

**ANALYSING SUB-SAHARAN AFRICA TRADE PATTERNS IN THE  
PRESENCE OF REGIONAL TRADE AGREEMENTS- A COMPARATIVE  
ANALYSIS**

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## **DEDICATION**

I dedicate this thesis to my parents, Mr. and Mrs. Appau and my four siblings, Adu, Kwame, Kwabena and Akua.

## **ABSTRACT**

This thesis employs a dynamic form of the gravity model and data from 1988-2005 to estimate the effects of RTAs in SSA on intra-African trade. The thesis proposes a better approach to examining member-nonmember trade relations of RTAs. This thesis is unique because it uses System GMM estimator to overcome econometric issues associated with estimating dynamic models. The results suggest that COMESA and SADC has led to a significant increase in intra and extra-RTA trade. ECOWAS has increased intra-ECOWAS trade but decreased extra-ECOWAS trade. ECCAS has had a negative impact on both intra-ECCAS and extra-ECCAS trade flows. The proposed approach of examining member-nonmember relationships provides better estimates. A comparative analysis is made to shed light on how high or low the trade creation effect of RTAs in SSA are. The results of this thesis support the view that the impact of RTAs in SSA is higher than perceived.

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## **LIST OF ABBREVIATIONS**

**AEC:** African Economic Community  
**AFTA:** ASEAN Free Trade Area  
**APTA:** Asia-Pacific Trade Agreement  
**ASEAN:** Association of Southeast Asian Nations  
**AUC:** African Union Commission  
**CARICOM:** Caribbean Community and Common Market  
**CEAO:** Communauté Economique de l'Afrique de l'Ouest  
**CEPII:** Centre d'Etudes Prospectives et d'Informations Internationales's  
**CEPT:** Common Effective Preferential Tariff Scheme  
**CET:** Common External Tariff  
**CM:** Common Market  
**COMESA:** Common Market for Eastern and Southern Africa  
**COPEX:** Council of Peace and Security in Central Africa  
**CU:** Custom Union  
**CUFTA:** Canada-United States Free Trade Agreement  
**DIFF-GMM:** Difference Generalized Method of Moments  
**E-TOI:** Extra-RTA Trade Openness Index  
**EAC:** East African Community  
**ECA:** Economic Commission for Africa  
**ECAFE:** United Nations Economic Commission for Asia and the Far East  
**ECCAS:** Economic Community of Central African States  
**ECOWAS:** Economic Community of West African States  
**EFTA:** European Free Trade Association  
**EU:** European Union  
**FDI:** Foreign Direct Investment  
**FE:** Fixed Effect  
**FTA:** Free Trade Agreement/Area  
**GMM:** Generalized Method of Moment  
**I-TOI:** Intra-RTA Trade Openness Index  
**MARAC:** Central African Early Warning System  
**MERCOSUR:** Mercado Comun del Sur  
**MRA:** Mutual Recognition Arrangement  
**MU:** Monetary Union  
**NAFTA:** North America Free Trade Agreement  
**OAU:** Organization of African Unity  
**OECD:** Organization for Economic Co-operation and Development  
**OLS:** Ordinary Least Squares  
**PCA:** Principal Components Analysis  
**PTA:** Preferential Trade Area  
**RE:** Random Effect  
**RTA:** Regional Trade Agreement  
**SADC:** Southern African Development Community  
**SADCC:** Southern African Development Coordination Conference  
**SSA:** Sub-Saharan Africa



**SYS-GMM:** System Generalized Method of Moments

**TOI:** Trade Openness Index

**UDEAC:** Union Duaniere et Economique de L'Afrique Centrale

**WG:** Within-Group Estimator

## **CHAPTER ONE**

### **1 INTRODUCTION AND LITERATURE REVIEW**

In the early era of world development, mercantilism was the common rule to achieve economic growth and development in a nation. The mercantilist doctrine mandated a positive balance of trade for countries seeking to gain economic growth and power to the detriment of trading partners. It was not until the 18<sup>th</sup> century that Adam Smith and later, David Ricardo, criticized the economic basis of the mercantilist ideas in Europe based on the notions of absolute and comparative advantage. This ushered in the case for free trade. Following these criticisms, and realizing that free trade allows for mutual gains from trade in goods and services between countries, the free trade revolution began to spread to other parts of the world. However, prior to and during World War II, countries reverted to extensive government controls on imports (inward looking strategies), with the aim of devoting output and tariff revenue to fund individual war efforts. Nevertheless, after World War II, there was a significant change from reliance on inward-looking industrial policies towards export-oriented strategies led by developed countries and later some developing countries. The rise of RTAs became an integral part of the new way of looking at world development via trade.

The interest in the impact of RTAs on world trade has increased over the few decades. RTAs are initiatives taken by governments in a region to liberalize and facilitate trade among their countries. It accounted for 59 percent of global exports of manufactured goods in 2009 (World Trade Report 2011). The beginning of the proliferation of RTAs was of the north-north nature where developed countries came

together to present the region as a strong competitive economic force in the international market. The formations of the Generalized Agreement on Tariffs and Trade in 1947, the European Economic Community in 1957 and the Australia-New Zealand Closer Economic Relations and Trade Agreement in 1983 are examples of RTAs initiated by developed countries. Currently, the WTO has received 575 notifications of RTAs of which 379 are in force.

The proliferation of RTAs has led to increase in studies evaluating their trade creation and trade diversion effects. Ghosh and Yamarik (2004) analyzed the effect of twelve RTAs using extreme bound analysis on a static gravity model. Having realized that various studies introduce numerous explanatory dummy variables with no specific selection criteria to explain trade between two countries, they found the need to employ a more rigorous test of the effects of model specification on results. For their estimation, they included all explanatory variables that have been used in previous studies in addition to dummy variables for each RTA and applied an extreme bound analysis. The results from the extreme bound analysis suggested that most RTAs were not trade creating. Even though Ghosh and Yamarik (2004) concluded that other omitted variables and not RTAs, may explain why two countries trade more than predicted by the traditional variables in the gravity model, they did not explore the possibility that introducing a lagged dependent variable as an explanatory variable may explain trade between two countries. Ghosh and Yamarik (2004b) analyzed the impact of RTAs on trade levels. They argued that the degree of integration of each RTA must be accounted for when examining their effect on trade. They used annual data for 186 countries from 1970 to 1995 for twelve regional trade agreements employing least squares on a static gravity model. Though they

recognized that the actual implementation of the RTA may be later than the date of formation and therefore the impact of the RTA on member's trade may have a delayed effect, their model failed to account for the relationship between past and present trade. RTA's were divided into five categories based on the level of integration: Preferential Trade Agreement (PTA), Free Trade Area (FTA), Customs Union (CU), Common Market (CM) and Monetary Union (MU).<sup>1</sup> They also distinguished between every RTA at every point in time by its actual implementation type. The results suggested that RTAs increase intra-bloc trade by 39 percent while reducing extra-bloc trade by 6 percent. A proposed FTA, CU and MU increased member's trade while a CM decreased trade. A proposed MU and CM increased the trade flow between members and nonmembers. Ghosh and Yamarik (2004b) concluded that as the level of integration increased, the level of total trade creation also increased. Spilimbergo (2000) used a Ricardian model to explain his proposition that the impact of RTAs on trade is dependent on central assumptions such as homothetic preferences. He argued that RTAs could hinder economic growth by changing the composition of goods traded between two developing nations from high quality manufactured goods to low-technology goods.

Another era of RTAs began in the later parts of the 1960's where RTAs were of the north-south form. These RTAs were formed to enable developed countries grant tariff concessions and other preferential treatments to developing countries. The north-south RTAs continue to proliferate today, ranging from large RTAs to small bilateral trade

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<sup>1</sup> A PTA is a trade agreement where members reduce tariffs for certain products amongst them. An FTA is a trading bloc where members have signed an agreement to eliminate tariffs, import quotas and extend preferences on most or all of goods and or services. CU is a free trade area with a common external tariff. MU is a group of countries that share a common currency. A CM is a group of countries in a geographical area that have free movement of goods, labour and capital.

agreements. A common example is the North American Free Trade Agreement (NAFTA) that came into force in 1994, which has generated many studies on its influence on members' trade. Gould (2009), examined the impact of NAFTA on its members' trade. He employed Bergstrand's (1985) theoretical foundation of the gravity model that stems from the assumptions that producers maximize profit subject to a constant elasticity of substitution utility function and a budget constraint. Exchange rates were included to control for price changes and multilateral resistance. Using pre and post-NAFTA quarterly trade data from 1986 to 1996, Gould (2009) found evidence that NAFTA has had a significant positive effect on trade flows between the USA and Mexico. This was however not the same for trade between the USA and Canada or Canada and Mexico because of already existing bilateral trade relationships. Even though the north-south RTAs were successful in increasing trade between countries, developing countries began to lean towards self-reliance for political and economic freedom.

The theories of the south-south cooperation began to be an integral part of economic policies of most developing countries in the late 1970's. Most developing countries came to the realization that they were more likely to gain from low cost solutions to their economic development problems by forming trade partnerships with other developing countries rather than their reliance on the rich north. Regional integration therefore became the key strategy that enabled first Asia, and subsequently other developing regions, to transform their small and largely agrarian economies to more heavily industrialized economies by benefiting from economies of scale. The campaign for, and spread of south-south RTAs resulted in an increase in empirical studies to examine and evaluate their impact on trade and the economies of their members. Lee and

Park (2005) used annual data on 186 countries from 1955 to 1997 to examine the effect of thirteen RTAs on trade concentrating on south-south RTAs. They also investigated the trade creation effect of existing East Asian RTAs and proposed new FTAs such as the Association of Southeast Asian Nations (ASEAN) countries plus three. Both random and fixed effects methods were used to estimate a static gravity model. They found evidence that suggested that countries that join an RTA experienced an increase in trade of 75 percent and that trade between members and non-members also increased by 3.5 percent. From specific RTA results, 6 of the RTAs had a positive and significant effect on member's trade while ASEAN Free Trade Area (AFTA) and European Free Trade Association (EFTA) had negative effects on intra-bloc trade. They found that the Caribbean Community and Common Market (CARICOM) was the only exception that continues to exhibit a negative impact on both intra and extra RTA trade.

Soloaga and Winters (2001) estimated a static gravity model using annual data for 58 countries to examine the effects of newly created PTAs such as the ANDEAN Pact, Central American Common Market and revamped PTAs (such as the Common Market of the South and the North American Free Trade Association) on trade flows. The aim of the study was to examine if the recently created and revived PTAs had significantly changed trade patterns in their respective regions. Their results suggested there was no evidence that regionalism had increased intra-bloc trade. They also found that some PTAs (EU and EFTA) had trade diversion effects.

In an effort to achieve economic growth and development after independence, most African countries adopted policies that existed during colonization. These economic policies were oriented towards dependence on the north for meaningful and productive

cooperation on the principle of comparative advantage arising from differences in factor endowments between the south and north. This north-south relationship was suitable since most of the African countries were in a similar economic position: underdeveloped, and did not have the capacity to provide meaningful support for each other. Regardless of the perceived benefits of the north-south cooperation, incomes of most of the sub-Saharan African (SSA) countries either dwindled or remained stagnant. A major part of this lack of economic improvement was the fact that these economies were reliant on high-cost western technology that were not suitable or did not match their primary production systems. African countries switched from reliance on the north like most non-African developing countries to self-reliance. This led to the formation of the Non-Aligned Movement and the Organization of African Unity (OAU) as steps towards collective self-reliance for developing nations.

Africa currently has approximately 30 FTAs, a large number of them springing from deeper integration schemes present in the continent. A World Bank report (2010) argued that south-south cooperation is likely to generate trade diversion if external tariffs are higher. It argues that when RTAs reduce or eliminate tariffs on goods produced by its members, it makes goods originating from outside the regional bloc more expensive because these goods face high tariffs. Even though African RTAs are aimed at facilitating trade, a report by the United Nations Economic Commission for Africa (ECA) in 2010 stated that a key remaining challenge to the positive effect of regional integration is the low level of trade within Africa. ECA reported that more than 80 percent of African countries exports are destined for markets outside the continent, with the EU and the United States accounting for more than 50 percent of the total compared to 10 to 12

percent of African trade taking place among other African nations. Even though most reports indicate that intra-African trade is low or at an unappreciable level in the presence of free trade agreements, empirical studies aimed at investigating this notion have reported mixed results with some studies concluding that trade within SSA is low while others conclude that it is high (Yang and Gupta, 2008). To contribute to this debate, studies have also examined the impact of the RTAs in SSA on trade levels.

