

**TRADE CREATION AND DIVERSION IN EAST AFRICA: THE EFFECT OF EAC ON  
MULTILATERAL TRADE FLOWS**

**ANGELIQUE UMUTESI**

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## DECLARATION

This research paper is my original work and has not been presented for the award of a degree in any other university.

Signed:  .....

Date: 3/8/2012 .....

**Angélique Umutesi**

This research paper has been submitted for examination with our approval as University supervisors.

Signed:  .....

Date: 7/8/2012 .....

**Prof. Tabitha Kiriti Ng'ang'a**

**School of Economics**

**University of Nairobi**

Signed:  .....

Date: 30/08/2012 .....

**Dr. Mary Mbithi**

**School of Economics**

**University of Nairobi**

## DEDICATION

To my late father Ladislav Nirene

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## **ACRONYMS AND ABBREVIATIONS**

<b>ADB</b>	<b>African Development Bank</b>
<b>ADF</b>	<b>African Development Fund</b>
<b>ACP</b>	<b>Africa-Caribbean-Pacific group of nations</b>
<b>AEC</b>	<b>African Economic Community</b>
<b>AGOA</b>	<b>African Growth and Opportunity Act</b>
<b>APEC</b>	<b>Asia-Pacific Economic Cooperation</b>
<b>ASEAN</b>	<b>Association of South East Asian Nations</b>
<b>AFTA</b>	<b>ASEAN Free Trade Agreement</b>
<b>CACM</b>	<b>Central America Common Market</b>
<b>CAN</b>	<b>Andean Community</b>
<b>CARICOM</b>	<b>Caribbean Community and Common Market</b>
<b>CEPII</b>	<b>Centre d'Etudes Prospectives et d'Informations Internationales</b>
<b>CET</b>	<b>Common External Tariff</b>
<b>CGE</b>	<b>Computable General Equilibrium</b>
<b>CMEA</b>	<b>Council of Mutual Economic Assistance</b>
<b>COMESA</b>	<b>Common Market for Eastern and Southern Africa</b>
<b>CU</b>	<b>Customs Union</b>
<b>DOT</b>	<b>Direction of Statistics</b>
<b>EAC</b>	<b>East African Community</b>
<b>EC</b>	<b>European Community</b>
<b>ECOWAS</b>	<b>Economic Community of Western African States</b>



EEC	European Economic Community
EPA	Economic Partnership Agreement
EPZ	Export Processing Zone
EU	European Union
FTA	Free Trade Area
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
IGAD	Inter-Governmental Authority on Development
IOR-ARC	Indian Ocean Rim-Association for Regional Cooperation
LAFTA	Latin American Free Trade Association
LDCs	Least Developed Countries
LLC	Levin-Lin Chu Test
MERCOSUR	Common Southern Market
MFN	Most Favored Nation
NAFTA	North American Free Trade Agreement
NTB	Non-Tariff Barrier
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
RIA	Regional Integration Agreement
RTA	Regional Trade Agreement
SADC	Southern African Development Community
SAP	Structural Adjustments Programs
SAPTA	South Asia Preferential Trade Agreement

SSA	Sub-Saharan Africa
SER	Southeast Region
SMART	System Modeling Analysis and Research Tool
SSA	Sub-Saharan Africa
UEMOA	West African Economic and Monetary Union
USA	United States of America
WTO	World Trade Organization

## ABSTRACT

East African Community (EAC) is a regional integration that joins Kenya, Tanzania, Uganda, Burundi and Rwanda. Throughout the period of 2000-2010, the gains of increased intra-EAC trade are unevenly distributed with only Kenya being a net intra-EAC exporter. Although the adoption of EAC Common External Tariff in 2005 led to a decline of tariff rates for Kenya and Tanzania, it resulted into a rise in average tariff rate for Uganda. The study investigated effects of EAC; that is trade creation or trade diversion on multilateral trade flows of member states using the gravity model. The results suggested that multilateral trade flows in EAC were explained by the standard variables of the gravity model before and after the year 2007. GDP positively and significantly impacted on EAC imports, while distance considerably was a barrier to multilateral trade. Evidence showed no existence of trade creation or trade diversion for both periods 2002-2006 and 2007-2010. Policy implications include improvement of transport infrastructures both within EAC and with other trading partners in order to reduce the cost of imports. EAC member countries' governments should continue to enhance policies that are geared towards economic growth, so that increased GDP will lead to increased multilateral trade flows.

## CHAPTER ONE

### INTRODUCTION

#### 1.1. Background

Regional integrations promote economies' trade and economic development through specialization and comparative advantage. The number of regional trade agreements (RTA) has been increasing in Africa. Eastern Africa has a high record of many regional integrations and trade agreements (African Development Bank (ADB) – African Development Fund (ADF), 2011). On one hand, these regional integrations followed African economies' independences in 1970s such as Southern African Customs Union (SACU) and Economic Community of West Africa (ECOWAS). On the other hand, in 1990s other African regional integrations were a result of enlarging the region coverage and reestablishing some that had been dissolved such as East African Community (EAC) (Dinka and Kennes, 2007).

EAC is a regional integration of the Republics of Kenya, Uganda, Rwanda, Burundi and the United Republic of Tanzania, whose mission among others is to promote and develop trade among member countries and to advocate for them in the international trade negotiations. EAC started as a customs union in 1917 between Kenya and Uganda; it expanded in 1927 with addition of Tanganyika and became East African High Commission (1948-1961), East African Common Services Organization (1961-1967) and East African Community (1967-1977) before breaking up in 1977. EAC was reestablished in 2000 (World Trade Organization (WTO), 2006).

As contained in the Treaty of EAC establishment under article 5, EAC's objective is to promote cooperation among members in different aspects (EAC, 2009). With respect to trade, East African Community Customs Union (EAC CU) was established in order to eliminate internal tariffs, non-tariff barriers and provide a basis for the EAC Common External Tariff (WTO, 2006; EAC, 2004). In order to achieve some of the above objectives, EAC adopted a three band (0, 10%, and 25%) common external tariff (CET) as from 2005, whereas above 25% Most Favored Nation (MFN) tariff rate applies to a number of "sensitive" products. In contrast, despite partner states efforts to create a smooth environment for trade in eliminating Non-Tariff Barriers (NTBs), they still constitute a major hindrance to trade and investment in the region (Mugisa, et al., 2009; EAC Secretariat, 2009). In accordance with Article 76 of the Treaty establishing EAC (EAC, 2000), EAC Common Market was established in July 2010 (EAC, 2009); in addition EAC is expected to become a Monetary Union during year 2012.

