insignificant relationship and minimum contribution to COMESA trade (i.e Intra – COMESA trade). Besides Intra-COMESA trade is less significant than total COMESA import. This leads to conclude that COMESA trade is insignificance has plays the role to Ethiopia economic growth and development.

There is significant advantage to increase production and specialization, so that the level of export and import would change. And the result also shows that population, total world export, total world import and GDP per capita significantly related to growth of GDP. The detailed output has been shown in **Table 4.1.** below.

Table 4.1. Fixed Effects Regression Results

Fixed-effects (within) regression

Group variable: nr

R-sq: within = 0.7559

 between = 0.6594

 overall = 0.6210

corr(u_i, X_b) = -0.9173

Number of obs = 171

Number of groups = 19

Obs per group: min = 9

 avg = 9.0

 max = 9

Prob > F = 0.0000

GDP	Coef	std. Err	T	p>/t/	[95% Conf. Interval]	
Popn	3012.706	416.3752	7.24	0.000	2189.758	3835.655
X	1.113632	0.1926693	5.78	0.000	0.7328285	1.494435
M	0.7304312	0.1983878	3.68	0.000	0.3383258	1.122537
Comx	-5.130301	2.897959	-1.77	0.079	-10.858	0.5973981
comm.	-7.008213	1.979896	-3.54	0.001	-10.9214	-3.095028
comtot	2.836523	1.776376	1.6	0.112	-0.6744122	6.347459
GDP per capita	2.37	0.8566747	2.77	0.006	0.6768173	4.063183
Fta	(Dropped)					
Cons	-56637.71	8664.453	-6.54	0.000	-73762.65	-39512.77
sigma_u	-56107.744					
sigma_e	8602.3418					
Rho	0.97703337 (fraction of variance due to u _i)					

F test that all u_i=0: F(18, 145) = 15.34 Prob > F = 0.0000

Source: Own computation

Table 4.2. Random Effects Estimate For Total COMESA TRADE

Random-effects GLS regression

Group variable: nr

R-sq: within = 0.7040

 between = 0.8828

 overall = 0.8492

Random effects u_i ~ Gaussian

corr(u_i, X) = 0 (assumed)

Number of obs = 171

Number of groups = 19

Obs per group: min = 9

 avg = 9.0

 max = 9

Wald chi2(8) = 502.44

Prob > chi2 = 0.0000

GDP	Coef	std. Err	z	p>/z/	[95% Conf. Interval]	
Popn	783.1394	115.4877	6.39	0.000	511.7877	964.4911
X	1.237212	0.2009858	6.16	0.000	0.8432871	1.631137
M	1.253926	0.2030917	6.17	0	0.8558734	1.651978
Comx	1.373739	2.918394	0.47	0.638	-4.346208	7.093686
Comm.	-8.946076	2.067223	-4.33	0	-12.99776	-4.894392
comtot	1.085951	1.885028	0.58	0.565	-2.608635	4.780538
GDPpercapita	0.819654	0.6971232	1.18	0.24	-0.5466825	2.18599
Fta	4146.38	4999.259	0.83	0.407	-5651.987	13944.75
Cons	-11266.93	4483.825	-2.51	0.012	-20055.07	-2478.80

sigma_u	8777.2766					
sigma_e	8602.3418					
Rho	0.5100645	(fraction of variance due to u_i)				

4.2. FTA and Non-FTA Country Groups Fixed Effects Analysis

4.2.1. Non-FTA groups Fixed effects Estimator Result.

Non - FTA country groups are countries who refrained themselves to take part in Free Trade Area (FTA) agreement to reduce tariff to 0% since 2002. They are 10 countries out of 19 COMESA member states and labeled as:

Country10= Burundi

Country15= Libya

Country11= DRC

Country16= Eritrea

Country12= Ethiopia

Country17= Seychelles

Country13= Rwanda

Country18= Uganda

Country14= Comoros

Country19= Swaziland

4.2.1.1. GDP and Population Non-FTA countries Relationship Result

GDP and population relationship as a group have significant and positive relationship. It says that when population increases by one million, GDP increases by 1.49 billion dollar on average during 2003-2011. While individual countries are sought insignificant and negative relationship between those variables. For Ethiopia (country12) GDP and population relationship is negatively and less significantly related when compared with other group during 2003-2011. Only Libya (country15) large economy is benefiting from this relationship but Ethiopia (country12) and DRC (country11) have both less benefited from this relationship than Libya. (See Table 4.3)

Table 4.3. GDP and Population (popn) relationship Fixed Effects

Source	SS	df	MS			
Model	2.5494e+11	11	2.3176e+10	Number of obs = 171		
Residual	6.3692e+10	160	398072799	F(11, 160) = 58.22		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.8001		
				Adj R-squared = 0.7864		
				Root MSE = 19952		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
popn	1488.523	66.77424	22.29	0.000	1356.65	1620.395
country10	-10789.83	6670.494	-1.62	0.108	-23963.4	2383.739
country11	-36984.8	7792.845	-4.75	0.000	-52374.9	-21594.7
country12	-95081.93	8438.099	-11.26	0.000	-111696.3	-78367.51
country13	-10677.01	6682.604	-1.60	0.112	-23874.5	2520.473
country14	-557.1348	6650.742	-0.08	0.933	-13691.7	12577.43
country15	44600.97	6662.72	6.69	0.000	31442.76	57759.19
country16	-5639.997	6658.266	-0.85	0.398	-18789.42	7509.422
country17	765.5786	6650.59	0.12	0.908	-12368.68	13899.84
country18	-32942.1	6953.765	-4.74	0.000	-46675.1	-19209.1
country19	1479.597	6650.945	0.22	0.824	-11655.37	14614.56

4.2.1.2. GDP and Total World Export of Non-FTA COMESA Countries Results

In Table 4.4, growth of total export significantly and positively interacted with growth of GDP as a group. Ethiopia (country12) and DRC (country11) have also shown this positive and significant relationship individually. But Libya (country15) has benefited less than the two countries. Therefore, the increase in one million dollar of total export of Ethiopia to the world increases GDP by 11.56 billion dollar on average during this period. Ethiopia and total exports significance has not obtained from COMESA but it is from the rest of the world export. This would be seen later.

4.2.1.3. GDP and Total world Import Estimation Analysis

Here under GDP and total imports from the world by COMESA countries has shown positive and significant relationship as a group during 2003-2011. It says that when imports from the world total increases by one million dollar to the group GDP increases by 3.2 million dollar. The Result for Ethiopia is insignificant but will have 1.2 billion dollar increment to GDP when imports increase by a million dollar.