Musila (2005), Kirkpatrick and Watanabe (2005) and Hanink and Owusu (1998) investigated the trade creation and diversion effect of RTAs in Africa. Musila (2005) estimated the intensity of trade creation and trade diversion in the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS) and the Economic Community of Central African states (ECCAS) for 20 countries. He used weighted least squares to estimate a static gravity model. His results suggested that the level of trade creation is higher in ECOWAS, followed by COMESA, while the results for ECCAS are not statistically significant. Musila (2005) only estimated the effect of these RTAs on a small fraction of member countries without providing a basis of sample selection that could introduce selection bias. Kirkpatrick and Watanabe (2005) employed a static gravity model to examine the pattern of trade of members of the East African Cooperation (EAC) using data from 1970-2001. In their estimation, they included RTAs that consisted of countries in the Organization for Economic Cooperation and Development (OECD) that had a GDP per capita of less than \$3000 as of 1970. They found that the EAC had a positive impact on intra-bloc trade over the period. Even though they included other RTAs from other regions, their discussion did not make any comparison between the impact of EAC and the other RTAs.



Hanink and Owusu (1998) examined the impact of ECOWAS on the trade of its members in 1973 and 1993. As their contribution to the literature on RTA's impact on trade in SSA, they used trade intensity to replace trade volumes as the dependent variable that accounts for trade with the rest of the world. Like most SSA studies, they estimated a static gravity model that does not account for the relationship between past and present trade.<sup>2</sup> They concluded that even though the coefficient of the dummy measuring the impact of ECOWAS on trade is positive, post-ECOWAS and pre-ECOWAS trade patterns were similar, therefore ECOWAS has not been significantly effective in promoting trade among its members.

The above studies similar to most empirical research on SSA trade have employed a static gravity model which does not account for the relationship between past and present trade levels, an important determinant of trade between countries. In addition, even though these studies examined the impact of RTAs on member-nonmember trade, they do not address the bias of the coefficient of the member-nonmember variable that occurs as a result overlapping RTA membership in SSA. Furthermore, these studies did not examine whether trade in Africa is small or not. In an attempt to do so, Foroutan and Pritchett (1993) employed the gravity model on data for 19 SSA countries to examine the perception that intra-SSA trade is small using a different approach. In order to be able to ascertain whether intra-SSA trade is truly small, it is necessary to know what level of expected trade actual trade is being compared to. To achieve this goal, they estimated the gravity model without SSA countries and used the estimated coefficients to predict intra-SSA trade. Having obtained an expected level of trade between SSA countries, they

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<sup>2</sup> Some studies that employed static gravity model on SSA data include Geda and Kebret (2007), Zannou (2010), Gbetnkom (2006), Simwaka (2006) and Warin et al. (2009).

included SSA countries in the sample and re-estimated the gravity model introducing regional integration dummies for the Communauté Economique de l'Afrique de l'Ouest (CEAO), ECOWAS and Union Duaniere et Economique de L'Afrique Centrale (UDEAC). The results suggested that the SSA share of imports plus exports were an average of 8.1 percent, higher than the 7.5 percent predicted by the gravity model. Their results for RTAs showed a positive impact of CEAO on trade while ECOWAS and UDEAC had insignificant results. They then concluded that African countries do trade more than the gravity model predicts. Though this study examines whether intra-Africa trade is small, it does not examine whether RTAs in SSA have a larger or smaller impact on trade levels than expected.

### **1.1 Thesis Objective**

The objective of this thesis is to fill in the gaps in the literature on SSA trade and contribute to the debate on whether the level of trade within SSA is indeed low or not. Specifically, the main objectives of the thesis are:

1. Examine the impact of the Economic Community of West African States (ECOWAS), Economic Community of Central African States (ECCAS), Common Market for Eastern and Southern Africa (COMESA) and Southern African Development Community (SADC) on trade between members and members and nonmembers, using a dynamic gravity model that accounts for the relationship between present and past trade.

2. Estimate the impact of NAFTA, APTA, AFTA, MERCOSUR and ANDEAN on trade and compare it to the impact of RTAs on intra-SSA trade to access if RTAs in SSA increase or decrease trade more or less than elsewhere.
3. Propose a better treatment for the examination of member-nonmember trade relationships that controls for overlapping RTA membership.

## **1.2 Thesis Contribution**

This thesis has four important contributions to the existing literature on RTAs in SSA. Firstly, it is the first study to examine the impact of the four largest RTAs in SSA (ECOWAS, ECCAS, COMESA and SADC) on intra-SSA trade using a dynamic gravity model. There is an existing gap in the SSA trade literature because earlier studies have estimated only static gravity models that do not control for the relationship between past and present trade levels. It is important to introduce dynamics into the gravity model to account for hysteresis in trade. This is because, prior to the formation of RTAs, and during their early stages, countries may have established distribution networks that lead to entrance and sunk costs. Current trade between two countries therefore will depend on past trade, which can be empirically accounted for by introducing dynamics into the static gravity model.

This thesis is the first to make use of a dynamic gravity model in the SSA trade literature. To efficiently estimate the dynamic gravity model, I employ System Generalized Method of Moments (SYS-GMM) as an estimation technique. Most dynamic gravity model studies have used the Within-Group (WG), Ordinary Least Squares (OLS) or Difference Generalized Method of Moments (DIFF-GMM) estimators. However, these

estimators have econometric problems including autocorrelation and endogenous variables. SYS-GMM has been recently proposed by Blundell and Bond (1998) as an efficient estimator for dynamic models. Martinez-Zarzoso et al. (2009) used SYS-GMM to estimate a dynamic gravity model on trade to examine the impact of RTAs on trade within Europe, North America and Latin America. Comparing results from SYS-GMM to those of other estimators, they concluded that SYS-GMM was a more appropriate and efficient estimator of dynamic models with persistent data. In this thesis, I use SYS-GMM to estimate the dynamic gravity model in order to avoid the problems of autocorrelation and endogeneity. In my opinion, this thesis is the first in the existing literature focusing on trade within SSA and the effects of RTAs to employ SYS-GMM to remedy econometric problems such as endogeneity and controls for time-invariant, country specific effects in estimating a dynamic gravity model.

Secondly, I do a comparative analysis to ascertain whether intra-SSA trade is small or not. This is done by first estimating the impact of the four largest RTAs in SSA and comparing them to the impact of NAFTA, APTA, AFTA, MERCOSUR and ANDEAN on intra-RTA trade.<sup>3</sup> Various reports and studies have suggested that intra-SSA trade is little. However the question still remains. To what trade level is intra-SSA trade being compared? To answer this question, Foroutan and Pritchett (1993) compared predicted trade levels from the gravity model to actual trade levels in SSA and concluded that SSA trades more than the gravity model predicts. They however did not examine if the impact of RTAs in SSA are larger than expected. Other researchers have made comparisons by pooling results from various studies that have employed different

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<sup>3</sup> For the purpose of this thesis, NAFTA, APTA, AFTA, MERCOSUR and ANDEAN will be referred to collectively as comparator RTAs or comparator group.

estimation techniques. These different estimation techniques influence the result of the studies, hence, for an unbiased comparison between groups of regional trade agreement one technique must be used. I use the same method in estimating the trade effects of RTAs in SSA and a comparator group for comparison purposes.

Thirdly, one caveat of most studies is the formulation of dummy variables aimed at examining the trade relationship between members and nonmembers of an RTA. Most studies fail to account for the fact that two countries may not both be members of the RTA being examined, but may be a member of another RTA. Classifying this pair of countries as member–nonmember biases the measured impact of the RTA in question. This is because, the coefficient estimate of the RTA in question will contain the impact of another RTA that the two countries belong to. Considering the fact that pair of countries belong to more than one RTA in Africa, this paper will be the first to address this treatment of the member-nonmember relationship by proposing a more efficient procedure.

Lastly, studies examining trade patterns in a region usually focus on member-member and member-nonmember relationships. They often exclude the examination of the trade patterns between countries that do not belong to any RTA in questions. It is paramount to examine their trade relationship to conclude whether it is beneficial to join an RTA in that region or if trade patterns in these countries are significantly different from that of RTA members. This thesis will examine the trade relationship between country pairs that do not belong to any RTA.

### **1.3 Thesis Organization**

The rest of the thesis is organized as follows. Chapter Two provides an in depth overview of the various RTAs analyzed in the thesis. The overview provides a background on the history and status of the RTAs examined which provides insight on their expected impact on trade. Chapter Three discusses the model specification and econometric issues in estimating the model. Chapter Four presents and discusses the econometric results and Chapter Five provides the summary and conclusions of the thesis.

## **CHAPTER TWO**

### **2 OVERVIEW OF THE REGIONAL TRADE AGREEMENTS**

#### **2.1 Regional Trade Agreements in SSA**

The new globalization phase that characterized the post-Cold War period gave an impetus for African countries to adjust to the rapid evolution in international trade and world development. The struggle for independence and subsequently its attainment by most African countries during this period provided further incentive for continent-wide integration to seek a new identity. It was crucial that the African continent take strides towards improving governance and political stability, achieving sustainable economic growth and competitiveness in the international market as well as reducing dependence on colonial masters. Efforts were made by leaders of western and northern Africa to integrate Africa, however no consensus was reached on how integration and consolidation was to be maintained. Sub-regional groupings such as the Pan-African Freedom Movement of East and Central Africa began to emerge. Leaders of Africa eventually came together to form the OAU in 1963 with the aim of promoting African solidarity, economic corporation and eradication of colonialism. Even though the OAU was instrumental in eradicating colonialism and the formation of regional trade agreements such as ECOWAS and Southern African Development Coordination Conference (SADCC), it was criticized for contributing little to achieving significant economic corporation in the continent. The Abuja Treaty of 1991 and the Lagos Plan of Action provided a platform for the intensification of regional economic integration in Africa towards the formation of the African Economic Community (AEC). The treaty was to be implemented in six stages with the main aim of strengthening existing RTAs,

and establishing RTAs in other parts of Africa. The first stage required the reinforcement of existing regional economic communities within a five-year period. It was during this period that RTAs that existed prior to 1991 such as SADCC and PTA were revamped. The AEC hopes to become an economic and monetary union at the end 2028 implementing its goals through the RTAs in Africa (AEC, 1991). This section briefly reviews the history and status of 4 of these RTAs.

Founded on 28<sup>th</sup> May 1975, ECOWAS became a trading bloc after the signing of the ECOWAS treaty by 15 West African countries. Its mission is to promote economic integration across the region and achieve “*collective self-sufficiency for its member states by creating a single large trading bloc through an economic and trading union*” (Grimm, 1999). The West African Economic community, a free trade area was an integral part of ECOWAS when it was formed. Its main aim was to extend ECOWAS into a custom union by 2001. In line with this goal, it advocated for the introduction of a regional cooperation tax, a preferential import duty applied on a product-by-product basis. ECOWAS also reduced the tariffs on imported industrial commodities originating from member countries. The ECOWAS Trade Liberalization Scheme was initiated in the first five years of its inception but not implemented until 1990. Initially, agricultural products, handicrafts and crude products were allowed to benefit from the liberalization scheme. Coverage was extended to industrial products in 1990. These groups of products were granted total exemption from taxes, import duties and quantitative restrictions as long as they complied with the rules of origin. The West African Economic Community was replaced with the West African Monetary and Economic Union in 1994 as a step towards forming a monetary union. In 2006, the ECOWAS Common External Tariff (CET) was



established. It imposed no duties on essential social goods, a 5 percent duty on goods of primary necessity, raw materials and specific inputs, a 10 percent duty on intermediate goods, a 20 percent duty on final consumption goods and a 35 percent duty on specific goods for economic development (ECOWAS, 2012). ECOWAS is currently embarking on trade diversification projects to increase intra-regional trade.

COMESA was formed in December 1994 to replace the former Preferential Trade Area that existed since 1981. The United Nations Economic Commission for Africa recommended its formation at a meeting assembled for leaders of independent states in eastern and southern parts of Africa in 1965. Its implementation was however delayed until 1981 as a result of political instability in the region. The collapse of initial regional integration schemes such as the EAC also dampened the willingness of countries to establish the union. In 1994, the COMESA treaty was signed in Malawi. It was inaugurated “*as an organization of free independent sovereign states which have agreed to co-operate in developing their natural and human resources for the good of all their people*” (COMESA, 2010). It is comprised of 21 countries. Considering the economic status of most countries that made up COMESA, their main focus was to form a large economic and trading unit that will enable them to overcome the barriers to economic development as individual states. Members of COMESA are at different stages of trade liberalization. In 2000, 9 member states eliminated their tariffs on COMESA originating products as a step towards creating an FTA.<sup>4</sup> Cameroon, Eritrea, Rwanda and Uganda apply 20 percent of Most Favored Nation (MFN) duty rates, Burundi maintains 40 percent of the MFN duty rates, Ethiopia applies 90 percent of the MFN duty rates, and

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<sup>4</sup> Djibouti, Egypt, Kenya, Madagascar, Mauritius, Malawi, Sudan, Zambia and Zimbabwe.