EAC members have overlapping membership in other regional integrations like African Economic Community (AEC, all members), Common Market for Eastern and Southern Africa (COMESA, all except Tanzania), Southern African Development Community (SADC, Tanzania only), Inter-Governmental Authority on Development (IGAD, Kenya and Uganda), Indian Ocean Rim-Association for Regional Cooperation (IOR-ARC, Kenya and Tanzania) and EAC members are also eligible for non-reciprocal preferential treatment under the Generalized System of Preferences (GSP); the Cotonou Agreement with the European Community (EC); and the U.S. African Growth and Opportunity Act (AGOA) (WTO, 2006).

The motivation behind the establishment of regional integrations and trade agreements is the improvements of welfare effects. These welfare effects include trade diversion and trade creation; which are indicated by the direction of trade flows after integration. Sayan (1998) used comparative advantage in member countries that induces efficient versus inefficient domestic production to determine welfare gains of trade creation that follow integration. On the other hand, following a regional integration can occur a welfare loss, when less costly production and imports of nonmembers is substituted for high costly imports from members of the regional integration. This constitutes a trade diversion (Appleyard, et al., 2006).

Total intra-EAC trade has been increasing (EAC, 2008; 2010; 2011). In addition, total trade of EAC with the rest of the world also increased and contributed to a gradual unfavorable trade balance (EAC, 2008, 2010). However, trade gains are unevenly distributed among EAC countries because trade flows in respective partner states do not have similar patterns due to different trade policies that have been implemented.

## **1.2. Overview of Trade Regimes, Tariffs and Trade Flows of EAC Countries**

### **1.2.1. Introduction**

Multilateral trade of EAC countries has been directed by different trade policies put into operations after their independences. They were mainly composed of import substitution policies slightly after the colonial period, followed by trade liberalization in the 1980s for countries like Kenya, Uganda and Tanzania. EAC tariff in general declined with the adoption of common external tariff where a 0% rates applies to imports of raw materials and capital goods, a 10% rate on moderate rates on intermediate goods, and the highest rates on consumer goods. Table 1 provides basic data on EAC.

**Table 1: Basic Data on EAC for selected years from 2001 up to 2010**

Year	GDP growth (% annual) <sup>1</sup>	GDP per capita, constant price 2000, US dollar <sup>2</sup>	Midyear Population (Million persons)	Number of member countries	Exports (Intra-EAC, million US dollar)	Imports (Intra-EAC, million US dollar)
2001	4.98	326.85	85.2	3	768.24	431.39
2005	6.53	365.34	98.9	3	1,247.90	773.51
2007	6.33	321.45	122.5	5	1,680.31	1,148.84
2010	5.77	348.69	133.1	5	2,355.5	1,764.6

Source: East African Community Secretariat (2011) and World Bank (2012)

As observed from table 1, formation of EAC led to an expansion of the regional market and recorded a rise in trade flows for both imports and exports within the region. Total trade flows for all EAC partner states experienced a rise; nevertheless only Kenya recorded a gradual favorable intra-EAC trade balance for the period of 2000-2010. Tanzania experienced an intra-EAC trade surplus since 2007 after EAC expansion membership to Rwanda and Burundi, while Uganda had a favorable intra-EAC trade balance for the period of 2008-2009. Concerning Rwanda and Burundi, intra-EAC imports have been greater than intra-EAC exports which widened the gap in trade balance (The EAC, 2010).

## **1.2.2. Situational Analysis of Individual Countries**

### **1.2.2.1. Kenya**

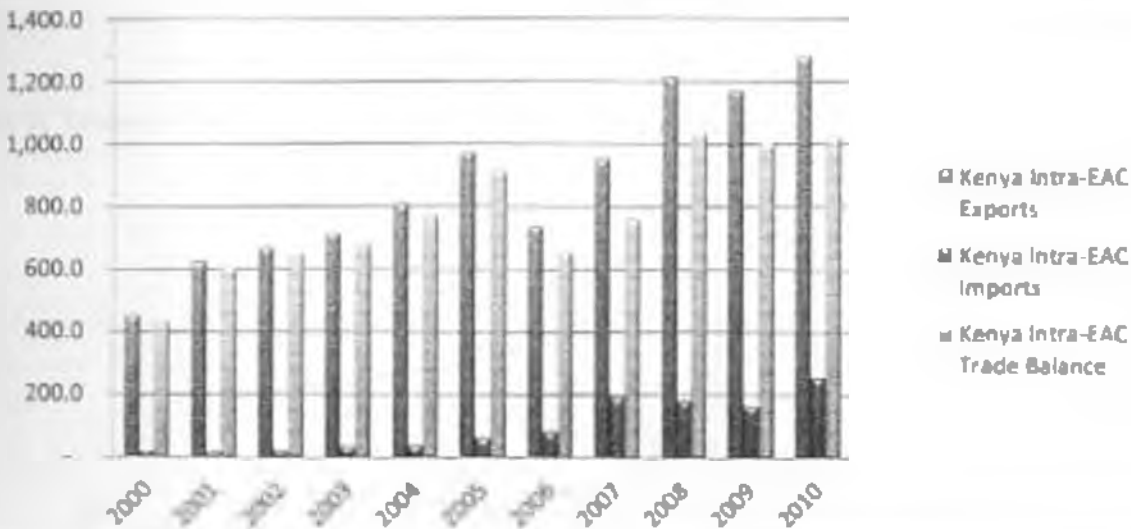
Kenya's trade regimes can be grouped into four phases that constitute its trade evolution. After imports substitution policy of 1963-1974, the Kenyan Government promoted exports in 1974-

<sup>1</sup> This is the average GDP growths of member countries calculated using data from African development Indicators

<sup>2</sup> Values of EAC GDP per capita were obtained by calculating the average of member countries

1986 at the same time implementing Structural Adjustment Programs (SAPs). The process of liberalization continued in 1986-1992 and up to now the Government of Kenya has put efforts in implementing policies that promote market liberalization including WTO agreements (Republic of Kenya, 2009; Gitu, et al., 2010). The resulting trade flows have been fluctuating, whereas total intra-trade exports with the rest of EAC increased considerably compared to imports; imports from the rest of the world also experienced an upsurge and this widened the gap in balance of payments. For the overall intra-EAC trade, Kenya dominates the EAC trade accounting for 51.6% of total volume of trade in 2007 (The EAC Secretariat, 2008). Figure 1 shows the evolution of intra-EAC trade flows of Kenya for the period of 2000-2010.