The significant country in this case are DR Congo (country11) and the less significant country Libya or

Country15 (See Table 4.5).

Table 4.4. GDP and Total World Export (x) Fixed Effects results

Source	SS	df	MS			
Model	2.8510e+11	11	2.5919e+10	Number of obs = 171		
Residual	3.3527e+10	160	209541003	F(11, 160) = 123.69		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.8948		
				Adj R-squared = 0.8875		
				Root MSE = 14476		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x	3.611256	.1094828	32.98	0.000	3.395038	3.827473
country10	210.8846	4825.199	0.04	0.965	-9318.408	9740.177
country11	43227.08	4835.335	8.94	0.000	33677.77	52776.39
country12	11558.91	4833.196	2.39	0.018	2013.822	21103.99
country13	2248.968	4825.433	0.47	0.642	-7280.786	11778.72
country14	205.0905	4825.183	0.04	0.966	-9324.171	9734.352
country15	-74683.52	6196.666	-12.05	0.000	-86921.32	-62445.71
country16	1210.41	4825.184	0.25	0.802	-8318.854	10739.67
country17	-2250.52	4826.118	-0.47	0.642	-11781.63	7280.588
country18	3018.664	4833.428	0.62	0.533	-6526.881	12564.21
country19	-4358.726	4830.357	-0.90	0.368	-13898.21	5180.754

Table 4.5. GDP and Total Import relationship Fixed Effects results

Source	SS	df	MS			
Model	2.8962e+11	11	2.6329e+10	Number of obs = 171		
Residual	2.9008e+10	160	181299578	F(11, 160) = 145.23		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.9090		
				Adj R-squared = 0.9027		
				Root MSE = 13465		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m	3.20132	.0893961	35.81	0.000	3.024771	3.377869
country10	-590.2164	4488.393	-0.13	0.896	-9454.351	8273.919
country11	41450.9	4500.971	9.21	0.000	32561.92	50339.87
country12	1237.7	4521.165	0.27	0.785	-7691.155	10166.56
country13	147.4747	4489.466	0.03	0.974	-8718.779	9013.728
country14	-194.6155	4488.288	-0.04	0.965	-9058.542	8669.311
country15	-20423.03	4940.91	-4.13	0.000	-30180.84	-10665.22
country16	-55.81928	4488.458	-0.01	0.990	-8920.081	8808.443
country17	-1921.595	4488.939	-0.43	0.669	-10786.81	6943.618
country18	151.8846	4501.117	0.03	0.973	-8737.378	9041.147
country19	-4362.988	4492.981	-0.97	0.333	-13236.18	4510.208

4.2.1.4. GDP and Import From COMESA (comx) by Each country

Table 4.6. Show the result of those Non-FTA member groups exports to COMESA with significant and positive relationship as group. When considering individual countries import, only Democratic Republic of Congo (DRC) and Libya (country15) have significant and positive relationship with GDP. Ethiopia has positive but insignificant relationship with COMESA export to raise GDP to 15.2 billion dollar because of

an increase in one million dollar of COMESA export. This indicates the existence of huge potential to play the role in COMESA Trade for Ethiopia.

Table 4.6. GDP and Export to COMESA (comx) relationship Fixed Effects results

Source	SS	df	MS	Number of obs = 171		
Model	1.7290e+11	11	1.5719e+10	F(11, 160) =	17.26	
Residual	1.4573e+11	160	910795758	Prob > F =	0.0000	
Total	3.1863e+11	171	1.8633e+09	R-squared =	0.5426	
				Adj R-squared =	0.5112	
				Root MSE =	30179	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comx	36.03346	3.19598	11.27	0.000	29.72171	42.3452
country10	-192.9862	10060.1	-0.02	0.985	-20060.7	19674.73
country11	38741.11	10145.3	3.82	0.000	18705.14	58777.07
country12	15222.28	10071.69	1.51	0.133	-4668.31	35112.87
country13	622.7923	10063.96	0.06	0.951	-19252.55	20498.13
country14	452.2862	10059.8	0.04	0.964	-19414.82	20319.4
country15	51936.62	10060.83	5.16	0.000	32067.48	71805.77
country16	1077.911	10059.86	0.11	0.915	-18789.33	20945.15
country17	877.9508	10059.8	0.09	0.931	-18989.16	20745.06
country18	-6339.199	10195.17	-0.62	0.535	-26473.66	13795.26
country19	-767.3425	10065.4	-0.08	0.939	-20645.51	19110.83

4.2.1.5. GDP and Import from COMESA (comm.) by each country.

On the other hand imports from COMESA with GDP growth have significant and positive relationship as a group and DRC and Libya also shares the same effect. Therefore, a one million dollar increase in imports increases GDP by 29.08 million dollar for the group, and 36.57 billion dollar for DRC. Ethiopia here has not been utilizing significantly from COMESA imports, but a positive relationship with GDP increase of 13.87 billion dollar due to a one million dollar increase in import from COMESA. (Table 4.7)

Table 4.7. GDP and Imports from (comm.) COMESA countries relationship results

Source	SS	df	MS	Number of obs = 171		
Model	1.5735e+11	11	1.4304e+10	F(11, 160)	=	14.19
Residual	1.6128e+11	160	1.0080e+09	Prob > F	=	0.0000
Total	3.1863e+11	171	1.8633e+09	R-squared	=	0.4978
				Adj R-squared	=	0.4590
				Root MSE	=	31749

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comm	29.08516	2.916931	9.97	0.000	23.32451	34.84581
country10	-1717.369	10585.87	-0.16	0.871	-22623.43	19188.69
country11	36571.27	10719.39	3.41	0.001	15401.53	57741.02
country12	13874.03	10605.49	1.31	0.193	-7070.766	34818.82
country13	-2365.124	10601.68	-0.22	0.824	-23302.41	18572.16
country14	112.2404	10583.18	0.01	0.992	-20788.49	21012.97
country15	42061.5	10645.76	3.95	0.000	21037.16	63085.83
country16	195.4106	10583.91	0.02	0.985	-20706.78	21097.6
country17	7.425198	10583.49	0.00	0.999	-20893.93	20908.78
country18	-3377.372	10699.72	-0.32	0.753	-24508.27	17753.53
country19	2746.358	10583.16	0.26	0.796	-18154.34	23647.05

4.2.1.6. GDP and Terms of Trade (comtot)

The other important point with COMESA trade is the effect of terms of trade (TOT) gain that measures development through welfare gain. According to the result in Table 4.8, TOT gain from COMESA export and import is insignificant but seems positive as a whole, except Swaziland, which is the true effect for Ethiopia as well.