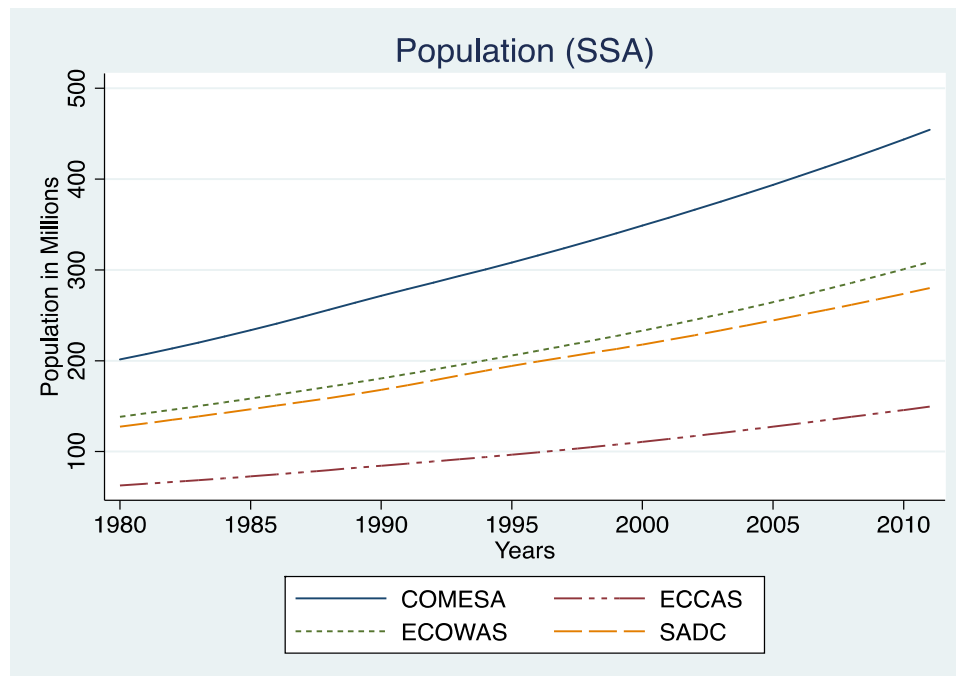
Angola, Democratic Republic of Congo, Swaziland, Namibia and Seychelles apply full MFN rates. In addition to the elimination of trade barriers, trade information networks have been established to provide businesses with reliable information on market conditions. In 2009, members of COMESA met in Zimbabwe to inaugurate the COMESA customs union after postponing it since 2006. This included the implementation of the COMESA CET. The CET has three categories, a rate of 0 percent on raw materials and capital goods, 10 percent on intermediate goods, and 25 percent on finished goods. The transition into a custom union is supposed to be a gradual process involving mandatory evaluation of members. This is to ensure uniformity and the achievement of scheduled goals. Currently, COMESA has provided a fund to supplement revenue losses in the initial stages of implementing the CET for members.

The SADC was formed in 1992 to replace the SADCC that existed since 1980. The initial objective of the SADCC was to gain political liberation of southern Africa. The need for integration was further intensified by high poverty levels and the threat of white minority in southern Africa. Subsequently after the independence of most of the southern African countries, SADC shifted its aim *“to promote sustainable and equitable economic growth and socio-economic development through efficient product systems, deeper co-operation and integration, good governance and durable peace and security so that the region emerges as a competitive and effective player in international relations”* (SADC, 2003). The long-term goal of the SADC was to establish a CU by 2010, a CM by 2015, a MU by 2016 and a single currency by 2018. Member states signed the SADC protocol on trade in 1996 that legalized the implementation of a free trade area in 2000 to promote intra-regional trade. As part of its liberalization strategy, the community has

harmonized customs procedures and classification and also introduced a single standardized document for customs clearance throughout the region. The SADC prohibits quota restrictions. Duties on 85 percent of the harmonized system tariff lines have been eliminated within the region. As at 2010, the average trade-weighted applied tariffs and MFN tariff on intra-SADC imports were 1.4 percent and 7.6 percent respectively. Intermediate goods account for 41 percent of SADC exports with raw materials, consumer goods and capital goods accounting for 29, 17 and 12 percent respectively (Mashayekhi et al., 2012).

Leaders of the Central African Customs and Economic Union saw the need to form a wider economic region of central African states resulting in the formation of ECCAS in 1983. It consists of 11 countries in the central sub region of Africa. Their aim is *“to promote and strengthen harmonious cooperation and balanced and self-sustained development in all fields of economic and social activity, particularly in the fields of industry, transport and communications, energy agriculture, natural resources, trade, customs, monetary and financial matters, human resources, tourism, education, further training, culture, science and technology and the movement of persons, in order to achieve collective self-reliance, raise the standard of living of its peoples, increase and maintain economic stability, foster close and peaceful relations between Member States and contribute to the progress and development of the African continent”* (ECCAS, 1983). The long-term goal was to establish a CU by the end of 2003, however, little progress was made to achieve this goal due to financial difficulties and socio political disturbances that characterizes central Africa. In 1999, ECCAS came to a consensus on establishing the Council of Peace and Security in Central Africa (COPEX) at the United

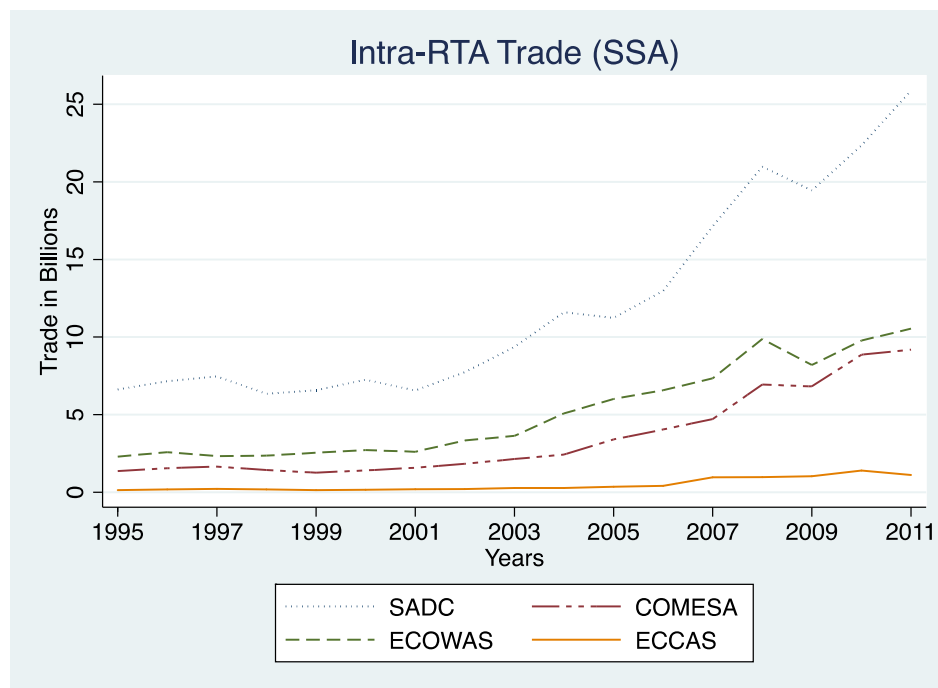
Nations Consultative Committee on Security in Central Africa. The COPEX operates through the Central African Early-Warning System (MARAC) that helps detect and prevent crises, the Defense and Security Commission that organizes and advises the other organs, and the Multinational Force of Central Africa, responsible for executing peace missions and providing humanitarian relief. In 2004 the FTA was implemented. A discount of 100% was to be extended to traditional craft and crude products. Mining and manufactured goods were to receive a reduction of custom duties of 50 percent in 2004, 70 percent in 2005, 90 percent in 2006 and 100 percent in 2007. However none of these reductions has been implemented (AUC, 2013). The region continues to allocate most of its resources and time in maintaining peace and stability in the individual countries as opposed to promoting economic integration.



Source: UNCTADstat

**Fig 2.1: SSA Population (Market Size)**

Figure 2.1 shows the total population of each RTA in SSA representing the total market size for goods traded within the region. The population of all the RTAs has increased over the time period indicating an increase in the market size. COMESA has the largest market size followed by ECOWAS, SADC and ECCAS in descending order. Even though increasing population growth requires governments to increase productivity and infrastructure to serve the increasing population, it also serves as a larger market for the region. It is therefore expected that regions with relatively larger population trade more than regions with smaller population.

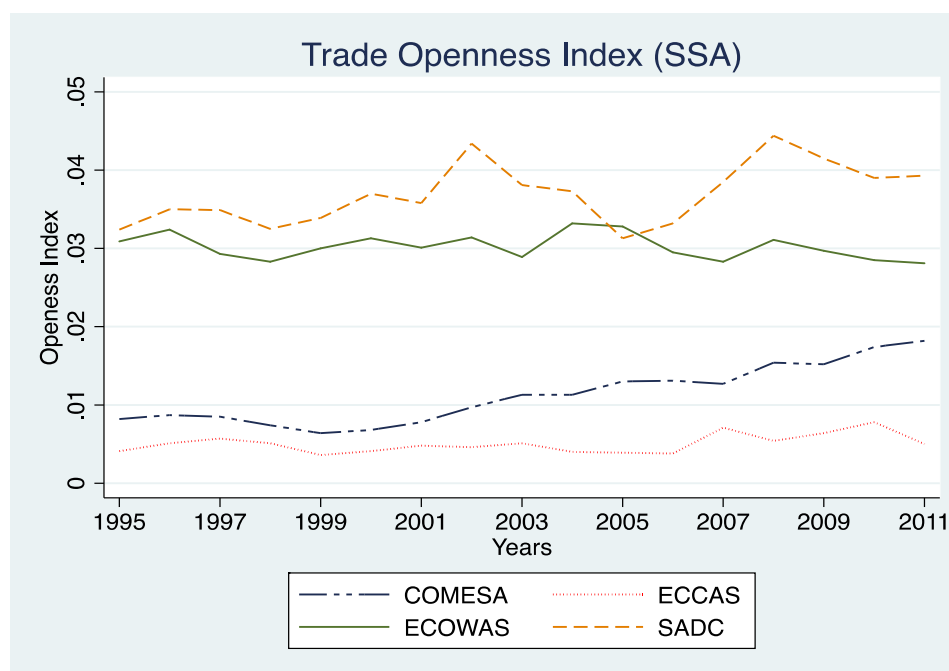


Source: UNCTADstat

**Fig 2.2: Intra-RTA Trade in Millions of Dollars in SSA**

Trade, being one of the most powerful growth engines in the world continues to be an integral part of economic policies in Africa. In spite of the proliferation of bilateral trade agreements in Africa, trade within Africa is perceived to be low. Figure 2.2 presents intra-RTA trade from 1995 to 2011. On the average, there has been an increase in intra-

SSA trade. SADC has the highest level of intra-RTA trade irrespective of the fact that it has a relatively smaller market size as compared to COMESA and ECOWAS. It is then followed by ECOWAS, COMESA and ECCAS in descending order. Surprisingly, COMESA ranks 3<sup>rd</sup> in intra-RTA trade levels even though it is the most populous and hence has the largest market in the region. ECCAS is the least populous RTA and also has the lowest level of intra-RTA trade. The difference in intra-RTA trade is partly as a result of different GDP levels.



Source: UNCTADstat

**Fig 2.3: Trade Openness Index of SSA**

The trade openness index (TOI) is another indicator used to analyze trade patterns. Figure 2.3 shows the TOI for RTAs in SSA<sup>5</sup>. SADC on the average was the most open RTA amongst the four RTAs. ECOWAS on the average was the second open

<sup>5</sup> The TOI is calculated as the ratio of total trade to GDP.

RTA for the period, however it was the most open RTA in 2005. COMESA was the third open RTA while ECCAS was the least open RTA.

## **2.2 Comparator Regional Trade Agreements**

A comparator group of RTAs consisting of NAFTA, APTA, AFTA, MERCOSUR and ANDEAN are included in the thesis for comparison purposes. This group of RTAs was chosen since they represent the various categories of RTAs in the literature and exhibit some similar characteristics as RTAs in SSA. NAFTA is of the north-south nature while APTA, AFTA, MERCOSUR and ANDEAN are south-south RTAs. Like RTAs in SSA, the comparator RTAs evolved from already existing preferential trade agreements with aims of integrating the region both economically and socially. All the RTAs in both SSA and the comparator group fall under a CU or FTA except APTA, which is a partial scope agreement. Apart from NAFTA and MERCOSUR, that cover both goods and services, all the RTAs in the thesis cover goods only.