**Figure 1: Kenya intra-EAC trade, 2000-2010 (US\$ million)**



Source: EAC Secretariat (2011)

Evidence from figure 1 indicates that Kenya has been experiencing a gradual and favorable trade balance within the EAC for the period of 2000-2010. Both exports and imports increased for the period of 2000-2010. Uganda is the main destination of Kenyan exports within EAC. These

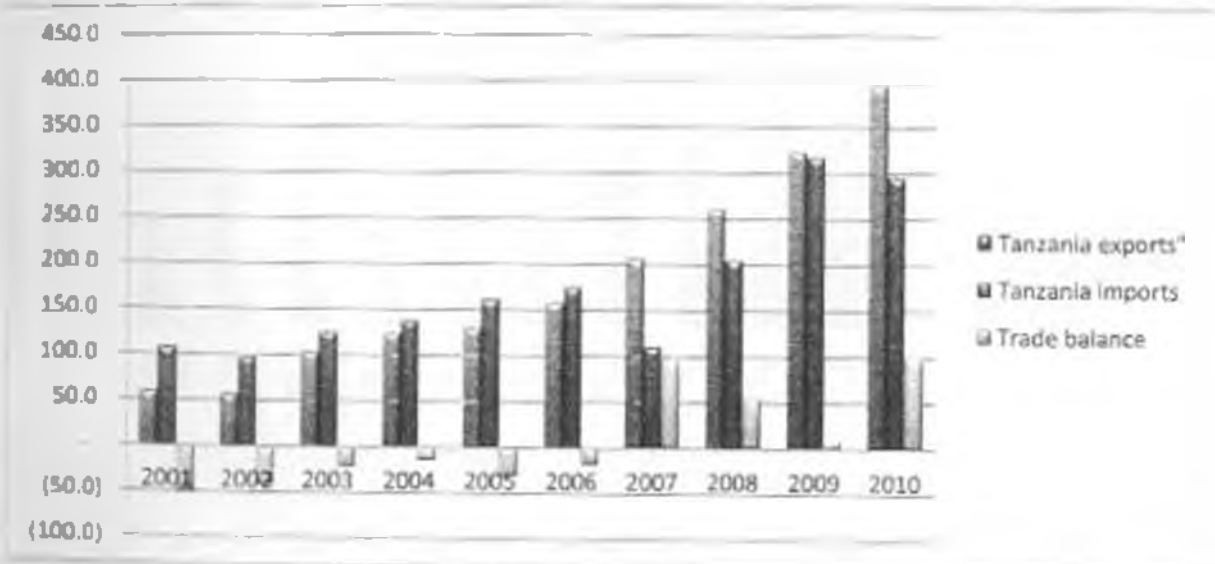


doubled from 307.5 million (USD) in 2000 to 657.1 million in 2010 (EAC Secretariat, 2011). Tanzania constitutes the main source of Kenyan intra-EAC imports which increased from 11.9 million (USD) in 2000 to 133.0 million in 2010 (EAC Secretariat, 2011).

### 1.2.2.2. Tanzania

After its independence, the United Republic of Tanzania started with a period of tight control from 1967-1984 aimed at import substitution industrialization (Wangwe, et al., 2010). This increased economic crisis and was therefore followed by a step towards liberalization in 1985. In the 1990s, the Republic of Tanzania put into operation policies directed towards institutional reforms. Currently Tanzanian trade policy focuses on integrating national trade agenda into both regional and international trade agreements. Figure 2 provides intra-EAC trade imports and exports of Tanzania.

Figure 2: Tanzania Intra-EAC Trade, 2001-2010 (US\$ million)



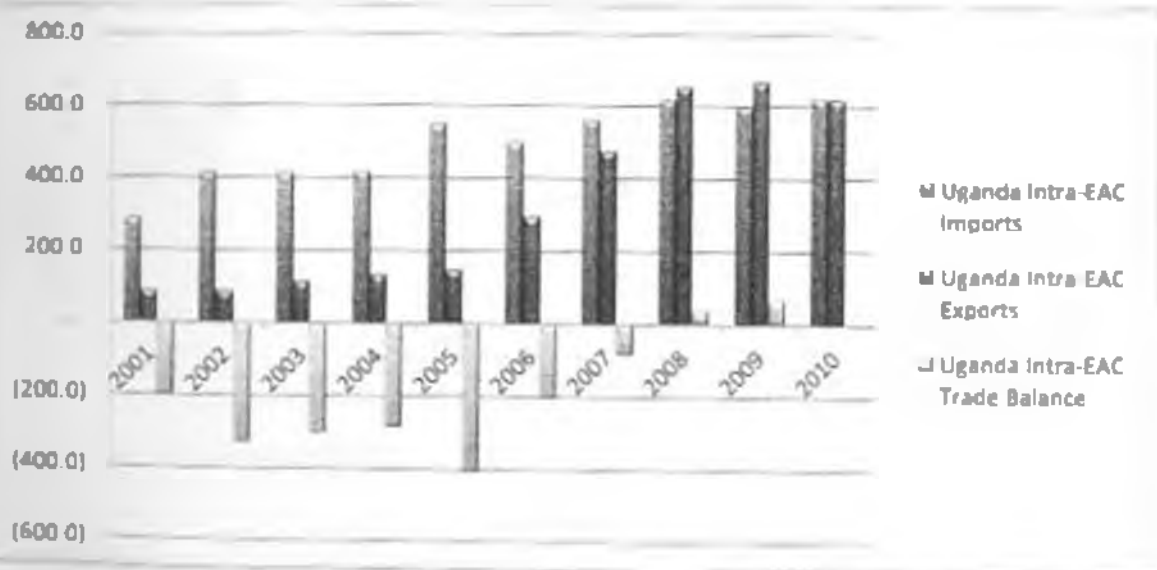
Source: EAC Secretariat (2011)

Figure 2 shows that Tanzania started to record a trade surplus in 2007. Its total intra-EAC trade increased with a gradual rise of exports, whereas imports slightly reduced for the years of 2007 and 2010. Although Tanzania is the main exporter to Kenya, its trade balance from intra-EAC trade has been unfavorable for the period of 2000-2006.