Table 4.8. GDP and COMESA Terms of Trade COMESA relationship results (comtot)

. regress gdp comtot country10–country19, noconstant

Source	SS	df	MS	Number of obs = 171		
Model	5.8338e+10	11	5.3035e+09	F(11, 160)	=	3.26
Residual	2.6029e+11	160	1.6268e+09	Prob > F	=	0.0005
Total	3.1863e+11	171	1.8633e+09	R-squared	=	0.1831
				Adj R-squared	=	0.1269
				Root MSE	=	40334

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comtot	5.565179	6.448694	0.86	0.389	-7.170357	18.30071
country10	521.0457	13446.09	0.04	0.969	-26033.66	27075.75
country11	53224.9	13450.28	3.96	0.000	26661.91	79787.89
country12	20853.3	13452.07	1.51	0.132	-6213.224	46919.82
country13	3397.889	13456.65	0.25	0.801	-23177.67	29973.45
country14	450.0942	13444.68	0.03	0.973	-26101.82	27002.01
country15	50144.01	14015.28	3.58	0.000	22465.22	77822.81
country16	1383.291	13445.2	0.10	0.918	-25169.66	27936.24
country17	887.0467	13444.68	0.07	0.947	-25664.87	27438.96
country18	11831.03	13457.12	0.88	0.381	-14745.45	38407.52
country19	-2332.292	14805.29	-0.16	0.875	-31571.27	26906.69

4.2.2. FTA groups Fixed effects Estimator Result Analysis

This Free Trade area (FTA) committed groups are nine in number and entered into an agreement to reduce tariff to 0% since 2000. Those nine countries fixed effects are labeled as follows and result analysis follows after.

- Country1 = Egypt Country2 = Djibouti
- Country 3 = Kenya Country4 = Malawi
- Country5= Sudan..... Country6= Madagascar
- Country7= Mauritius..... Country8= Zambia
- Country9= Zimbabwe

4.2.2.1. GDP and Population(popn) for FTA grouped countries

According to Table 4.9, GDP and Population have positive and significant relationship among this FTA agreed nine member groups of COMESA. The table shows that a one million increase in population increases GDP by 547.5 million dollar during 2003-2011. This significant relationship shows the true effects for countries like Egypt (Country1) and Sudan (Country5). Djibouti, Kenya, Mauritius and Zambia have positive but insignificant GDP with Population relationship. The remaining three countries have insignificant but negative relationship with of the intended variables.

Table 4.9. GDP and Total Population FE relationship of FTA Countries.

Source	SS	df	MS	Number of obs = 171		
Model	2.4713e+11	10	2.4713e+10	F(10, 161) =	55.65	
Residual	7.1502e+10	161	444114720	Prob > F =	0.0000	
Total	3.1863e+11	171	1.8633e+09	R-squared =	0.7756	
				Adj R-squared =	0.7617	
				Root MSE =	21074	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
popn	547.4731	67.07618	8.16	0.000	415.0105	679.9357
country1	103811.8	8721.029	11.90	0.000	86589.45	121034.2
country2	423.9241	7024.903	0.06	0.952	-13448.91	14296.76
country3	4616.73	7463.063	0.62	0.537	-10121.39	19354.85
country4	-3735.942	7084.103	-0.53	0.599	-17725.69	10253.8
country5	21715.35	7531.47	2.88	0.004	6842.145	36588.56
country6	-3376.897	7139.521	-0.47	0.637	-17476.08	10722.29
country7	7252.028	7025.186	1.03	0.303	-6621.366	21125.42
country8	4871.724	7071.229	0.69	0.492	-9092.597	18836.05
country9	-737.6355	7075.147	-0.10	0.917	-14709.69	13234.42

4.2.2.2. GDP and Total Export(x)

According to Table 4.10, Total exports of all FTA-COMESA countries to the world have significant and positive relationship with GDP. It says that when these countries export to the

world increases by one million dollar, then GDP grows by 1.83 million dollar on average during 2003-2011 out of 171 observations. This significant and positive relationship has been seen by Egypt, Sudan and Kenya. And five countries (Malawi, Madagascar, Mauritius, Zambia and Zimbabwe) have positive but insignificant results. Djibouti is the only country to register both insignificant and negative result during the observation time.

Table 4.10. GDP and Total Export FE FTA Countries.

Source	SS	df	MS			
Model	2.6853e+11	10	2.6853e+10	Number of obs =	171	
Residual	5.0103e+10	161	311201305	F(10, 161) =	86.29	
Total	3.1863e+11	171	1.8633e+09	Prob > F =	0.0000	
				R-squared =	0.8428	
				Adj R-squared =	0.8330	
				Root MSE =	17641	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x	1.831497	.1430889	12.80	0.000	1.548924	2.11407
country1	78186.84	7914.693	9.88	0.000	62556.84	93816.84
country2	-35.38169	5880.739	-0.01	0.995	-11648.71	11577.95
country3	12686.1	5960.844	2.13	0.035	914.5765	24457.62
country4	1811.841	5882.224	0.31	0.758	-9804.423	13428.1
country5	28413.55	6003.225	4.73	0.000	16558.33	40268.77
country6	3216.512	5887.854	0.55	0.586	-8410.87	14843.89
country7	23.59268	5912.756	0.00	0.997	-11652.97	11700.15
country8	3120.069	5916.49	0.53	0.599	-8563.864	14804
country9	1218.345	5892.897	0.21	0.836	-10418.99	12855.69

4.2.2.3. GDP and Total Import(m)

Table 4.11 below shows fixed effects relationship with FTA-COMESA member countries significant and positive relationship between GDP and imports from world during 2003-2011. The positive interaction could be explained as a one million dollar increase in total import leads to 2.54 million dollar GDP growth on average. Egypt and Sudan have significant and positive total import and GDP relationship. Kenya and Zambia have insignificant but positive results, while Djibouti, Malawi, Madagascar, Mauritius and Zimbabwe have insignificant and negative results.

Table 4.11. GDP and Total Import FE relationship of FTA Countries.