NAFTA, which came into effect on January 1<sup>st</sup> 1994 is one of the most unique RTAs of the north-south nature involving two highly developed countries (USA and Canada) and a developing country (Mexico). Like most RTAs in SSA, it originated from an already existing trade agreement, the Canada-United States Free Trade Agreement (CUFTA). Under NAFTA, tariff reduction on commodities was to be implemented over a period of 10 to 15 years. Compared to the other two countries, Mexico is most likely to pay the most adjustment cost for the elimination of trade barriers under NAFTA and similarly likely to receive the highest benefit since Canada and the US had already reduced tariffs significantly under CUFTA. Tariffs on textiles were to be eliminated on 26 percent of US textile commodities. One-half of agricultural exports to Mexico were

also to attract no charges for the time period. Export performance requirements and rules of domestic content for US firms based in Mexico were to be eliminated. As at 2012, NAFTA had an output of \$17 trillion and a total market size of 463.1 million with the US being the most populous accounting for 68.5 percent, Mexico accounting for 24 percent and Canada 7.5 percent (NAFTA, 2012). Irrespective of its success in eliminating trade barriers and addressing key economic issues, NAFTA has been criticized for having a negative impact on employment both in the US and Mexico.

MERCOSUR, also known as the Common Market of the South was inaugurated with the signing of the treaty of Asuncion by Argentina, Brazil, Paraguay and Uruguay in 1991. Like RTAs in SSA, MERCOSUR is a building bloc that has gone through different stages of restructuring aimed at integrating Latin America and promoting a democratic political environment in member countries. According to Gardini (2011), MERCOSUR has gone through four stages: *“the genesis years (1984-1990), the neoliberal apogee (1990-1999), the dark years (1999-2003) and the search for a renewed identity (2003-present)”*(p. 686). MERCOSUR became a currency union in 1995 and with the implementation of the CET for non-MERCOSUR members, a CU in 2008. Brazil remains the largest economy in the trading region. In 2012, MERCOSUR increased its CET on imports to 35 percent. MERCOSUR has been an active advocate for democracy in the region. MERCOSUR formally documented in 1996 that only democratic countries could be members. In line with this, Paraguay was suspended in 2012 as a result of the improper eviction of its president Fernando Lugo. Intra-MERCOSUR merchandise trade grew from \$10 million in 1991 to 88 billion in 2010. The region has a total GDP of approximately \$1.6 trillion (Hufbauer and Schott, 2005).

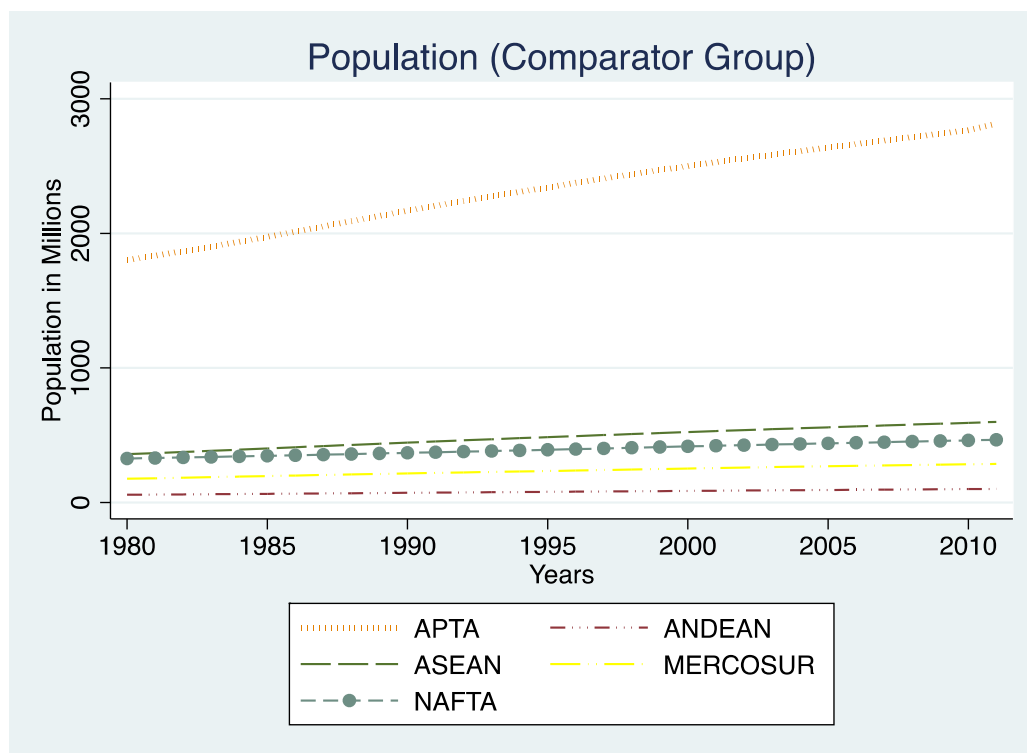


In 1970, the United Nations Economic Commission for Asia and the Far East (ECAFE now ESCAP) adopted the Kabul Declaration stressing the need to develop an intra-regional trade agreement to promote economic cooperation and growth in Asia. The Bangkok Agreement, which was the very first trade negotiation agreement within ECAFE, was signed in 1975 by 7 countries. It was later in 2005 that the ministerial council of the Bangkok Agreement adopted the name “Asia-Pacific Trade Agreement”. APTA is the oldest preferential trade agreement involving developing countries in Asia and the only agreement that brings the east and south together. APTA is open to all developing member countries of the Economic and Social Commission for Asia and the Pacific (ESCAP). Three rounds of negotiations have been concluded on concession exchange. APTA decided at the second session of the Ministerial Council at GOA on 26th October 2007 to implement a common set of operational procedures for the certificate and verification of the origin of goods for APTA. This made APTA the first among RTAs in the region to adopt a single custom procedure. For the period between 2001 and 2005 intra-APTA trade accounted for 15 percent of member’s trade. The region has a combined GDP of \$7.1 trillion (UNCTAD stat).

After years of efforts to form a deeper integration scheme, members of the ANDEAN community started a revitalization process for integration in 1997 as steps towards becoming a common market by 2005. The ANDEAN community was inaugurated with the signing of the Cartagena Agreement designed to improve standards of living. They aimed at having free flows of goods, capital and people. Members of ANDEAN created a free trade area in 1993 and adopted a CET in 1995 with three countries participating at the early stages. The ANDEAN Community Advisory Council

of Treasury of Finance Ministers, the Central Banks and Economic Planning Authorities oversee the harmonization of macroeconomic policies within the region. The ANDEAN in 2005 achieved a free flow of people with the implementation of a no-visa requirement for movements across member countries. Currently members of MERCOSUR have been granted associate membership in the ANDEAN free trade area.

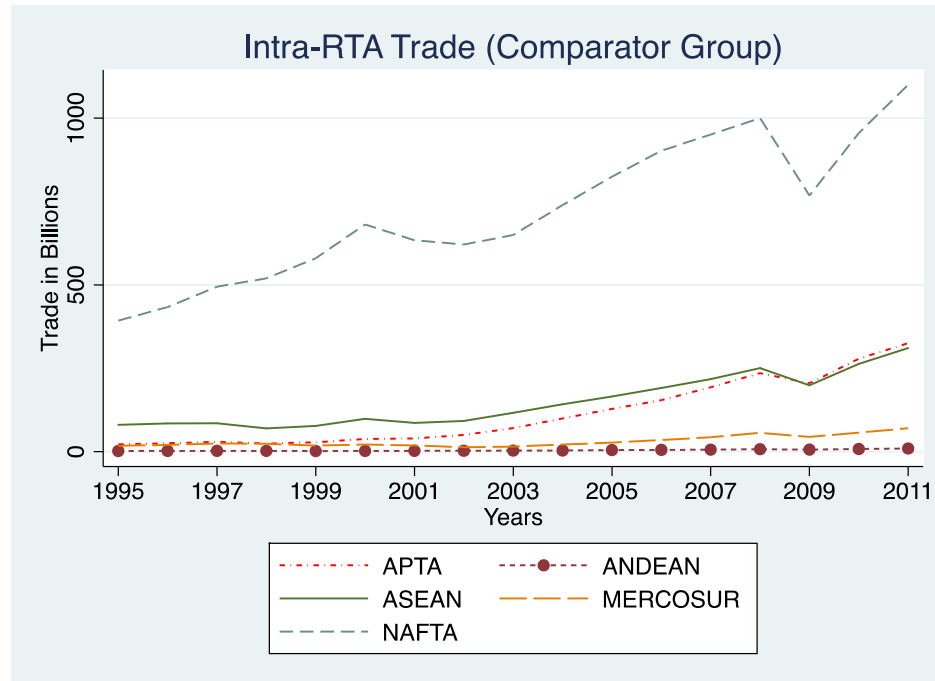
ASEAN was formed on August 1967 by the major non-communist states in Asia. The main aim of forming this regional bloc was to reduce the intra-ASEAN political tension and external influence on the region, and like SSA, improve the socio-economic development of its members. According to Narine (2008), in response to future economic competition from the newly formed Asia Pacific Economic Cooperation that was likely to *“promote economic policies disadvantageous to the weaker regional economies”*, members of ASEAN acknowledged the need to intensify integration efforts (p. 419). In line with this, Thailand proposed the formation of the ASEAN Free Trade Area (AFTA) that was inaugurated in 1992. The free trade area was a means of attracting foreign direct investment (FDI) into the region and also providing a bigger market for their local products. AFTA has reduced trade barriers with the ratification of the Common Effective Preferential Tariff Scheme (CEPT Scheme). As at 2010, Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand had eliminated import duties on 99.65 percent of traded tariff lines while Cambodia, Laos, Myanmar and Vietnam reduced tariffs to a range 0-5 percent on 98 percent of their tariff lines. AFTA as at 2011 had a combined GDP of \$3.3 trillion (ASEAN, 2012). Cambodia’s political instability however continues to remain a main challenge in ASEAN.



Source: UNCTADstat

**Fig 2.4: Comparator Group Population (Market Size)**

Figure 2.4 and Figure 2.5 show the market size and intra-RTA levels of the 5 RTAs discussed above. The population of most of comparator RTAs has increased marginally as compared to Africa. APTA is the most populous RTA and ranks 3<sup>rd</sup> in intra-RTA levels amongst the 5. ASEAN is the second most populous RTA and records the second highest level of intra-RTA trade. NAFTA is the third most populous RTA however has the highest level of intra-RTA trade in the comparator group. MERCOSUR and ANDEAN rank fourth and fifth in both market size and intra-RTA trade respectively.



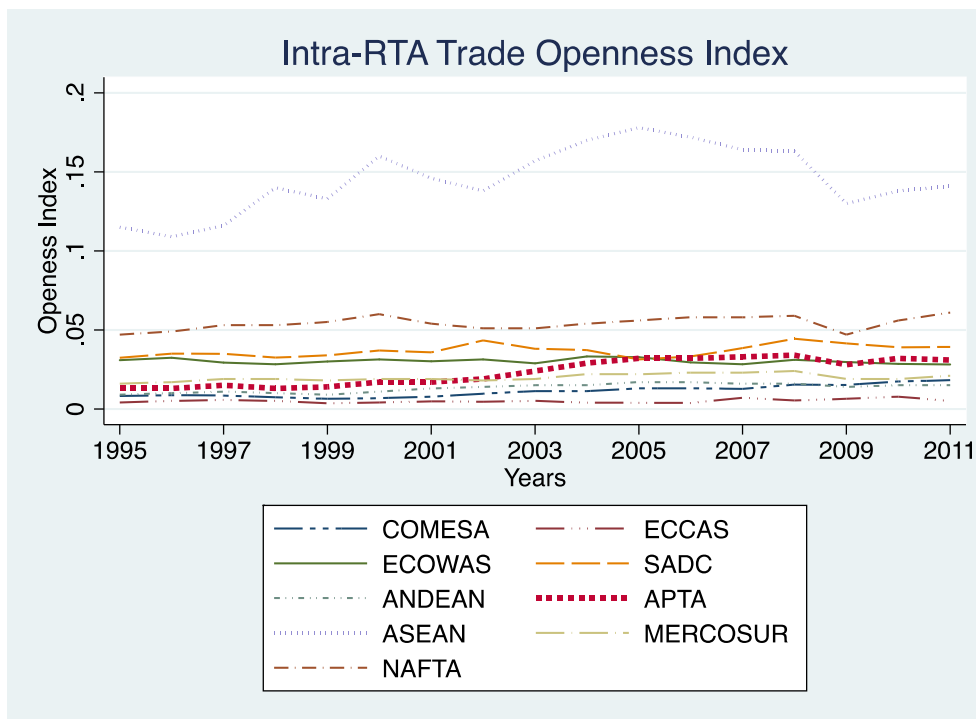
Source: UNCTADstat

**Fig 2.5: Intra-RTA Trade in Billion of Dollars in Comparator Group**

A comparison of intra-RTA trade levels between RTAs in SSA and RTAs in the comparator group reveals that most of the comparator RTAs have higher intra-RTA trade levels than RTAs in SSA. In descending order of intra-trade values, NAFTA is the highest followed by ASEAN, APTA, MERCOSUR, SADC, ECOWAS, ANDEAN, COMESA and ECCAS. In descending order of population figures, APTA is the most populous followed by ASEAN, NAFTA, COMESA, MERCOSUR, SADC, ECCAS and ANDEAN. The higher level of intra-RTA trade in the comparator group may be mainly due to the fact that most of the comparator RTAs have a larger market size and higher GDP levels as compared to SSA. GDP levels therefore become a major limitation to trade levels in SSA. It is also important to note that the value of total trade is also affected by the price of commodities traded. Unlike most countries in the comparator group, SSA trades mainly in agricultural products, raw materials and primary manufactured goods