### 1.2.2.3. Uganda

Uganda has been progressively adopting and implementing different trade policies since its independence, and is a member of EAC, COMESA, WTO and Cotonou Agreements. Like other partner states in EAC, Uganda is a net importer in general whereas considering intra-EAC trade, Uganda was a net exporter only in 2008 and 2009 mainly to Kenya, Tanzania and Rwanda. However Kenya is Uganda's main origin of imports (Mugisa, et al., 2009). Figure 3 shows the evolution of Uganda's intra-EAC trade for the period 2001-2010.

Figure 3: Uganda Intra-EAC Trade, 2001-2010 (US\$ million)



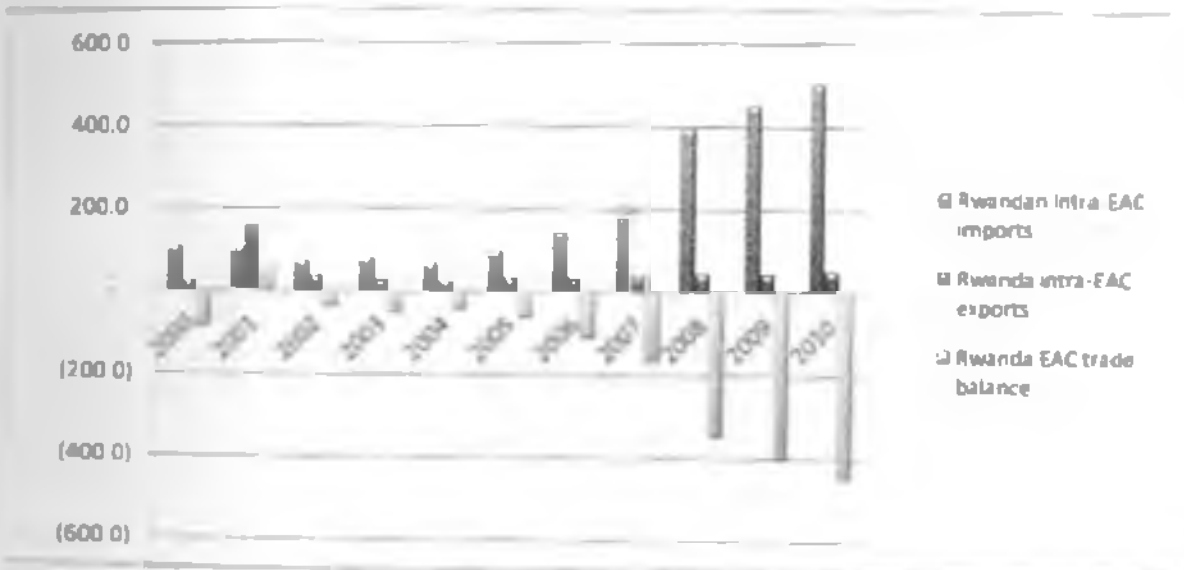
Source: EAC Secretariat (2011)

Figure 3 shows that Uganda started to have a trade surplus in 2008 and 2009. However, it experienced intra-trade deficit in 2010.

#### 1.2.2.4. Rwanda

After joining EAC in 2007, Rwanda's imports from other partner states rose drastically by 90% whereas exports only increased by 15% (EAC, 2011). Kenya constitutes the main origin of Rwanda's imports. However, throughout 2009-2011, these imports have gradually been declining (Republic of Rwanda, 2011). Figure 4 shows the evolution of Rwanda's imports and exports from and to EAC partner states from 2000 to 2010.

Figure 4: Rwanda Total Intra-EAC Trade: Imports, Exports and Trade Balance, 2000-2010 (US\$ million)



Source: EAC Secretariat (2011)

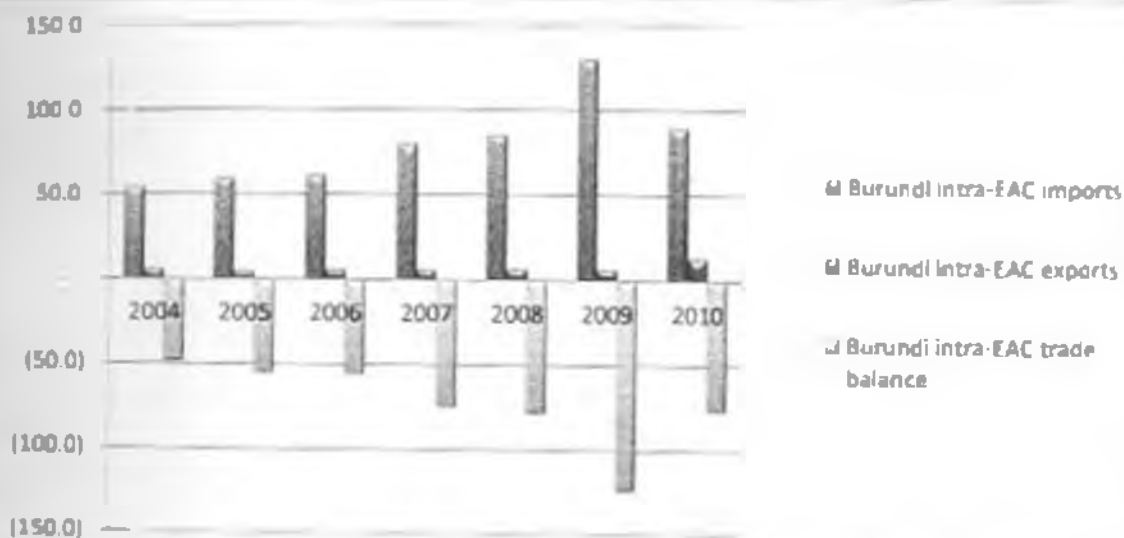
Rwanda EAC trade balance continuously worsened after its admission in 2007. The main exporter to Rwanda is Kenya followed by Tanzania, at the same time being the main destination of Rwanda's intra-EAC trade exports (Republic of Rwanda, 2011). The main products imported

from Kenya include petroleum products and salt, whereas, products of milling industry constitutes the main imports from Tanzania (The E.A.C, 2010).