Source	SS	df	MS			
Model	2.7780e+11	10	2.7780e+10	Number of obs = 171		
Residual	4.0831e+10	161	253605878	F(10, 161) = 109.54		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.8719		
				Adj R-squared = 0.8639		
				Root MSE = 15925		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m	2.539046	.164719	15.41	0.000	2.213757	2.864334
country1	36876.33	8848.175	4.17	0.000	19402.89	54349.78
country2	-211.2508	5308.812	-0.04	0.968	-10695.14	10272.63
country3	1395.281	5528.162	0.25	0.801	-9521.779	12312.34
country4	-726.3342	5316.23	-0.14	0.891	-11224.87	9772.199
country5	20048.65	5528.962	3.63	0.000	9130.013	30967.29
country6	-1580.038	5337.663	-0.30	0.768	-12120.9	8960.823
country7	-4878.556	5373.105	-0.91	0.365	-15489.41	5732.295
country8	1173.361	5350.309	0.22	0.827	-9392.472	11739.19
country9	-2017.417	5334.699	-0.38	0.706	-12552.42	8517.59

4.2.2.4. GDP and Export to COMESA by each country (comx)

Table 4.12, shows the results of GDP and Exports of nine countries to COMESA involved free trade area to COMESA. These countries total export to COMESA, as a group is totally insignificant. But, the relationship is positive that a one million dollar increase in export to COMESA increases GDP by 5.46 million dollar. The terms of trade between these economic interactions are about 72% indicating increasing welfare gain during this period. Only Egypt (country1) and Sudan (country5) have positive and significant relationship.

Table 4.12. GDP and Export to COMESA-FTA Countries.

Source	SS	df	MS			
Model	2.1837e+11	10	2.1837e+10	Number of obs = 171		
Residual	1.0026e+11	161	622715.099	F(10, 161) = 35.07		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.6854		
				Adj R-squared = 0.6658		
				Root MSE = 24954		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comx	5.460739	4.726568	1.16	0.250	-3.873326	14.7948
country1	133868.8	13391.94	10.00	0.000	107422.3	160315.3
country2	758.695	8318.8	0.09	0.927	-15669.34	17186.73
country3	17908.27	10434.25	1.72	0.088	-2697.374	38513.92
country4	2885.899	8350.696	0.35	0.730	-13605.12	19376.92
country5	43172.55	8340.83	5.18	0.000	26701.01	59644.09
country6	6810.947	8320.307	0.82	0.414	-9620.062	23241.96
country7	7098.507	8350.105	0.85	0.397	-9991.347	23588.36
country8	8424.94	8729.189	0.97	0.336	-8813.533	25663.41
country9	3671.983	8589.656	0.43	0.670	-13290.94	20634.91

4.2.2.5. GDP and Import from COMESA by individual country

The presentation of Table 4.13 explains that COMESA-FTA import from and among COMESA is insignificant but a one million dollar increase in total import leads GDP to rise by 1.11 million dollar. Even if there is total failure with this relationship Egypt (country1), Kenya (country3) and Sudan (country5) are also positively and significantly related. Other countries have positive but insignificant results.

Table 4.13. GDP with imports from COMESA Countries results

Source	SS	df	MS				
Model	2.1761e+11	10	2.1761e+10	Number of obs = 171			
Residual	1.0103e+11	161	627486911	F(10, 161) = 34.68			
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000			
				R-squared = 0.6829			
				Adj R-squared = 0.6632			
				Root MSE = 25050			

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comm	1.110138	3.505547	0.32	0.752	-5.812644	8.032921
country1	142969.5	12687.11	11.27	0.000	117914.9	168024.1
country2	855.5446	8350.4	0.10	0.919	-15634.89	17345.98
country3	24810.71	8433.665	2.94	0.004	8155.845	41465.58
country4	3552.527	8370.34	0.42	0.672	-12977.29	20082.34
country5	43288.91	8558.527	5.06	0.000	26387.46	60190.36
country6	6875.06	8364.778	0.82	0.412	-9643.771	23393.89
country7	7817.028	8359.293	0.94	0.351	-8690.972	24325.03
country8	10761.45	8655.552	1.24	0.216	-6331.608	27854.5
country9	5832.827	8408.861	0.69	0.489	-10773.06	22438.71

4.2.2.6. GDP and Terms of Trade from intra-trade (comtot)

On the other hand, the relationship between GDP and Terms of trade gain because of COMESA trade results in insignificant and positive interaction has been seen in Table 4.14 in general in this group.

Egypt, Kenya, and Sudan have significant and positive relationship from terms of trade. The remaining four countries are insignificant but positively indication is sought.

Table 4.14. GDP and TOT results between COMESA-FTA Countries.

Source	SS	df	MS				
Model	2.1996e+11	10	2.1996e+10	Number of obs = 171			
Residual	9.9268e+10	161	616573336	F(10, 161) = 35.58			
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000			
				R-squared = 0.6885			
				Adj R-squared = 0.6691			
				Root MSE = 24831			

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comtot	6.219811	3.620197	1.72	0.088	-9293839	13.36901
country1	145342.2	8285.667	17.54	0.000	128979.6	161704.8
country2	331.6871	8283.219	0.04	0.968	-16026.08	16689.45
country3	22502.82	8423.034	2.67	0.008	5868.948	39136.7
country4	3192.733	8283.04	0.39	0.700	-13164.68	19550.15
country5	43639.61	8278.184	5.27	0.000	27291.79	59987.44
country6	6830.454	8277.804	0.83	0.411	-9516.622	23177.53
country7	7061.503	8292.834	0.85	0.396	-9915.253	23438.26
country8	10828.09	8285.749	1.31	0.193	-5534.674	27190.86
country9	3369.952	8433.384	0.40	0.690	-13284.36	20024.27

4.2.2.7. GDP and GDP per capita intra-trade (gdppercapita)

Another interesting result is GDP per capita is significantly and positively interacted with growth of GDP during the period of this investigation. A one million dollar increase in GDP per capita of this group increases GDP by 2.96 million dollar on average. And individual countries in this group like Egypt, Kenya and Sudan have significant and positive result in terms of the relationship with GDP and GDP per capita. Four countries in this group have positive but insignificant relationship and the remaining two negative and insignificant relationships (See Table 4.15).