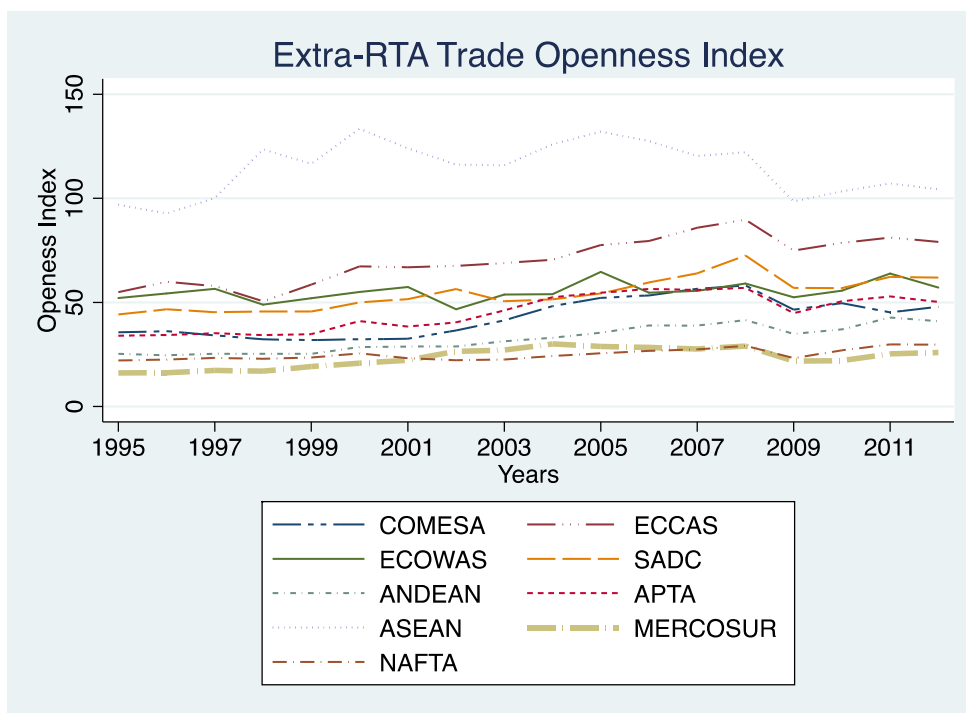
such as rubber products and textiles. This may contribute to the comparatively low value of total trade. The TOI provides a less biased comparison of intra-RTA trade between SSA and the comparator group. This is because the TOI is calculated as the ratio of an RTA's trade to its GDP hence providing a fair platform of comparison that is not influenced by size of GDP.

I use two different TOI measures, the Intra-RTA Trade Openness Index (I-TOI) and Extra-RTA Trade Openness Index (E-TOI) to compare intra-RTA and extra-RTA trade openness. Figures 2.6 and 2.7 show I-TOI and E-TOI of the RTAs, respectively. Examining I-TOI in Figure 2.6, ASEAN and NAFTA have the highest I-TOI followed by SADC and ECOWAS. COMESA and ECCAS have the lowest I-TOI. Apart from ASEAN, 3 of the RTA in SSA have higher E-TOI than the other 4 RTAs in the comparator group. This implies that SSA may be more open to external trade than the other regions in the study. Also this suggests that RTAs in SSA may have spill-over effects that increase trade between RTA members and non-members. These statistics suggest that, the level of trade effect of RTAs in SSA may or may not be higher than that of the comparator group. Results from the econometric estimation will confirm the direction and magnitude of the influence of SSA RTA's on trade.



Source: Author's Calculation

**Fig 2.6: Intra-RTA Trade Openness Index**



Source: UNCTADstat

**Fig 2.7: Extra-RTA Trade Openness Index**

## CHAPTER THREE

### 3 MODEL SPECIFICATION AND ECONOMETRIC ISSUES

In this Chapter, I introduce the model specification of the gravity model and the econometric issues associated with estimating it. First, a step-by-step derivation of the gravity model is presented and the rational behind the variables included in the model is discussed. Second, the econometric bias associated with estimating the dynamic gravity model is discussed and the appropriate measures to address them are presented.

#### 3.1 Model Specification

The gravity model was first used by Tinbergen (1962) and Poyhonen (1963) to estimate bilateral trade flows of countries. The traditional gravity model postulates that the flow of trade between two countries  $i$  and  $j$  is a function of each countries trade potential and their mutual attraction. A country's trade potential is dependent on its economic size measured by GDP, and other factors such as area and population. The standard gravity model is specified as:

$$Bt_{ij,t} = \beta_0 (GDP_{it}^{\beta_1} GDP_{jt}^{\beta_2} / D_{ij}^{\beta_3}) \eta_{ij,t} \quad (1)$$

where  $Bt_{ij}$  is the volume of bilateral trade between countries  $i$  and  $j$  which includes zero trade measures,  $GDP_{it}$  and  $GDP_{jt}$  are GDP for exporting and importing countries respectively,  $D_{ij}$  denotes the distance between the two countries,  $\beta_0$  is the constant and  $\eta_{ij}$  represents an error term.

Taking the log of equation (1) yields:

$$\ln Bt_{ij,t} = \beta_0 + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \beta_3 \ln(D_{ij}) + \ln \eta_{ij,t} \quad (2)$$

where  $\ln$  denotes the natural log of variables. One major shortcoming of estimating the log-linear model is that it cannot be used when there are observations for which  $BT_{ij}$  is equal to zero. For this reason, the dependent variable for this study is  $\ln Bt_{ij,t} = \ln(1 + BT_{ij,t})$  to enable the inclusion of zero measurable trade.

Depending on the purpose of a study, various authors have included different variables in the standard gravity model. For instance, studies that used the gravity model to estimate the effect of free trade agreements in Africa and elsewhere have included numerous dummy variables such as common language, common border, island and common colonial masters, to account for the mutual attraction between two pair of countries. The list of dummy variables that controls for the mutual attraction between two countries is enormous and cannot be exhausted in the estimation of the gravity model. For the purpose of this thesis, I treat all variables that account for mutual attraction as fixed effects pertaining to a specific pair of countries.

To control for bilateral resistance between two countries and also provide a proximate measure of the relative price effects on trade, I follow the literature by including bilateral exchange rates as an explanatory variable in the gravity model. The estimated coefficient of nominal exchange rates in the gravity model gives insight on the elasticities of demand for imports and exports through the Marshall-Lerner condition and how price changes affect trade.<sup>6</sup> Exchange rate affect trade when they alter relative prices (a lack of pass-through of exchange rate changes), contributing to the extent of the border effect on bilateral trade. A real devaluation of a country's currency improves the trade

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<sup>6</sup> The Marshall-Lerner condition states that a currency devaluation will only lead to an improvement in the balance of payment if the sum of the elasticities of the demand for import and exports with respect to the real exchange rate is greater than one.



balance if the sum of the absolute elasticities of demand for imports and exports to the real exchange rate is greater than one.

As mentioned earlier, studies that seek to estimate the effect of RTAs in Africa have employed gravity models of static specification. This may not be the appropriate approach for the following reasons. First, countries that trade prior to the formation of the RTA have established distribution and service networks in partner countries leading to entrance and exit sunk costs (Martinez-Zarzoso et al., 2009). Second, prior trade relationships could lead to habit formation of consumers who tend to be familiarized with commodities from trade partners. This leads to hysteresis of the trade relationship where current trade ( $Bt_{ij,t}$ ) is influenced by past trade ( $Bt_{ij,t-1}$ ). To account for hysteresis in trade, I follow the Martinez-Zarzoso et al. (2009) formulation by augmenting equation (2) with a lagged dependent variable and exchange rate to obtain:

$$\begin{aligned} \ln Bt_{ij,t} = & \beta_0 + \psi_{ij} + \lambda \ln Bt_{ij,t-1} + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \\ & \beta_3 \ln(D_{ij}) + \beta_4 \ln(EX_{ij,t}) + \ln \eta_{ij,t} \end{aligned} \quad (3)$$

where  $\lambda$  is the adjustment coefficient in the dynamic model,  $EX_{ij,t}$  is bilateral exchange rate and  $\psi_{ij}$  is the fixed effects parameter associated with the pair of countries.

To capture the effects of the four largest RTAs in SSA, two different sets of dummy variables are introduced into the model. The first set of dummies ( $COMESA_{ij}$ ,  $SADC_{ij}$ ,  $ECCAS_{ij}$ ,  $ECOWAS_{ij}$ ) captures intra-RTA trade which takes a value of 1 if both countries are members of the RTA in question and 0 if otherwise.  $COMESA_{ij}$  captures bilateral trade between members of COMESA,  $SADC_{ij}$  captures bilateral trade between

members of SADC,  $ECCAS_{ij}$  captures bilateral trade between members of ECCAS and  $ECOWAS_{ij}$  captures bilateral trade between members of ECOWAS.

As initially stated, most earlier empirical studies do not consider the fact that a pair of countries,  $i$  and  $j$  may not both belong to the regional integration in question but may belong to another regional integration in the sub-region (the “usual” approach). If this is the case, there will be some trade relationship between these two countries that may not be explained by the RTA in question. The coefficient of the dummy variable (capturing bilateral trade between member and a nonmember of the RTA in question) will be biased upwards since explanatory power belonging to another regressor is being allocated to it. To remedy this, I specify strict member-nonmember dummy variables ( $COMESA1_{ij}$ ,  $SADC1_{ij}$ ,  $ECCAS1_{ij}$ ,  $ECOWAS1_{ij}$ ) that takes the value of 1 if country  $i$  is a member of the RTA in question while country  $j$  is not a member, and both countries  $i$  and  $j$  (as a pair) do not belong to any other RTAs in the sub-Saharan region of Africa.

A third set of dummy variables ( $NONMEMBER_{ij}$ ) is introduced into the gravity model to examine trade between non-member pairs of RTAs. This takes the value of 1 when the pair of countries does not belong to an RTA being examined and 0 if otherwise. In this thesis, the three sets of dummy variables explained above are also estimated for the comparator RTAs in the same fashion. This allows for a comparison of RTA effects in SSA and elsewhere to be able to contribute to the debate on whether intra-SSA trade and for that matter the effect of RTAs in SSA on trade is low or not. The final equations for the examination of members, member-nonmember and nonmembers trade relationships are (hat indicates instrument):

$$\begin{aligned}
\ln Bt_{ij,t} = & \beta_0 + \psi_{ij} + \lambda_1 \ln Bt_{ij,t-1} + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) + \\
& \beta_3 \ln(\widehat{D}_{ij}) + \beta_4 \ln(EX_{ij,t}) + \gamma_1 \widehat{COMESA}_{ij} + \gamma_2 \widehat{SADC}_{ij} + \\
& \gamma_3 \widehat{ECCAS}_{ij} + \gamma_4 \widehat{ECOWAS}_{ij} + \ln \varepsilon_{ij,t}
\end{aligned} \tag{4}$$

$$\begin{aligned}
\ln Bt_{ij,t} = & \delta_0 + \psi_{ij} + \lambda_2 \ln Bt_{ij,t-1} + \delta_1 \ln(GDP_{it}) + \delta_2 \ln(GDP_{jt}) + \delta_3 \ln(D_{ij}) \\
& + \delta_4 \ln(EX_{ij,t}) + \gamma_5 COMESA1_{ij} + \gamma_6 SADC1_{ij} + \gamma_7 ECCAS1_{ij} \\
& + \gamma_8 ECOWAS1_{ij} + \ln \eta_{ij,t}
\end{aligned} \tag{5}$$

$$\begin{aligned}
\ln Bt_{ij,t} = & \omega_0 + \psi_{ij} + \lambda_3 \ln Bt_{ij,t-1} + \omega_1 \ln(GDP_{it}) + \omega_2 \ln(GDP_{jt}) + \\
& \omega_3 \ln(\widehat{D}_{ij}) + \omega_4 \ln(EX_{ij,t}) + \gamma_9 NONMEMBER_{ij} + \ln \theta_{ij,t}
\end{aligned} \tag{6}$$

respectively.