### 1.2.2.5. Burundi

Like Rwanda, Burundi has been experiencing a trade deficit both in total trade and in intra-EAC trade. Burundi exports mainly to EU (32.5% of total exports), Rwanda (6.7% of total exports) and Uganda (3.5% of total exports), while the main sources of its imports are Kenya and Uganda. Burundi exports mainly coffee, tea, raw hides and skins and cotton. Figure 5 shows Burundi's intra-EAC trade evolution for the period of 2004-2010.

Figure 5: Burundi Intra-EAC Trade Flows, 2004-2010 (US\$ million)



Source: The E.A.C (2011)

Figure 5 shows a relatively low increase in exports compared to imports from partner states for the period 2004-2007, which translated into a gradual widening gap in trade balance. This unfavorable trade balance worsened after Burundi became a member of EAC, particularly in 2009 with 123.2 million (USD).

### 1.2.3. Tariffs in EAC

With the adoption of a three band CET on imports from third countries, the EAC CU liberalized trade among EAC member countries. This has contributed to increased multilateral trade flows. However, regional trade has been affected by the CU in different ways. According to article 75 of treaty establishing the EAC, the member states agreed to eliminate internal tariffs and other charges of equivalent effect on trade, establish a CET and eliminate NTBs *inter alia*. The level of initial tariff is among what determines the direction of CET effects: the higher the tariff the more positive effects. (Applevard, et. al, 2006). Although, EAC countries have progressively reduced their tariffs, the EAC CET led to an increased average MFN tariff for Uganda as shown in the table 2.

Table 2: Trends in Average Tariff Rates for EAC, Selected Years

Member country	Before 2000 <sup>1</sup>	2000-2005 <sup>2</sup>	After CU, 2005 <sup>3</sup>
Burundi	7.4 (1993)	-	-
Kenya	18.0 (1999)	16.8 (2004)	12.9 (2006)
Rwanda	34.8 (1993)	-	-
Tanzania	16.1 (1999)	13.5 (2003)	12.9 (2006)
Uganda	13.2 (1997)	9 (2004)	12.9 (2006)

Sources: WTO (2006) and Hoekman, et al. (2002)

The adoption of the EAC Common External Tariff (CET) in January 2005 led to a marked reduction in Kenya's applied tariffs: the simple average fell from 16.8% in 2004 to 12.9% under

<sup>1</sup> All tariff rates are based on unweighted averages for all goods in ad valorem rates, or applied rates, or MFN, whichever data are available over a longer period (Hoekman, et al., 2002)

<sup>2</sup> Average MFN rate (WTO, 2006)

<sup>3</sup> Average MFN rate (WTO, 2006)

the CET (WTO, 2006). For Uganda, it led to an overall increase of average duties on imports from 9% in December 2004, (11% including the import license commission), to the EAC's average MFN tariff rate of 12.9% (WTO, 2006). CET resulted into an overall decrease of average tariffs on imports into Tanzania; from an average MFN tariff rate of 13.5% in December 2003 to the average MFN rate of the CET at 12.9%. In addition, EAC partner states have overlapping membership in different regional integrations. This implies duplication and diversity of views (Kasekende and Ng'eno, 1999). It is also a source of conflict in interests. All these challenges affect to a certain extent trade flows of EAC partner states.

### 1.3. Problem Statement

Over the past decades, there has been a significant increase in the efforts of developing countries to achieve regional economic integration. The Eastern and Southern African region is counted among the regions with highest number of groupings (De la Torre and Kelly, 1992; ADB-ADF, 2011). EAC joins the Governments of Kenya, Rwanda, Burundi, Uganda and Tanzania. As from January 2005 a three band CET was adopted. In July 2010 EAC Common Market was established and EAC is now moving towards a Monetary Union by 2012.

Since its establishment, Intra-EAC trade volume increased throughout 2000-2010. Nevertheless the gains are unevenly distributed. Kenya has been experiencing a gradual and favorable trade balance (EAC Secretariat, 2009; ADB-ADF, 2011). Whereas Tanzania recorded a surplus only since 2007, Uganda only during 2008-2009, Rwanda and Burundi have been having growing intra-EAC trade deficits before and after joining EAC (EAC, 2011). Moreover, trade between Uganda and Tanzania is still low (EAC Secretariat, 2009). Another challenge to trade in EAC was the effect of EAC CU on MFN tariffs of partner states. The adoption of CET led to a decline

of tariff rates for Kenya (from 16.8% to 12.9%) and Tanzania (from 13.5% to 12.9%) and a rise for Uganda (from 9 or 11% to 12.9%) (WTO, 2006). Lower tariffs stimulate the demand for imports and higher tariffs increase the costs of importing and may affect negatively trade in an economy. Therefore, there is need to analyze different effects resulting from the establishment of EAC since 2000.

Ng'eno, et al. (2003) argued that the empirical work on the effects of African regional integrations is little. There is little knowledge on the analysis of EAC on the five members' trade flows. Indeed there have been reports and little ex-ante research on EAC's effect on trade with focus on individual countries mainly Kenya and Uganda. This study therefore, contributes to the scarce literature on East African regional integration trade effects by analyzing the static effects of EAC on trade flows of the five partner states, that is, an investigation on trade creation and trade diversion in EAC.

#### 1.4. Research Questions

This study on the effect of East African regional integration on trade flows of partner states addresses the following questions:

- i. What is the role of partner states GDP in trade flows of EAC countries?
- ii. To what extent does the distance influence trade among EAC countries?
- iii. Has there been any trade creation between the EAC countries since the customs union was formed?
- iv. How much of intra-trade volume increase was a result of trade diversion?
- v. What implications do the results in the above five questions suggest for policy?

#### 1.5. Objectives

The main objective of this study is to determine the effect of EAC integration on trade flows of partner states. Specifically, the objectives are to:

1. Determine the role of partner states GDP in influencing trade flows within the EAC;
2. Assess the role of distance on EAC trade flows;
3. Determine the extent of trade creation in EAC;
4. Assess the degree of trade diversion in EAC;
5. Provide appropriate policy recommendation based on study findings.