Table 4.15. GDP and with GDP per capita Result

Source	SS	df	MS			
Model	2.3483e+11	10	2.3483e+10	Number of obs = 171		
Residual	8.3796e+10	161	520475118	F(10, 161) = 45.12		
Total	3.1863e+11	171	1.8633e+09	Prob > F = 0.0000		
				R-squared = 0.7370		
				Adj R-squared = 0.7207		
				Root MSE = 22814		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdppercapita	2.96074	.5136649	5.76	0.000	1.946351	3.97513
country1	140478.7	7664.614	18.33	0.000	125342.5	155614.8
country2	-2201.326	7623.464	-0.29	0.773	-17256.2	12853.55
country3	23228.12	7612.225	3.05	0.003	8195.435	38260.8
country4	2939.409	7605.902	0.39	0.700	-12080.79	17959.61
country5	40744.5	7624.119	5.34	0.000	25688.33	55800.67
country6	5950.921	7606.958	0.78	0.435	-9071.361	20973.2
country7	-10631.97	8259.251	-1.29	0.200	-26942.41	5678.467
country8	8731.287	7619.616	1.15	0.254	-6315.993	23778.57
country9	4708.153	7608.769	0.62	0.537	-10322.71	19729.01

In general it could be said that from the above results and discussion, in this group of COMESA countries there is significant and positive growth of GDP with population, total export and import to the world but insignificant results are displayed in exports to and imports among each country and terms of trade due to COMESA. These are the major indicators that show growth and development. And the actions and commitment taken by this group to reduce tariff to 0% has contributed nothing except for Egypt and Sudan which are relatively in middle income groups. The remaining seven countries are insignificant and

the relationship is to some extent is negative. Reducing tariff has nothing to do to gain from trade from the past situation of this bloc.

4.3. Hausman Test Results

If there is significant correlation between the unobserved individual country-specific random effects and the regressors and if there is no such correlation, then the random effects model may be more powerful and parsimonious. If there is such a correlation, the random effects model would be inconsistently estimated and the fixed effects model would be the model of choice. Because there is heterogeneity in COMESA in terms of population, land and economic size and location fixed effects estimates has been chosen.

The test for this correlation is a comparison of the covariance matrix of the regressors in the LSDV model with those in the random effects model. The null hypothesis is that there is no correlation. If there is no statistically significant difference between the covariance matrices of the two models, then the correlations of the random effects with the regressors are statistically insignificant. The Hausman test is a kind of Wald chi square test with $k-1$ degrees of freedom (where k =number of regressors) on the difference matrix between the variance-covariance of the LSDV with that of the Random Effects model.

Therefore, based on this analysis for most research problems if $\text{Cov}(x_{it}, v_{it}) \neq 0$, the RE-estimator will be biased. Because $\text{corr}(u_i, Xb) = -0.9173$ (which is different from zero) I preferred **the FE-estimator to get unbiased estimates** for the result in fixed effect estimator. The RE-estimator, however, provides estimates for time-constant covariates. Many researchers want to report effects of sex, race, etc. Therefore, they choose the RE-estimator

over the FE-estimator. In most applications, however, the assumption $Cov(x_{it}, v_i)=0$ will be wrong, and the RE-estimator will be biased. This is risking to throw away the big advantage of panel data only to be able to write a paper on "The determinants of Y". To take full advantage of panel data the style of data analysis has to change: One should concentrate on the effects of (a few) time-varying covariates only and use the FE-estimator consequently!(Table 4.16 and 4.17)

Table 4.16. Hausman fixed effects results.

Variables	Coefficients		(b-B)	sqrt(diag(V_b-V_B)) S.E.
	(b)	(B)	Difference	
	Fixed			
Popn	3012.706	738.1394	2274.567	400.0386
X	1.113632	1.237212	0.1235803	
M	0.7304312	1.253926	-0.5234947	
Comx	-5.130301	1.373739	-6.50404	
Comm.	-7.008213	-8.946076	1.937863	
comtot	2.836523	1.085951	1.750572	
GDP per capita	2.37	0.819654	1.550346	0.4979064

b = consistent under Ho and Ha; obtained from xtreg

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

Test: Ho: difference in coefficients not systematic

$\chi^2(7) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 39.75$

Prob> $\chi^2 = 0.0000$, (V_b-V_B is not positive definite)

4.1.2. Fixed effect Correlation Test

Table 4.17(obs=171)

Variable	popn	X	M	comx	comm	comtot	gdpper~a
popn	1.00						
X	0.3374	1.00					
M	0.5027	0.8919	1.00				
comx	0.5127	0.439	0.547	1.00			
comm	0.4928	0.4893	0.5626	0.7836	1.00		

comtot	-0.0891	0.0571	0.0005	0.1686	-0.0838	1.00	
gdppercapita	-0.3058	0.389	0.2412	-0.1166	-0.0499	0.0413	1.00

Breusch and Pagan Lagrangian multiplier test for Random Effects

$$\ln gdp[nr,t] = Xb + u[nr] + e[nr,t]$$

Estimated results: Var sd = sqrt(Var), Test: Var(u) = 0, chi2(1) = 429.85, Prob > chi2 = 0.0000

4.4. First Difference Estimator (FD Estimator)

With panel data we difference out the country specific error (T=2):

$$GDP_{i2004} = \beta_1 popn_{i2004} + \beta_2 x_{i2004} + \beta_3 m_{i2004} + \beta_4 comx_{i2004} + \beta_5 comm_{i2004} + \beta_6 comtot_{i2004} + \beta_7 gdppercapita_{i2004} + V_i + \varepsilon_{i2004} \dots \dots \dots (1)$$

$$GDP_{i2003} = \beta_1 popn_{i2003} + \beta_2 x_{i2003} + \beta_3 m_{i2003} + \beta_4 comx_{i2003} + \beta_5 comm_{i2003} + \beta_6 comtot_{i2003} + \beta_7 gdppercapita_{i2003} + V_i + \varepsilon_{i2003} \dots \dots \dots (2)$$

By subtracting the second equation from first gives

$$(GDP_{i2004} - GDP_{i2003}) = (\beta_1 popn_{i2004} - \beta_1 popn_{i2003}) + (\beta_2 x_{i2004} - \beta_2 x_{i2003}) + (\beta_3 m_{i2004} - \beta_3 m_{i2003}) + (\beta_4 comx_{i2004} - \beta_4 comx_{i2003}) + (\beta_5 comm_{i2004} - \beta_5 comm_{i2003}) + (\beta_6 comtot_{i2004} - \beta_6 comtot_{i2003}) + (\beta_7 gdppercapita_{i2004} - \beta_7 gdppercapita_{i2003}) + (\varepsilon_{i2004} - \varepsilon_{i2003})$$

Therefore,

$$\Delta GDP_i = \beta_1 \Delta popn_i + \beta_2 \Delta x_i + \beta_3 \Delta m_i + \beta_4 \Delta comx_i + \beta_5 \Delta comm_i + \beta_6 \Delta comtot_i + \beta_7 \Delta gdppercapita_i + \Delta \varepsilon_i$$

Δ This delta shows the change from year one to year two. This is a simple regression equation in differences without constant. This could be extended T=9 for all variables. The slope co-efficient could be estimated by OLS, if ε_{it} is uncorrelated with other independent variables (First difference estimator).