### 3.2 Econometric Issues

Incorporating the lagged dependent variable in the gravity model introduces the entire history of the dependent variable on the right hand side of the equation. For the entire data set, the model comprises of present trade values as the dependent variable and trade values from the previous year as an independent variable. This will introduce endogeneity into the model that needs to be addressed. For panel data analysis, the common estimation methods are OLS, Fixed Effect (FE), Random Effects (RE) and DIFF-GMM. In the FE setting the individual level effect are assumed to be correlated with other regressors while under the RE setting, the individual level effects are assumed

to be uncorrelated with the regressors. However, these techniques face substantial complications as a result of the introduction of the lagged dependent variable. In both the fixed and random effect setting, the lagged dependent variable is correlated with the disturbance term ( $\eta_{ij}$ ) even if it is assumed to be not autocorrelated. In the FE setting, the lagged dependent variable  $Bt_{ij,t-1}$  is endogenous to the fixed effect ( $\psi_{ij}$ ). It arises from the fact that those factors that compose the fixed effects contribute to the value of the lagged dependent variable. For instance, a new binding contract between two countries that requires country  $i$  to sell cocoa to country  $j$  in 2012 for 5 years explains why the two countries had an increase in cocoa trade in 2012 and subsequent years. This new binding contract becomes a time invariant effect and at the same time contributes to the increase in previous trade levels. The bias is more transparent in the RE setting because the lagged dependent variable is correlated with the compound disturbance term that enters the model for every observation in a group. According to Weeks and Yao (2003), Roodman (2006) and Darku (2010), applying OLS to equation (3) without the fixed effects gives rise to dynamic panel bias. This is because, the lagged dependent variable is correlated with the fixed effects term, violating an assumption necessary for the consistency of OLS. OLS biases the coefficient estimate of the lagged dependent variable upwards. It allocates explanatory power to the lagged dependent variable that belongs to the fixed effects term.

The Within-Group (WG) estimator is one approach to dealing with the endogeneity problems discussed above. The approach transforms the equation to eliminate the fixed effects by utilizing the deviations from the mean values of the dependent variable, lagged dependent variable, the fixed effect and the disturbance term

for each group. Since the mean of the fixed effect is equal to the fixed effect itself, it is eliminated from the transformed equation. Even though this approach eliminates the endogeneity between the lagged dependent variable and the fixed effects term, it does not eliminate the dynamic panel bias. According to Bond (2002), under the WG transformation, the lagged dependent variable becomes  $y_{i,t-1}^* = y_{i,t-1} - \frac{1}{T-1}(y_{i2} + \dots + y_{iT})$  while the error becomes  $v_{it}^* = v_{it} - \frac{1}{T-1}(v_{i2} + \dots + v_{iT})$ . The  $y_{i,t-1}$  in  $y_{i,t-1}^*$  correlates negatively with the  $\frac{1}{T-1}v_{i,t-1}$  in  $v_{it}^*$  while symmetrically the  $-\frac{1}{T-1}y_{it}$  and  $v_{it}$  terms move together. The continuing endogeneity cannot be tackled by using lags of  $y_{i,t-1}$  as instruments because they are embedded in the transformation error. Arellano and Bond (1991) suggested that the endogeneity can be expunged from the model by taking the first difference of equation (3) to eliminate the fixed effects and estimating the equation using the two-step Generalized Method of Moments (GMM). Taking first difference of equation (3) yields:

$$\begin{aligned}
\ln Bt_{ij,t} - \ln Bt_{ij,t-1} = & \beta_0 - \beta_0 + (\psi_{ij} - \psi_{ij}) + \beta_1(\lambda \ln Bt_{ij,t-1} - \lambda \ln Bt_{ij,t-2}) + \\
& \beta_1(\ln GDP_{i,t} - \ln GDP_{i,t-1}) + \beta_2(\ln GDP_{j,t} - \ln GDP_{j,t-1}) - \\
& \beta_3(\ln D_{ij,t} - \ln D_{ij,t-1}) + \beta_4(\ln EX_{ij,t} - \ln EX_{ij,t-1}) + \ln \eta_{ij,t} - \\
& \ln \eta_{ij,t-1}
\end{aligned}$$

$$\begin{aligned}
\Delta \ln Bt_{ij,t} = & \lambda \Delta \ln Bt_{ij,t-1} + \beta_1 \Delta \ln(GDP_{it}) + \beta_2 \Delta \ln(GDP_{jt}) + \beta_4 \Delta \ln(EX_{ij,t}) + \\
& \Delta \ln \eta_{ij,t}
\end{aligned} \tag{7}$$

where  $\Delta$  denotes first differences. In this approach the first-difference equations replaces the independent variables with their one-period lagged values as instruments under the assumption that the level residuals are not serially correlated. This amounts to the

following moment condition:  $E(y_{it}\Delta\psi_{it}) = 0$  for all  $t = 3, \dots, T$ , where  $y_{it}$  is the dependent variable. Even though the fixed effect is eliminated, this approach performs poorly when the dependent variable is persistent because past levels provide little information about future changes so the lagged levels of the variables become weak instruments for subsequent first-differences (weak instrument problem). Since with bilateral trade flows, the dependent variable is highly persistent, Blundell and Bond (1998) argue that DIFF-GMM estimation can be improved by using the SYS-GMM estimator, which will supplement the equations in first differences with equations in levels. Lagged levels are used as instruments in the first difference equation while lagged differences are used as instruments in equations in levels. I use distance and the dummy variables as the instruments for the estimation. The first difference and level equations for SYS-GMM

$$\begin{aligned}\Delta \ln Bt_{ij,t} = & \lambda \Delta \ln Bt_{ij,t-1} + \beta_1 \Delta \ln(GDP_{it}) + \beta_2 \Delta \ln(GDP_{jt}) + \beta_4 \Delta \ln(EX_{ij,t}) + \\ & \vartheta RTA_{ij} + \Delta \ln \eta_{ij,t}\end{aligned}\quad (8)$$

and

$$\begin{aligned}\ln Bt_{ij,t} = & \beta_0 + \lambda \ln Bt_{ij,t-1} + \beta_1 \ln(GDP_{it}) + \beta_2 \ln(GDP_{jt}) - \beta_3 \ln(D_{ij}) + \\ & \beta_4 \ln(EX_{ij,t}) + \vartheta RTA_{ij} + \ln \eta_{ij,t}\end{aligned}\quad (9)$$

where  $RTA_{ij}$  is the list of dummy variables introduced for each RTA and  $\vartheta$  is the set of coefficients for the dummy variables.

The SYS-GMM has performed better than DIFF-GMM in empirical studies on international trade using dynamic panel data models. Darku (2010) evaluated the finite

sample performance of the DIFF-GMM and SYS-GMM estimators in a study on the effect of trade liberalization and the federal equalization transfers on income convergence among Canadian provinces. After tackling the issues of fixed effects and dynamic panel bias, his empirical results showed that the SYS-GMM estimator, compared to OLS and WG estimators, is a preferred estimation method in terms of providing consistent and efficient estimates. His approach and conclusion is consistent with Weeks and Yao (2003). In the gravity model literature, Martinez-Zarzoso et al. (2009) estimated the effects of preferential agreement on trade between trade group members and non-members using a dynamic gravity model. They estimated the model using DIFF-GMM, FE-GMM and SYS-GMM estimators. They realized that FE-GMM estimates were biased downwards while DIFF-GMM was not suitable for highly persistent panel data. The SYS-GMM estimator provided better results in terms of standard errors, therefore I use SYS-GMM in estimating the dynamic gravity model in this thesis.

The variables  $GDP_{it}$  and  $GDP_{jt}$  are expected to have positive coefficients since the trade potential of a country has a positive effect on trade flow. The variable  $D_{ij}$  is expected to have a negative coefficient. Distance is a proxy for transportation cost and therefore the further apart a pair of countries are, the higher the transportation cost and therefore the lower the flow of trade. The bilateral nominal exchange rate may have a positive or negative effect on trade values. A positive coefficient implies that a devaluation of the exchange rate increases imports more than it decreases exports. The opposite is true for the case of a negative coefficient. The regional integration dummies may have positive or negative coefficient. A positive coefficient indicates the RTA has increased trade while a negative coefficient indicates the RTA has reduced trade.

## **CHAPTER FOUR**

### **4 ECONOMETRIC ANALYSIS**

In this Chapter, I discuss the econometric results of the thesis. First, the data used for the thesis and their respective sources are provided. Second, the rational for the use of a dynamic model is provided by comparing the results for a static and dynamic gravity model. It is followed by a discussion of the results of the dynamic models examining the effects of RTAs in SSA and the comparator RTAs. Lastly, I make a comparison between the effects of RTAs in SSA and the comparator group on trade of its members and member-nonmembers to ascertain if the effect of RTAs in SSA on trade is more than the effect of RTAs in other regions. All models were estimated in logarithm form hence coefficients are explained as elasticities.

#### **4.1 Data**

This section presents the sources of data used in the thesis. The data for this study was obtained from various databases. Annual total bilateral trade data in thousands of US dollars was obtained from World Trade Analyzer by Statistics Canada. Annual real GDP and exchange rate data were obtained from the International Macroeconomic Dataset provided by the United States Department of Agriculture. Data on bilateral distance was obtained from the GeoDistance database provided by Centre d'Etudes Prospectives et d'Informations Internationales's (CEPII). Annual data covers the period from 1988 to 2005 for 38 sub-Saharan countries and 27 comparator countries. A sample of 65 countries



is used due to the unavailability of data or missing observations for some sub-Saharan African countries.<sup>7</sup>

## 4.2 Econometric results

This section discusses the results of the thesis using SYS-GMM. Earlier studies have used a static form of the gravity model to examine and predict trade patterns between two countries. This study however uses a dynamic gravity model since we find it vital to account for the persistent nature of trade. This is because present trade is dependent on past trade as a result of industries establishing trade networks. In order to confirm this assertion, base static and dynamic gravity models were estimated. The results are reported in Table 4.1.

**Table 4.1: Static and Dynamic Model**

Model	$\ln(\text{GDP}_{it})$	$\ln(\text{GDP}_{jt})$	$\ln(\text{D}_{ij})$	$\ln(\text{Bt}_{ij,t-1})$
Static	0.99 (42.02)*	0.44 (15.60)*	-1.13 (24.95)*	
Dynamic	0.48 (69.88)*	0.22 (23.05)*	-0.51 (13.21)*	0.56 (69.88)*

NOTE: Asterisks \*, \*\*and \*\*\* denote significance level at 1%, 5% and 10%. Values in parentheses are t-statistics.

In Table 4.1, the static and dynamic gravity models have significant coefficients for all the traditional gravity variables. However in the static model, the coefficients of the traditional gravity model variables are larger than their corresponding coefficient in the dynamic model. This is because, without adding the lagged dependent variable as a regressor in the static model, OLS allocates predictive power to the other explanatory variables which do not belong to them, hence the larger coefficients. The second row reports coefficients of the basic dynamic gravity model which test the ability of the

<sup>7</sup> See Appendix A for list of RTA member countries.

dynamic gravity model to predict trade patterns. The coefficients of the traditional variables of the gravity model have the expected sign. The coefficients of the logarithms of GDP of the countries are 0.48 and 0.22 and significant at the 1 percent level suggesting that the larger the country's GDP the higher the flow of trade between the two countries. The coefficient of distance is -0.51 hence the further away the two countries are the lower the trade level. The coefficient of the lagged dependent variable is 0.56. This means that a 1 percent change in last year's trade increases this year's bilateral trade by 0.56 percent. The basic dynamic gravity model successfully predicts trade patterns between sub-Saharan African countries.<sup>8</sup>

The dynamic gravity model is estimated for both SSA and the comparator group using SYS-GMM. One major econometric concern arising from employing instrumental variables is the bias caused by having too many instruments. For DIFF-GMM, the number of instruments grows quadratically with time, hence, specifying lags for this estimation is crucial. Previous studies have either limited the lag length or collapsed the instrument set in the estimation. However, according to Mehrhoff (2009), factorized instruments produce the lowest bias. Factorizing instruments summarizes the information content of the instrument set into a smaller number of instruments. This reduces the likelihood of over fitting endogenous variables without losing important information. In factorizing the instrument set, the Principal Components Analysis (PCA) obtains the largest eigenvalues of the estimated covariance matrix of the instrumental set. PCA then compiles their corresponding eigen vectors into a transformation matrix. To reduce the

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<sup>8</sup> In the long run,  $lnt_{ij,t} = lnt_{ij,t-1}$  the long run coefficient will be calculated as  $\frac{\beta_i}{1-\beta_1}$  where  $i=1,2,3,4$ . The long run coefficients of GDP of exporter, GDP of importer and distance in the dynamic base model are 1.09, 0.5 and -1.16. This suggests that in the long run the impact of the traditional variables will be larger with distance having the largest effect.

possible bias from using too many instrumental variables, I factorized the instrumental set in the estimation process. The Sargan test of over identifying restrictions was computed and the results obtained for the estimation are not weakened by too many instruments. The p-values of the Sargan test suggest that the moment conditions of the SYS-GMM are valid. In all the estimations, the traditional gravity model variables have the expected sign as theory predicts and are statistically significant. Discussion of the results will concentrate on the coefficient of the lagged dependent variable, exchange rate and the dummy variables of RTAs.