#### 1.6. Justification of the Study

There is little knowledge about the impact of East African regional integration on trade flows and since EAC is soon becoming a Monetary Union, there is need to investigate the effect of the first three stages, i.e., Free Trade Area (FTA) which started in 2000, Custom Unions (CU) / CET that was launched in January 2005 and Common Market established in July 2010. This study



therefore contributes to the scarce literature on East Africa Regional integration effects on trade flows.

This study provides to partner states and EAC policy makers insights on partial evaluation of the regional integration objectives with respect to trade and based on findings will provide useful implications for policy interventions on further opportunities or obstacles to economic integration.

### **1.7. Organization of the Study**

This study is organized in five chapters. Following this introduction, chapter two presents a brief survey of the theoretical and empirical analyses of the likely effects of regional integration. The methodology and data that will be used in this study are explained in chapter three. Chapter four reports empirical results and their interpretation. Main conclusions and policy implications of the findings are presented in chapter five.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1. Introduction

Regionalism promotes trade by allowing an economy to specialize and benefit from comparative advantage. This study determines the effect of EAC on trade flows of partner states, specifically to evaluate the extent of trade creation and diversion. The literature reviewed in this chapter is both theoretical and empirical. The empirical evidence presented in this chapter on the role of economic integration in influencing trade is regionally focused and chronologically organized: in the world in general, in Sub-Saharan Africa and finally in East Africa. Since this study will use the gravity model, this literature's center of attention is on GDP, distance, and population in addition to trade creation and trade diversion.

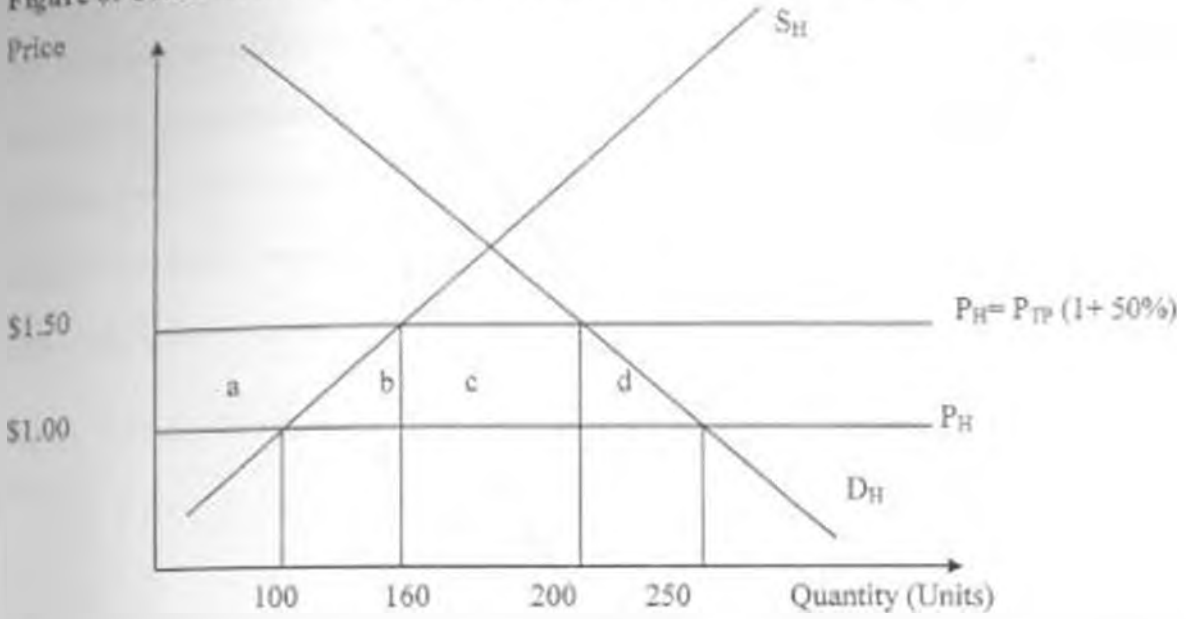
#### 2.2. Theoretical Literature

One among key changes that follow regionalism is the reduction and/or elimination of tariffs for member countries, and consequently lessening the cost of imports. However, the existence of net trade gains in an economy following regionalism depends on the magnitude of trade creation and trade diversion. There will be trade gains for these trading partners if inefficient domestic production is replaced by imports from member countries that are produced at low cost, also called trade creation. On the other hand, there will be losses when lower cost imports from the rest of the world are substituted by higher cost imports from member countries.

### 2.2.1. Trade Creation

The concepts of trade creation and trade diversion emanated from the work of Viner in 1950 (Appleyard, et al., 2006). Markusen, et al. (1995) defined trade creation as when less costly imports from regional integration members replace high cost domestic production. Assume two countries: home country H and the potential trade partner country TP. Assume that country H is small and takes prices as fixed, imports goods from TP as well as produces them before the forming of a regional integration with TP.  $D_H$  in figure 6 is the demand for home country H while  $S_H$  is its supply curve. The world market price is fixed at  $P_{TP} = \$1.00$  in country TP, while a tariff of 50% on good is imposed so that the domestic price of imported goods becomes  $P_H = \$1.50$ . For these prices, the domestic supply is at  $Q = 160$  whereas the quantity consumed is  $Q = 200$ , therefore imports from TP equals  $200 - 160 = 40$  units. With regional integration between H and TP, the 50% tariff is removed and the  $P_H$  becomes  $\$1.00$ , whereas the quantity consumed increases to  $Q = 250$  on one hand and on the other hand domestic production and supply falls to  $Q = 100$  units. Figure 6 shows the effect of removing 50% tariff between two trading partners H and TP.