Here the big advantage is the fixed effects V_i is cancelled out. So that it would not be necessary to consider the assumption that the individual effect is uncorrelated with other independent variables.

Time constant unobserved heterogeneity is no longer a problem.

Differencing is also straight forward with more than two time periods. But this estimator is inefficient because year 1 is subtracted from 2 and year 2 from 3 and there is a possibility that year 1 could be subtracted from year 3. Besides, with more than two years the problem of serially correlated $\Delta \varepsilon_i$ arises.

OLS assumes that error terms across observations are uncorrelated (no autocorrelation). This assumption can easily violate with multi-period paned data. So standard error could be biased. To

remedy this GLS and Huber-White sandwich estimator has been used by making all variables lagged operators stata displayed the result as follows. With time lagged operator, growth of GDP in COMESA is significant with population growth, total export and GDP per capita, but insignificant with COMESA trade.

Based on the above equations derived above the lagged fixed effects for this group result shows that only population, total world export and GDP per capita have significant relationship. The remaining variables especially MOMESA trade is insignificant with lagged regression.

Table 4.18. Lagged Fixed Effects Result For all COMESA Countries.

Source	SS	df	MS			
Model	5.2421e+09	7	748875267	Number of obs = 152		
Residual	5.5769e+09	145	38461299.1	F(7, 145) = 19.47		
Total	1.0819e+10	152	71177731.8	Prob > F = 0.0000		
				R-squared = 0.4845		
				Adj R-squared = 0.4596		
				Root MSE = 6201.7		

dgdpcap	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
dpopn	4023.819	685.7887	5.87	0.000	2668.386	5379.253
dx	.4921559	.1244716	3.95	0.000	.2461428	.7381689
dm	.1597774	.2497415	0.64	0.523	-.3338266	.6533815
dcomx	-2.89353	1.572452	-1.84	0.068	-6.001417	.2143582
dcomm	-.5745251	1.214647	-0.47	0.637	-2.975226	1.826175
dcomtot	.8503088	1.03479	0.82	0.413	-1.194912	2.89553
dgdppercap~a	3.967482	.5498829	7.22	0.000	2.880661	5.054304
dfta	(dropped)					

Table 4.19. Robust Standard Error regression

Linear regression

Number of obs = 152
 F(7, 18) = 1309.19
 Prob > F = 0.0000
 R-squared = 0.4845
 Root MSE = 6201.7

(Std. Err. adjusted for 19 clusters in nr)

dgdp	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
dpopn	4023.819	1959.257	2.05	0.055	-92.42708	8140.065
dx	.4921559	.0450717	10.92	0.000	.3974638	.5868479
dm	.1597774	.1994093	0.80	0.433	-.2591659	.5787207
dcomx	-2.89353	2.600123	-1.11	0.280	-8.356186	2.569127
dcomm	-.5745251	1.267437	-0.45	0.656	-3.237312	2.088261
dcomtot	.8503088	.9874137	0.86	0.400	-1.22417	2.924788
dgdppercap~a	3.967482	.6871826	5.77	0.000	2.523765	5.411199
dfta	(dropped)					

The First Difference-estimator identifies the true causal effect (almost). With lagged operator in year any action taken by individual effect changes the policy variables. The robust S.E. is much lower for population, total export, total import and real GDP per capita. However, the FD-estimator is inefficient because it uses only the GDP observations immediately before and after any policy change/policy preference estimates the slope.

The intuition behind the First Difference-estimator is that it no longer uses the between-country comparison. It uses only within-country changes: If export to COMESA changes, how much does real GDP change within each country? Therefore, in this model, unobserved ability differences between countries no longer bias the estimator.

4.5. Difference in Difference(DID) Estimator For FTA Treated groups

There would be a measurement error that causes the model to be biased in within regression. Therefore it would be appropriate to use **Difference in Difference** estimator. With real dataset the DID estimator is not so straight forward. The problem lies how to find the appropriate control group (how to see Non-FTA group effects). To prove whether FTA helps

to achieve economic growth by free trade area agreement grace period is considered to be after 2005 after reduction of tariff to 0% as a “treatment” for nine countries since 2000. Finally, after arranging the data for Stata software with three dummy variables, the following result has been made.

Accordingly, the true effect of DID estimator shown that FTA increases growth of all variables significantly and positively in general but insignificantly and positively after treatment played the role to increase GDP growth. After treatment population growth increased GDP by 7.4 billion dollar, total world export increased GDP by 5.7 billion dollar, total world import by 1.96 billion dollar, export to COMESA by 2.97, import from COMESA by 6.76, GDP per capita by 9.8 and terms of trade by 7.61 billion dollar for control group during 2003-2011 after taking treatment from 2005-2011. (The result is summarized in Table4.20 below.)

Table 4.20. Summarized DID Estimator Result (Effect After Treatment)

Variable	Coef	Std.Err	t	p>/t/	95% Conf. Interval	R ²	Adj. R ²
GDP						0.43	0.41
popn	974.52	97.18	10.03	0.000	782.54 – 1166.49		
after	5462.31	8239.6	0.66	0.508	-10814.92-21739.54		
treat	2228.13	9762.42	0.23	0.820	-17057.42-21513.67		
aftertr	7405.021	11076.82	0.67	0.505	-14477.11 – 29287.15		
-cons	-8108.88	7407.89	-1.09	0.275	-22743.07 – 6525.31		
GDP						0.75	0.74
X	2.67	0.129	20.55	0.000	2.41 – 2.93		