Table 4.2 reports the results of the estimation of the dynamic gravity model for SSA. The first column presents the results of the equation that examines the impact of RTA's on bilateral trade between members of RTA's in SSA. The coefficient of the lagged dependent variable is 0.675 and is statistically significant at the 1 percent level, suggesting that 0.675 percent of present trade is as a result of a one percent change in past trade. This confirms that there is a continual relationship between present trade and past trade emanating from binding relationships that have resulted from established distribution and service networks and work contracts. The bilateral nominal exchange rate is introduced into the gravity model to control for bilateral resistance and proxies the influence of changes in price levels on trade. The coefficient of the bilateral nominal exchange rate variable is negative but insignificant. This maybe due to the fact that the bilateral exchange rate in SSA has remained fairly constant over the years hence having little effect on levels of trade or prices.

### **4.3 Analyzing the Effect of RTAs on SSA Trade (Member-Member Trade Results)**

As mentioned earlier, three sets of dummy variables are introduced for member-member, member-nonmember and non-members relationship to measure the impact of RTAs. The first set of dummy variables measures the effect of RTAs on member's trade. The results suggest that apart from ECCAS, all the RTAs in SSA have had a positive effect on member's trade.

The percentage value of the impact of all the RTAs on trade is calculated by using the formula,  $e^{\beta} - 1$ , where  $\beta$  is the value of the coefficient of the dummy variables. The coefficient of the dummy variable for COMESA is statistically significant at 5 percent level. COMESA increased trade between its members by 1.2 percent. SADC increased trade among members by 4.26 percent and its coefficient is also significant at the 10 percent level. ECCAS is the only RTA that has a negative effect on its member's trade with a negative coefficient statistically significant at the 1 percent level. ECCAS has decreased trade between its members by 0.98 percent. The negative effect of ECCAS on trade levels could be the result of declining economic activity and political instability and tension in the region with member states fighting on opposing sides of the war in Democratic Republic of Congo. This worsened the region's integration since most resources have been dedicated to maintaining a stable political environment and restructuring of the RTA as opposed to improving the regional economic integration. ECOWAS has increased trade between its members by 1.22 percent. Its coefficient is also statistically significant at the 10 percent level.

**Table 4.2: SSA Dynamic Panel Gravity Models**

VARIABLE	1	2	3	4	5
$\ln(Bt_{ij,t-1})$	0.675 (23.11)*	0.416 (22.93)*	0.254 (12.04)*	0.226 (10.54)*	0.239 (11.91)*
$\ln(GDP_{it})$	0.665 (5.58)*	1.068 (19.74)*	1.397 (11.15)*	1.4 (9.97)*	1.363 (9.86)*
$\ln(GDP_{jt})$	0.710 (5.15)*	0.489 (4.54)*	0.451 (3.63)*	0.704 (4.88)*	0.610 (5.99)*
$\ln(D_{ij})$	-0.453 (3.95)*	-1.476 (6.15)*	-0.826 (8.77)*	-0.866 (5.09)*	-0.274 (1.32)
$\ln(EX_{ij,t})$	-0.001 (0.01)	0.159 (4.26)*	-0.096 (1.54)	0.028 (0.42)	-0.1 (1.50)
$COMESA_{ij}$	0.797 (1.96)**				
$SADC_{ij}$	1.661 (1.80)*				
$ECCAS_{ij}$	-3.741 (4.24)*				
$ECOWAS_{ij}$	0.799 (1.91)***				
$COMESA I_{ij}$		2.327 (3.93)*			
$SADC I_{ij}$			2.195 (3.52)*		
$ECCAS I_{ij}$				-1.714 (2.90)*	
$ECOWAS I_{ij}$					-2.202 (3.53)*
<i>Observations</i>	9880	7270	6346	6262	7390
<i>SARG</i>	0.11	0.663	0.783	0.608	0.00

NOTE: Asterisks \*, \*\*and \*\*\* denote significance level at 1%, 5% and 10%. Values in parentheses are absolute values of t-statistics. SARG is the sargan test of over identifying restriction.

The results are consistent with the discussion in Chapter 2. COMESA is expected to have a positive effect on trade since it has the largest market size in SSA. Also SADC

though has a relatively smaller market size than COMESA, it has the highest intra-RTA trade level and TOI amongst the SSA RTAs and therefore is expected to have the largest positive effect on members trade within SSA. Since ECOWAS has the second largest market and intra-RTA trade level in SSA, it is consistent that it has the second largest positive effect on member's trade within SSA. The directions of these results are consistent with result from other studies. Hanink and Owusu (1998) obtained a coefficient of 1.49 and 1.179 for 1973 and 1993, respectively, and concluded that ECOWAS had a positive impact on member trade. My result of a 1.22 percent increase in intra-ECOWAS trade is consistent with his results. Musila (2005) obtained 0.178, 0.909 and -0.094 for the dummy variables measuring the impact of COMESA, SADC and ECCAS respectively on intra-RTA trade. Even though the signs of the results of Musila (2005) are the same as the results obtained from this thesis, the magnitude is relatively smaller. Sawkut (2006) reported a positive coefficient of 1.19 (similar to the 1.2 percent from my estimation) for the dummy measuring intra-COMESA trade in his study.

#### **4.4 Analyzing the Effect of RTAs on SSA Trade (Member-Nonmember Trade)**

The second set of dummy variables examines trade effect of RTAs on member-nonmember trade. I propose a different treatment of member-nonmember trade relationships to control for overlapping membership that characterizes the region. In my approach, the dummy variable takes the value of 1 when country  $i$  is a member of the RTA in question while country  $j$  is not a member, and both countries  $i$  and  $j$  (as a pair) do not belong to any other RTAs in the sub-Saharan region of Africa.

Column two of Table 4.2 presents results for the second set of dummy variables measuring the effect of COMESA on trade between members and non-members. Interestingly COMESA members traded more with non-members of COMESA in the region. COMESA increased trade between its members and nonmembers by 9.2 percent. This does not come as a surprise since COMESA had not implemented the CET during the period under study. Earlier examination of the I-TOI and E-TOI suggested that COMESA is more open to external trade than intra-COMESA trade. The lagged dependent variable has a positive coefficient of 0.416 at the 1 percent significance level. A one percent increase in the bilateral nominal exchange rate increases trade between COMESA members and non-members of COMESA by 0.159 percent. The coefficient is statistically significant at the 1 percent level. An appreciation in the bilateral nominal exchange rate increases imports more than it reduces exports for COMESA members and nonmembers. A possible explanation for the positive relationship seen here could be the J-curve effect that postulates that a devaluation of a currency will worsen current account balances in the short run. Under the J-curve effect, the devaluation of exchange rate decreases both imports and exports in the short run, resulting in a positive relationship between exchange rate and trade

Column three presents the results for the model that examines the trade relationship between SADC members and non-members. Most of the coefficients in this equation are statistically significant at the 1 percent level. Opposite to the effect of bilateral exchange rate on COMESA members and nonmembers, the bilateral exchange rate has a negative effect on trade levels between SADC members and nonmembers

however the coefficient is not significant. SADC increases trade between members and nonmembers by 7.9 percent.

Column four and five presents results for the models examining the effect of ECCAS and ECOWAS on member and non-member trade. For ECCAS members and nonmembers, bilateral exchange rate has a positive but insignificant coefficient while the coefficient of the bilateral exchange rate is negative but also insignificant for ECOWAS members and nonmembers. The presence of ECCAS reduced trade between its members and nonmembers by 0.82 percent while the presence of ECOWAS reduced trade between members and nonmembers by 0.889 percent. The coefficients of these dummies are statistically significant at the 1 percent level.

To empirically test the validity of the argument in favor of my proposed treatment of member-nonmember relationships and for confirmation purposes, I estimated the dynamic gravity model by employing the procedure used by earlier studies and compare the results to the estimated coefficients from my proposed procedure. Table 4.3 presents results using the “usual” procedure. As expected, the traditional gravity model variables ( $GDP_i$ ,  $GDP_j$  and distance) have the correct signs except distance in the case of ECOWAS. Most importantly, the COMESA<sub>2ij</sub> has a coefficient of 3.684 which is larger than 2.327 from my proposed treatment. The coefficients of the “usual” procedure for SADC<sub>2ij</sub>, ECCAS<sub>2ij</sub> and ECOWAS<sub>2ij</sub> are 4.236, -3.288, and -3.281, respectively. They are all statistically significant at the 1 percent level and are larger than the corresponding coefficients from my proposed procedure (2.195, -1.714, and -2.202 respectively).



**Table 4.3: Second Dynamic Panel Gravity Models**

VARIABLE	1	2	3	4
$\ln(Bt_{ij,t-1})$	0.251 (14.31)*	0.238 (13.84)*	0.245 (14.18)*	0.251 (14.42)*
$\ln(GDP_{it})$	1.494 (12.09)*	1.322 (10.68)*	1.24 (9.77)*	1.309 (10.44)*
$\ln(GDP_{jt})$	0.679 (6.39)*	0.727 (6.92)*	0.721 (6.83)*	0.694 (6.55)*
$\ln(D_{ij})$	-2.056 (8.23)*	-1.889 (14.81)*	-0.954 (20.16)*	0.257 (1.31)
$\ln(EX_{ij,t})$	-0.026 (0.48)	-0.014 (0.27)	-0.032 (0.59)	-0.122 (0.23)
$COMESA2_{ij}$	3.685 (4.22)*			
$SADC2_{ij}$		4.236 (7.35)*		
$ECCAS2_{ij}$			-3.288 (6.81)*	
$ECOWAS2_{ij}$				-3.781 (6.66)*
<i>Observations</i>	9880	9880	9880	9880

NOTE: Asterisks \*, \*\*and \*\*\* denote significance level at 1%, 5% and 10%. Values in parentheses are absolute values of t-statistics.

Hence, the results from the comparison confirm that the procedure used by earlier studies biases estimates upwards by allocates explanatory power belonging to another RTA to the RTA in question. The proposed treatment therefore provides an improved estimate of extra-RTA trade flows controlling for the overlapping membership effect.

#### 4.5 Results for Comparator RTAs

The discussion of the results from the model examining the effect of RTAs in the comparator group concentrates on the coefficient of RTA dummy variables for

comparison purposes. Intra-SSA trade is perceived to be low. The question that remains is, to what is intra-SSA trade being compared to.

**Table 4.4: Comparator RTA Dynamic Panel Gravity Models**

VARIABLE	1	2	3
$\ln(Bt_{ij,t-1})$	0.855 (25.92)*	0.369 (8.68)*	0.354 (13.58)*
$\ln(GDP_{it})$	0.296 (7.91)*	0.842 (12.27)*	0.985 (23.55)*
$\ln(GDP_{jt})$	0.150 (3.17)*	0.732 (9.10)*	0.728 (15.23)*
$\ln(D_{ij})$	-0.149 (2.41)*	-1.162 (12.21)*	-0.830 (13.45)*
$\ln(EX_{ij,t})$	-0.011 (0.91)	0.063 (3.21)*	0.003 (0.21)
$ANDEAN_{ij}$	-4.499 (2.91)*		
$APTA_{ij}$	0.037 (0.07)		
$NAFTA_{ij}$	-2.045 (2.39)*		
$MERCOSUR_{ij}$	0.784 (1.50)		
$AFTA_{ij}$	0.921 (4.22)*		
$ANDEANI_{ij}$		-0.704 (3.55)*	
$APTAI_{ij}$		0.576 (4.15)*	
$NAFTAI_{ij}$		-1.134 (7.69)*	
$MERCOSURI_{ij}$		0.165 (1.00)	
$AFTAI_{ij}$		1.241 (11.81)*	
NONMEMBER			-1.357 (6.58)*
Observations	4275	4429	4430
SARG	0.266	0.131	0.152

NOTE: Asterisks \*, \*\*and \*\*\* denote significance level at 1%, 5% and 10%. Values in parentheses are absolute values of t-statistics. SARG is the sargan test of over identifying restriction.