Figure 6: Trade Creation and Welfare Effects of Regional Integration



Source: Adapted from Alpeyard, et al. (2006); Clausing (2001); de Melo, et al. (1992); Canning (2001) and Milner, et al. (2005)

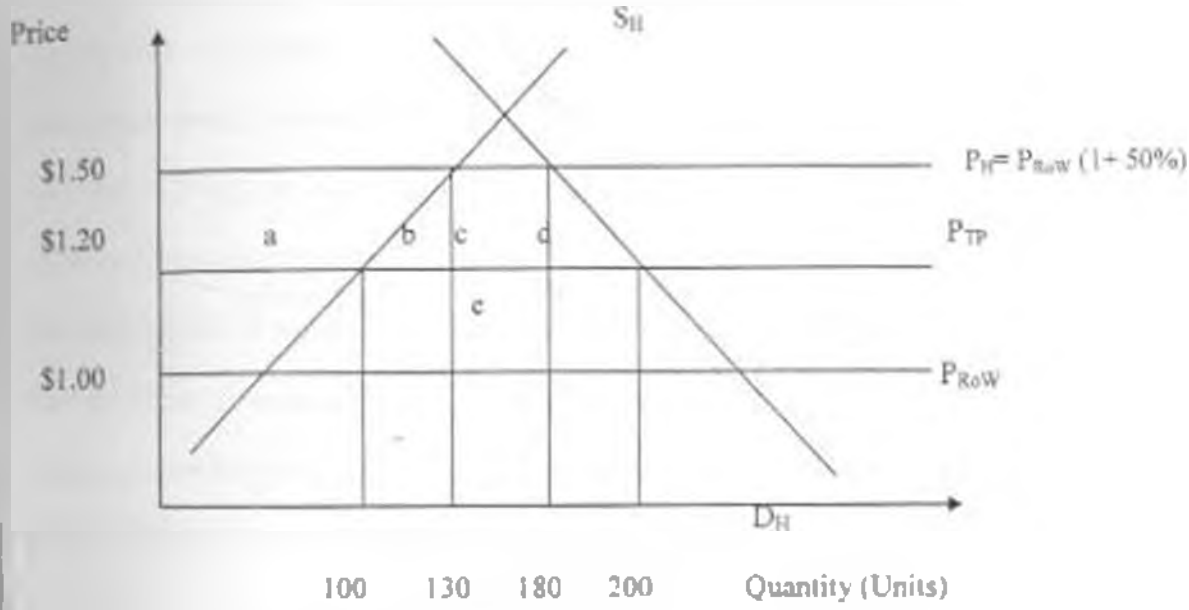
From Figure 6, it is evident that when the tariff was removed, trade between countries H and TP increased by 110 (250-200 and 160-100) units whereas inefficient domestic production reduced by 60. There is a new consumer surplus gain of  $a+b+c+d$ , from which  $a$  is a producer surplus loss and  $c$  was an area representing government revenue from the 50% tariff, this gives a net welfare effect given by the area  $b+d$ .

### 2.2.2. Trade Diversion

Trade diversion arises when less costly imports from outside the regional integration are replaced with high cost imports from regional integration members (Markusen, et al., 1995). Assuming there are three countries: home country H, potential trade partner TP and a country representing the rest of the world, RoW. Before regional integration the production cost in the country representing the rest of the world is  $P_{RoW} = \$1.00$ ;  $P_{TP} = \$1.20$  and the domestic price of the

Home country is \$1.50 reflecting a 50% tariff, and H is only buying from RoW because of the low price relative to TP's of  $P_{TP} = \$1.80$  (that is  $1.20 + 50\%$  of 1.20). With the formation of regional integration between H and TP, 50% tariff is removed between the two trading partners. However the tariff still applies to goods imported from RoW. Therefore imports from TP are at a cost of  $P_{TP} = \$1.20$  lower than  $P_{RoW} = \$1.50$  even if RoW's cost of production is still efficient. This is illustrated by figure 7.

Figure 7: Trade Diversion and Welfare Effects of Regional Integration



Source: Appleyard, et al. (2006)

With regional integration, there is a loss of government revenue given by the area  $c-e$ , a loss in producer surplus given by area  $a$  and consumer surplus gain of  $a+b+c+d$ . The resulting net welfare gain is represented by the area  $b+d-e$ . This net effect will be positive only if  $b+d$  is greater than  $e$ , but, this cannot be assured.

Given the ambiguity of resulting effects from regional integration, there are factors that influence the likelihood of having a net trade creation or trade diversion (Appleyard, et al, 2006; Södersten, 1977). Regional integration is likely to be beneficial if members are competitive and complementary; there are large cost differentials in the goods they produce; if there are high initial tariffs between partner states and low tariffs to the outside world; the more elastic the demand and supply curves are the bigger the producers and consumers responses; and, the bigger the number of trading partners or traded goods after integration.

Taking into consideration these factors and the EAC, the net effect is ambiguous: EAC economies cannot be classified as either competitive or complementary (McIntyre, 2005), tariff rate was only high for Kenya while CET augmented Ugandan tariffs. However, the number of member countries moved from three to five in 2007. In addition to trade creation and trade diversion effects of regional integration, there exist dynamic effects which include competitive market, reduced monopoly, economies of scale, specialization, increased investments and increased incomes from factor mobility. However, this study focuses on analyzing the static effects of EAC.

### 2.3. Empirical Literature

Most research on bilateral trade and particularly on regional integration effects have been using gravity model for ex-post studies and partial or general equilibrium models for ex-ante studies. Using the gravity model to analyze static effects of different regional integrations outside Africa, coefficients of the conventional independent variables of the gravity model (GDP, population and distance) had the expected signs (Ekanayake et al., 2010; Doanh and Heo, 2009; Morais and Bender, 2006). However, there are conflicting results about the static effects of regional integrations outside Africa. Table 3 provides a summary of different studies' findings on trade creation and diversion variables.