Variable	Coef	Std.Err	t	p>/t/	95% Conf. Interval	R ²	Adj. R ²
after	-1748.61	5492.363	-0.32	0.751	-12598.71 – 9101.49		
treat	5717.47	6478.75	0.88	0.379	-7081.216 – 18516.16		
aftertr	5761.18	7362.66	0.78	0.435	-8783.67 – 20306.03		
-cons	-1325.99	4843.08	-0.27	0.785	-10893.43 – 8241.46		
GDP						0.87	0.87
m	3.06	0.097	31.61	0.000	2.87 – 3.252		
after	-2626.213	3883.385	-0.68	0.500	-10297 – 5045.37		
treat	1844.573	4583.799	0.40	0.688	-7210.667 – 10899.81		
aftertr	1964.646	5208.625	0.38	0.707	-8324.93 – 12254.22		
-cons	-465.26	3420.668	-0.14	0.892	-7222.748 – 6292.228		
GDP						0.32	0.28
comx	31.094	3.973	7.83	0.000	23.246 – 38.942		
after	4745.376	8963.931	0.53	0.597	-12962.76 – 22453.52		
treat	-915.376	10657.02	-0.09	0.932	-21968.46 – 20137.19		
aftertr	2965.22	12064.90	0.25	0.806	-20868.84 – 26799.28		
-cons	4764.901	7903.245	0.60	0.547	-10847.87 – 20377.67		
GDP						0.30	0.28
comm	24.23	3.29	7.37	0.000	17.74 – 30.72		
after	3855.48	9117.24	0.42	0.673	-14155.51 – 21866.47		
treat	828.95	10814.61	0.08	0.939	-20535.18 – 22193.09		
aftertr	6757.25	12245.39	0.55	0.582	-17433.38 – 30947.88		
-cons	4557.72	8034.38	0.57	0.571	-11314.10 – 20429.54		
GDP						0.05	0.03
comtot	1.30	5.79	0.22	0.822	-10.14 – 12.74		

Variable	Coef	Std.Err	t	p>/t/	95% Conf. Interval	R ²	Adj. R ²
after	7927.765	11020.34	0.72	0.473	-13842.79 – 29698.32		
treat	8400.016	12873.89	0.65	0.515	-17032.21 – 33832.24		
aftertr	7614.822	14603.89	0.52	0.603	-21234.98 – 36464.63		
-cons	5580.182	10047.96	0.56	0.579	-14269.45 – 25429.82		
GDP						0.09	0.06
GDPpercapita	2.23	0.935	2.38	0.018	0.381 – 4.077		
after	4555.75	10461.99	0.44	0.664	-16111.78 – 25223.29		
treat	10397.7	12357.35	0.84	0.401	-14014.09 – 34809.48		
aftertr	9820.07	13999.05	0.70	0.484	-17834.88 – 37475.02		
-cons	1680.45	9385.47	0.18	0.858	-16860.43 – 20221.32		

Chapter Five: Conclusion and Policy Implication

5.1. Conclusion

This study used panel data to empirically analyze the role of COMESA to economic growth and development of Ethiopia during 2003 – 2011 across 19 countries. The study used to analyzed GDP as a dependent variable; population, Terms of Trade, and GDP per capita as a major GDP growth and development factor; and trade induced variables like total world export and total world import in general; and mainly to see the role of COMESA to growth and development of individual country export to and imports from COMESA by individual country in particular has been considered in the model. COMESA as an institution has been investigated with fixed effects analysis and countries were divided into FTA involved countries on one hand and Non-FTA countries on the other hand. And the analysis has been carried out from general to specific country Ethiopia has been analyzed.

Fixed effects regression is preferred because hausman test results and the correlation results directed to do so. So, according to the result significant and positive relationship of GDP with population, total world export, total world import and GDP per capita has been sought. On the other hand trade with COMESA trade becomes insignificant but positively related with GDP due to Intra - COMESA to each other and as a group. Besides country groups by FTA involvement and those refrain from FTA country results is also insignificant but still positively related to trade induced growth. In addition, this study considered control group effects after they took treatments (reduction of tariff to 0%) by difference in difference estimator and their result is still insignificant but have positive relationship on basic variables.

When there is an economic growth and development, then it should go in line with population growth, terms of trade gain and changes in GDP per capita. These variables are major growth and development indicators to exchange resources and increase production and then by changing the welfare of each society. The estimated variables of these indicators are positively and significantly related to GDP growth except terms of trade gain as COMESA is a trade integration unit. This shows that as COMESA is a large population and economic size are benefiting from this growth. In this study trade induced growth indicators are total exports and total imports of each and all COMESA country/s, exports to COMESA and imports from COMESA is the major ones for this study. And the regression result for total export and import is significant and positively related to GDP growth. This is an indication of an increased volume of trade and production by each country as indicated from the overall trade, the contribution from COMESA is very low, insignificant and have negative relationship showing less effort to achieve the objective of growth and development to this regional bloc.

There is increased production in goods and services and indicates growth of GDP for Ethiopia and COMESA in general. This growth comes from other parts trade partners but not from COMESA trade and has minimal role to Ethiopia economic growth and development. The countries benefited from this integration are DRC and Libya (oil exporting country) from Non-FTA groups and while from FTA countries Egypt, Sudan and Kenya took the lions share. The remaining 15 countries including Ethiopia have not been benefited from this bloc. Reducing only trade barrier does not result in trade gain. But, increasing free trade by differentiating products to be exchanged, satisfying infrastructure, to implement agreements, and full utilization of technology needs consideration. Besides, there is difference across

countries in economic and resource size, lack of sound policies, special ability of the country and large economy made the result to be different.

Finally, by separately assessing the COMESA action by dividing into preferences, the supposed gain from trade by FTA didn't become effective after 2005. Even if insignificant does not mean good for individual countries like Ethiopia, it's worthwhile to consider the positive relationship with growth. COMESA may play the role to Ethiopia and other member countries because there is positive access to markets, resources and technology in the area. Problems need to be identified and tackled to utilize the huge potential.

5.2. Policy Implications

Since COMESA trade role to economic growth and development of Ethiopia with the selected method of analysis is insignificant as most of the output show, COMESA as a whole and Ethiopia and other countries should work together to tackle their problems. This is because there is enormous potential to achieve individual and institutional countries economic growth and development objective by increasing the intra-trade.

To improve the level of growth from what it is now to the next level, production and productivity must be encouraged so as to gain from trade. Therefore Ethiopia as a country and member with COMESA of this bloc should:

- Assess and Implement sound macro-economic and trade policies,
- Strengthen negotiation ability that meets the demand for her products and services,
- Facilitate infrastructural facilities so as to meet them conductively with neighboring countries trade,

- Use modern technology to attract those countries with new, quality and differentiated products, in most scenarios COMESA countries trade depends on mono-crop exchange of goods. This needs to be changed.