The comparison of RTAs in SSA to other RTAs has been based on results from a pool of studies examining trade volumes and trade effects. This conclusion is highly biased since the results of different studies are influenced by the data and estimation techniques used. A less biased comparison of trade effects of SSA RTAs to other RTAs requires the use of the same estimation technique and data source. It is for this reason that I include a comparator group of RTAs in the thesis to be able to conclude whether intra-SSA is low or not. Table 4.4 presents the results. All the coefficients of the traditional gravity model variables in the three equations measuring the effect of RTAs on member-member trade, member-nonmember trade and nonmembers trade have the expected signs and are statistically significant at the 1 percent level.

Column one of table 4.4 presents results of the first set of dummy variables measuring the effect of RTAs on member-member trade. The lagged dependent variable has a positive coefficient of 0.855. A one percent increase in past trade in an RTA increases present trade by 0.855 percent. The exchange rate has an inverse relationship with trade, however it is statistically insignificant. APTA increased trade by 0.04 percent between its members. ANDEAN and NAFTA decreased trade between its members by 0.99 and 0.87 percent, respectively. MERCOSUR and AFTA increased trade between its members by 1.19 and 1.51 percent respectively. Column two presents results from the second model examining member-nonmember relationships. The bilateral exchange rate has a positive association with trade with a one percentage increase in the bilateral exchange rate increasing trade by 0.063 percent. ANDEAN reduced trade between members and nonmembers by 0.51 percent. APTA and AFTA increased trade between its members and nonmembers by 0.78 and 2.46 percent, respectively. NAFTA like

ANDEAN has a negative coefficient suggesting it reduced trade between its members by 0.68 percent. The results of this thesis are consistent with previous studies. Ghosh and Yamarik (2004), and Soloaga and Winters (2001) obtained negative coefficients for intra-RTA and extra-RTA effects for NAFTA and ANDEAN, Tang (2007) had positive coefficients for AFTA and Gilbert et al. (2001) concluded that MERCOSUR and AFTA has a positive effect on trade while NAFTA has a negative effect on trade. The third dummy variable that measures the impact of not belonging to an RTA has a coefficient of -0.917. Not being a member of an RTA reduced trade between the two countries by 0.18 percent.

#### **4.6 Comparison of Intra-RTA Effect of SSA and Comparator RTAs**

Table 4.5 presents a comparison of the effect of the 4 RTAs in SSA and the 5 RTAs in the comparator group from the estimated dynamic gravity models.<sup>9</sup> A comparison of the coefficients of the two sets of RTAs reveals that indeed RTA's in SSA increased trade between both its members and also between members and nonmembers more than the RTA's in the other regions. Most interestingly, the RTAs in Africa have larger spill-over effects on nonmembers. SADC and COMESA for example trade more with their nonmembers than with their members. This may be the result of the absence of a common external tariff system in the sample period, which allowed large spillover effects of tariff reductions and also preferential treatment extended to nonmembers by individual members. However, most RTAs have recently introduced common external tariffs.

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<sup>9</sup> Figures in table 4.5 are coefficients of RTA dummy variables in tables 4.2 and 4.4.

**Table 4.5: RTA Trade Effects**

RTA	Members	Member-Nonmember
COMESA	0.797	2.327
SADC	1.661	2.195
ECCAS	-3.741	-1.714
ECOWAS	0.799	-2.202
ANDEAN	-4.499	-0.704
APTA	0.037	0.576
NAFTA	-2.045	-1.134
MERCOSUR	0.784	0.165
AFTA	0.921	1.241

On the other hand ECOWAS and ECCAS have a larger negative effect on member-nonmember trade levels as compared to the negative effect of NAFTA and ANDEAN on member-nonmember trade. However unlike NAFTA and ANDEAN, ECOWAS has had a positive effect on its member's trade. On the average, RTAs in SSA have a larger positive effect on trade levels within the region as compared to the comparator group and have generally increased at least intra-RTA trade within the region.

## **CHAPTER FIVE**

### **5 SUMMARY AND CONCLUSION**

#### **5.1 Summary**

The recognition of the importance of trade to economic development for African countries led to the proliferation of RTAs in Africa. This in turn led to the growing importance of studies that seek to access the effects of these various RTAs on intra-African trade. The premise that intra-SSA trade is low hence the impact of RTAs in SSA is low has been a sensitive debate with mixed conclusions for the past few decades. My contribution to this debate is to examine the impact of RTAs in SSA on trade levels to ascertain whether trade effect of RTAs in SSA is smaller compared to RTAs elsewhere.

This thesis is distinct from other studies on SSA for four reasons. First, unlike most SSA studies that used a static gravity model, I use a dynamic version of the gravity model that accounts for hysteresis in trade to examine the effects of the four largest RTAs in sub-Saharan Africa on trade patterns. Second, I employ a more reliable estimator for dynamic models; SYS-GMM, on panel data for the period of 1988 to 2005. With reference to earlier studies that have tested the performance of SYS-GMM in dynamic panel data analysis with persistent variables, their results suggests that SYS-GMM provides more efficient and consistent estimates than OLS, WG and DIFF-GMM estimators which face econometric issues such as variable endogeneity. This thesis therefore becomes the first to use SYS-GMM to examine the impact of RTAs in SSA. Third, I propose a more efficient treatment of member-nonmember dummy variables to account for overlapping RTA membership that characterizes SSA. Fourth, I provide a

better basis of comparison of the effect of RTAs in SSA to RTAs elsewhere. I estimate the effect of RTAs in Asia and the Americas employing the same estimation technique as a comparator group. This allows for constructive comparison of the effect of RTAs in Africa to the comparator RTAs on trade levels to be able to access the claim that the impact of RTAs in SSA on trade is low, hence intra-SSA trade is low. The thesis also examines nonmember countries trade relationships.

A base static and gravity model is estimated and compared to justify the use of a dynamic model in this thesis. The results confirm that the base dynamic gravity models is a more appropriate specification for examining trade patterns. First, the coefficient of the lagged dependent variable is positive and significant. Present trade levels are dependent on past trade levels as a result of previously established trade relations. In addition to that, coefficients in the static model are larger than those in the dynamic model because OLS allocates predictive power to regressors that belong to the lagged dependent variable. In line with this, I use dynamic gravity models to examine RTA impacts on trade for the thesis.

The results suggest that, COMESA, SADC and ECOWAS have increased trade between its members. ECCAS has however decreased trade between members. An examination of the results for member-nonmember trade revealed that COMESA and SADC have had a larger positive effect on trade between members and nonmembers as compared to their members. ECOWAS and ECCAS on the other hand have reduced bilateral trade between members and nonmembers. Secondly, for the proper treatment of member-nonmember trade relations, the proposed procedure provides the actual estimate of this relationship since its estimated coefficients are lower than those reported by

studies using the “usual” procedure. The “usual” treatment of member-nonmember trade relationship in SSA biases estimated coefficients upwards since they do not control for overlapping RTA membership. Hence, my proposed procedure is a more efficient methodology in examining member-nonmember trade relations. The use of a dynamic model and SYS-GMM therefore provides a true estimate of the impact of RTA’s on SSA trade.

The results of the effect of RTAs in the comparator group are equally mixed. NAFTA and ANDEAN have negative coefficients for both members and member-nonmembers, hence they have decreased intra and extra-RTA trade. APTA, MERCOSUR and AFTA on the other hand have increased trade between members and also between members and nonmembers. Contrary to the claim in the literature, I found that RTAs in SSA have had significantly higher effect on intra-SSA trade compared to RTAs elsewhere. Specifically, most RTAs in SSA have led to an increase in trade for both member-member and member-nonmember. However it is important to note that irrespective of the relatively larger trade creation effects, the value of total trade within SSA is lower than the value of trade in the comparator RTAs. This draws attention to the fact that the value of total intra-SSA trade is relatively low not as a result of trade barriers or negative effects of regional trade agreements. RTAs in SSA must therefore go beyond the traditional role of trade liberalization to improve total trade values since most of them have a positive impact on trade levels.



## **5.2 Policy Recommendations**

The results of the statistical and econometric analysis of this thesis indicates that intra-Africa trade is at an appreciable level since three of the largest RTAs increased trade between its members, two of which also increased trade between members and nonmembers. Irrespective of the high trade creation effect of RTAs within SSA, the total monetary value of intra-RTA trade is relatively low compared to comparator RTAs, hence the region is not able to reap substantial positive benefits of its trade liberalization on its economy. This impact may have been limited by the size and production capacity of the economies in the region in comparison to NAFTA, ASEAN, APTA and MERCOSUR. To further increase trade levels and subsequently economic growth, it is important that these RTAs go beyond trade creation to implement policies aimed at increasing productivity within the region. Since most of the countries produce similar goods, the RTAs should pursue policies that promote sector cooperation to benefit from economies of scale and increase total productivity based on comparative advantage. Also, the region could benefit from infrastructure development such as transport links that is serving as a trade barrier. An increase in GDP levels will further increase trade volumes and growth rates since the impact of these RTAs on trade are already potentially high.

Secondly, the relatively low value of total trade may partly be as a result of low trade commodity prices. The region is a large producer of raw materials and natural resources. These commodities either have relatively lower prices or volatile prices compared to high technology goods. Mineral fuels, manufactured goods (rubber products and textiles), machinery and transport equipment, food and live animals have been the most traded product categories in SSA since the 1980s. Apart from machinery and

transport equipment, import needs of African countries do not fall in these categories. SSA had an export concentration index of 0.248 as at 2012, which was 0.752 units below the maximum export concentration index (UNCTAD stats) indicating low concentration of trade products. RTAs in SSA must diversify their trade baskets by providing incentives in producing manufactured and high technological goods. They must invest in and promote research in other areas apart from agriculture, such as science and technology to expand their commodity baskets to include high technology and manufactured products that have higher prices and higher import demand and also find innovative ways of producing them at lower costs. Furthermore, countries must be encouraged to increase value added on already traded goods by providing extra tariff preferences on finished goods. This will reduce the reliance of the region on imports of final commodities originating from outside the region, hence improving its trade balance with the rest of the world and at the same time increasing the value of intra-Africa trade.

Thirdly, RTAs in SSA such as ECCAS have been unable to increase trade levels between members probably as a result of political instability. Central Africa has been characterized by political upheavals and tribal wars that has not only affected the regional economy but also violated human rights. Resources that could be allocated to economic growth and development projects are diverted into maintaining peace and rebuilding war-torn zones. RTAs must be able to influence not only trade patterns but also impose severe sanctions that will induce individual countries to maintain acceptable political and economic environments. This will encourage member countries to maintain acceptable political and economic standards that will contribute to economic growth of individual countries and the region at large.

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## APPENDIX

### Appendix A: RTA Member States

COMESA	ECCAS	ECOWAS	SADC
Angola	Angola	Benin	Angola
Burundi	Burundi	Burkina Faso	Botswana
Comoros	Cameroon	Cape Verde	D.R Congo
D.R Congo	C A R	Cote D'ivoire	Lesotho
Djibouti	Chad	Gambia	Malawi
Egypt	Congo	Ghana	Mauritius
Eritrea	D.R Congo	Guinea	Mozambique
Ethiopia	Equatorial Guinea	Guinea-Bissau	Namibia
Kenya	Gabon	Liberia	Seychelles
Madagascar	Rwanda	Mali	South Africa
Malawi	Sao Tome Et Principe	Niger	Swaziland
Mauritius		Nigeria	Tanzania
Namibia		Senegal	Zambia
Rwanda		Sierra Leone	Zimbabwe
Seychelles		Togo	
Sudan			
Swaziland			
Uganda			
Zambia			
Zimbabwe			

APTA	ANDEAN	AFTA	NAFTA	MERCOSUR
Bangladesh	Bolivia	Brunei	USA	Argentina
China	Colombia	Indonesia	Mexico	Brazil
India	Ecuador	Vietnam	Canada	Paraguay
Korea	Peru	Malaysia		Uruguay
Laos		Philippines		Venezuela
Sri Lanka		Laos		
Nepal		Singapore		
Philippines		Thailand		
		Myanmar		