COMESA and member countries as trade integration unit should;

- Strengthen the institutional capacity of implementing on negotiated issues which has been discussed in several times before,
- Nations as a member needs to give concern to agreed negotiations to implement fully,
- Governments should vigorously promote improvements in rural and urban infrastructure, provide sustainable markets to their counterparts, provide modern and technologically supported marketing system,
- Support export oriented industries so that countries and firms would get encouraged to produce more and employ resources fully.

Generally, if these and other policy measures are taken seriously and quickly, it would have a greater possibility to gain countries and the integration to achieve growth and development by trade aid.

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Appendices

Appendix Table 1. DID Fixed Effect GDP with Population after treatment

Source	SS	df	MS	Number of obs = 159		
Model	9.7155e+10	4	2.4289e+10	F(4, 154) = 28.76		
Residual	1.3005e+11	154	844473532	Prob > F = 0.0000		
Total	2.2720e+11	158	1.4380e+09	R-squared = 0.4276		
				Adj R-squared = 0.4127		
				Root MSE = 29060		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
popn	974.5158	97.17889	10.03	0.000	782.54	1166.492
after	5462.311	8239.598	0.66	0.508	-10814.92	21739.54
treat	2228.126	9762.421	0.23	0.820	-17057.42	21513.67
aftertr	7405.021	11076.82	0.67	0.505	-14477.11	29287.15
_cons	-8108.88	7407.888	-1.09	0.275	-22743.07	6525.313

Appendix Table 2. DID Fixed Effect GDP with export to COMESA after treatment

Source	SS	df	MS	Number of obs = 159		
Model	7.3409e+10	4	1.8352e+10	F(4, 154) = 18.38		
Residual	1.5380e+11	154	998670623	Prob > F = 0.0000		
Total	2.2720e+11	158	1.4380e+09	R-squared = 0.3231		
				Adj R-squared = 0.3055		
				Root MSE = 31602		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comx	31.094	3.972818	7.83	0.000	23.24575	38.94226
after	4745.376	8963.931	0.53	0.597	-12962.76	22453.52
treat	-915.6366	10657.02	-0.09	0.932	-21968.46	20137.19
aftertr	2965.22	12064.9	0.25	0.806	-20868.84	26799.28
_cons	4764.901	7903.245	0.60	0.547	-10847.87	20377.67

Appendix Table 3. DID Fixed Effect GDP with import from COMESA, and TOT after treatment

Source	SS	df	MS	Number of obs = 159		
Model	6.8306e+10	4	1.7077e+10	F(4, 154) = 16.55		
Residual	1.5890e+11	154	1.0318e+09	Prob > F = 0.0000		
Total	2.2720e+11	158	1.4380e+09	R-squared = 0.3006		
				Adj R-squared = 0.2825		
				Root MSE = 32122		

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comm	24.23	3.286823	7.37	0.000	17.73692	30.72308
after	3855.478	9117.235	0.42	0.673	-14155.51	21866.47
treat	828.9524	10814.61	0.08	0.939	-20535.18	22193.09
aftertr	6757.254	12245.39	0.55	0.582	-17433.38	30947.88
_cons	4557.721	8034.378	0.57	0.571	-11314.1	20429.54

Source	SS	df	MS	Number of obs = 159		
Model	1.2304e+10	4	3.0760e+09	F(4, 154) =	2.20	
Residual	2.1490e+11	154	1.3955e+09	Prob > F =	0.0711	
Total	2.2720e+11	158	1.4380e+09	R-squared =	0.0542	
				Adj R-squared =	0.0296	
				Root MSE =	37356	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
comtot	1.301766	5.791827	0.22	0.822	-10.13992	12.74345
after	7927.765	11020.34	0.72	0.473	-13842.79	29698.32
treat	8400.016	12873.89	0.65	0.515	-17032.21	33832.24
aftertr	7614.822	14603.89	0.52	0.603	-21234.98	36464.63
_cons	5580.182	10047.96	0.56	0.579	-14269.45	25429.82

Annex Table 4. DID Fixed Effect GDP with Total export to COMESA after treatment

Source	SS	df	MS	Number of obs = 159		
Model	1.6976e+11	4	4.2440e+10	F(4, 154) =	113.77	
Residual	5.7445e+10	154	373017906	Prob > F =	0.0000	
Total	2.2720e+11	158	1.4380e+09	R-squared =	0.7472	
				Adj R-squared =	0.7406	
				Root MSE =	19314	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
x	2.669756	.1299153	20.55	0.000	2.41311	2.926403
after	-1748.612	5492.363	-0.32	0.751	-12598.71	9101.486
treat	5717.47	6478.746	0.88	0.379	-7081.216	18516.16
aftertr	5761.18	7362.661	0.78	0.435	-8783.67	20306.03
_cons	-1325.993	4843.084	-0.27	0.785	-10893.45	8241.461

Appendix 5. DID Fixed Effect GDP with Total Import to COMESA after treatment

Source	SS	df	MS	Number of obs = 159		
Model	1.9849e+11	4	4.9622e+10	F(4, 154) =	266.13	
Residual	2.8714e+10	154	186457572	Prob > F =	0.0000	
Total	2.2720e+11	158	1.4380e+09	R-squared =	0.8736	
				Adj R-squared =	0.8703	
				Root MSE =	13655	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
m	3.06048	.0968331	31.61	0.000	2.869188	3.251773
after	-2626.213	3883.385	-0.68	0.500	-10297.79	5045.369
treat	1844.573	4583.799	0.40	0.688	-7210.667	10899.81
aftertr	1964.646	5208.625	0.38	0.707	-8324.93	12254.22
_cons	-465.2598	3420.668	-0.14	0.892	-7222.748	6292.228

Appendix Table 6. DID Fixed Effect GDP with GDP per capita after treatment

Source	SS	df	MS	Number of obs = 159		
Model	1.9878e+10	4	4.9695e+09	F(4, 154) =	3.69	
Residual	2.0733e+11	154	1.3463e+09	Prob > F =	0.0067	
Total	2.2720e+11	158	1.4380e+09	R-squared =	0.0875	
				Adj R-squared =	0.0638	
				Root MSE =	36692	

gdp	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
gdppercapita	2.229149	.9354491	2.38	0.018	.3811801	4.077117
after	4555.752	10461.99	0.44	0.664	-16111.78	25223.29
treat	10397.7	12357.35	0.84	0.401	-14014.09	34809.48
aftertr	9820.07	13999.05	0.70	0.484	-17834.88	37475.02
_cons	1680.447	9385.467	0.18	0.858	-16860.43	20221.32