**Table 3: A Summary on Regional Integration Static Effects outside Africa**

Author/Year	Methodology	Case Study	Trade creation/Trade diversion
Ekanayake, et al. (2010)	Gravity model	Regional Trading Agreements (RTA) in Asian countries	There is trade creation, no trade diversion
Doanh and Heo (2009)	Gravity model	Association of South East Asian Nations (ASEAN) Free Trade Agreement (AFTA) in Vietnam and Singapore	No trade diversion for both Vietnam and Singapore. No trade creation in Vietnam and there is trade creation in Singapore
Kammera, et al. (2009)	Single commodity gravity model	Free trade agreements: North American Free Trade Agreement (NAFTA), Asia-Pacific Economic Cooperation (APEC), European Union	Trade creation effects by NAFTA, APEC and EU, but EU's are smaller

		(FL), Southeast Region (SER) and US vegetable and fruit	
Claring (2001)	Gravity model (commodity level)	Canada-US free trade agreements	There is trade creation, no evidence of trade diversion
Alvarez and Bender (2006)	Gravity model	Common Southern Market (MERCOSUR) and NAFTA	No evidence of trade creation for both MERCOSUR and NAFTA, trade diversion for NAFTA
Wang (1999)	Gravity model	European Economic Community (EEC), Latin American Free Trade Association (LAFTA) and Council of Mutual Economic Assistance (CMEA)	Trade creation and no trade diversion with EEC, Trade diversion and no trade creation with LAFTA, both trade creation and trade diversion with CMEA
Samy (1995)	Elasticity of export demand	Trade diversion and ASEAN	Trade diversion greater in Philippines, Singapore, Thailand and Malaysia Net gain in Indonesia and Thailand, Net loss in Malaysia and Singapore
Thoumi (1989)	Gravity model	Least Developed Countries (LDCs) of the Caribbean Basin	Trade creation by Central America Common Market (CACM) and Caribbean Community and Common Market (CARICOM), no trade creation by LAFTA

Summarized and Tabulated by the Author



Static effects of regional integration in Africa have been studied using both simulation and gravity model. Empirical evidence shows that intra-sub-Saharan African trade flows are low (Lyakurwa, 1999; Decaluwe, et al., 1999; Ogunkola, 1998; Foroutain and Pritchett, 1993). This existing empirical literature about sub-Saharan Africa regional integration mainly consists of North-South as well as South-South trade agreements. Table 7 displays a brief summary of the main findings about trade creation and diversion in Africa.

**Table 4: A Summary of Research Findings on Regional Integration Static Effects in Africa**

Author/Year	Methodology	Case Study	Effect on trade: Trade creation/Trade diversion
Ngodjiri (2008)	Gravity model	West African Economic and Monetary Union (UEMOA)	No trade creation, there is trade diversion in imports and exports
Chikanda and Kebebe (2008)	Gravity model	Common Market for Eastern and Southern Africa (COMESA)	No effect on trade flows
Montenegro, et al. (2008)	Partial equilibrium model	European Union/ Africa-Caribbean-Pacific (EU/ACP) in 6 ACP regions	Increase in exports
Wambui and van Mensbrugghe (2007)	CGE (LINKAGE)	EU/ACP trade agreements, case of Uganda	Modest gains or worse
Zgovu and Keeka (2007)	Partial equilibrium model	Economic Partnership Agreement (EPA) with EU: Malawi and Tanzania case studies	Trade diversion greater than trade creation
Wang, et al. (2004)	CGE	EU/ACP and ECOWAS	Trade creation greater than trade diversion

Coulbaly (2004)	Gravity model	EAC, Economic Community of Western African States (ECOWAS), SADC, AFTA, South Asia Preferential Trade Agreement (SAPTA), Andean Community (CAN), MERCOSUR	Net trade creation (ECOWAS and SAPTA), net export diversion (the others)
Lyakurwa (1999)	Gravity model	SADC	Intra-SADC trade flows has been limited
Ogunkola (1998)	Gravity model	ECOWAS	Small intra-ECOWAS trade
Wunderlin and Prichet (1993)	Gravity model	Intra-SSA trade	Very low level of intra-SSA trade

Source: Summarized and Tabulated by the Author

Table 7 shows ambiguous results about the effects of SSA regional integration and EU ACP partnership agreement on trade flows. Yang and Gupta (2005) argued that regional integrations effects in Africa are little or insignificant. In addition, South-South regional integrations are less preferable to developing economies than North-South trade agreements (Hoekman, 2002). Studies by Anderson and van der Mensbrugge (2007), Zgovu and Keeka (2007) and Busse, et al. (2004) on the evaluation of North-South trade agreements are ex-ante and consist of simulations by use of partial and general equilibrium models. Using the gravity model for ex-post analysis of regional integration in Africa by Agbodji (2008), Geda and Kebret (2008) and Coulbaly (2004): GDP and distance came with expected signs. The results exhibited a positive relationship between GDP of trade partners and the average trade flows and a negative relationship between distance and trade flows of trading partners. This implies that transportation costs still constitute barriers to trade (Aghodji, 2008; Ogunkola, 1998; Lyakurwa, 1999).

Research work on EAC effects is scanty and focuses on trade gains or losses for individual countries. Semboja (2009) conducted a base case study on economic analysis of East African economic integration using a purchasing power parity (PPP) model taking the launch of CU as the base, that is year 2005. On one hand this study found that there are some similar factors that constitute opportunities for EAC to succeed such as the fact that EAC countries are small economies with low standards of living. On the other hand, poor infrastructure in these economies increase the cost of investment and hence hinder trade and therefore regional integration alone may not make them achieve economic development.

EAC regional integration has had a positive impact on member's intra-regional exports. This was found in a much more comprehensive study by Coulibaly (2009) with a view to evaluating trade effects of developing RTA which focused on 22 RTA from all continents and used a two-steps estimation approach. Other findings showed a negative relationship between distance and bilateral trade flows while higher GDP induced higher trade. Even though this gives insights on EAC static effects, this study covered the period of 1962-2006 before Rwanda and Burundi joined EAC. This stimulates our interest to find out the effect of EAC particularly and even after the year 2007.

The trade effects of EAC on member countries also appear to be positive from ex-ante studies. The customs union was expected to be favorable to Kenya's trade (McIntyre, 2005). Using a partial equilibrium model to analyze the potential impact of EAC CU on Kenya's trade, McIntyre (2005) found a significant trade creation effect of \$ 193.86 million and a relatively small trade diversion effect of \$ 0.32 million resulting into a net trade creation of \$193.54 million for all product lines following the three bands CET. On the other hand, the customs

was expected to negatively affect tax revenues. Similarly, Mugisa, et al (2009) argued that Kenya is the most benefiting from EAC with a gradual favorable intra-EAC trade balance. This finding was based on trade statistics analysis in an evaluation of the implementation and impact of the East African Community Customs Union. This contradicts Coulibaly (2004) findings on the assessment of trade creation and trade diversion effects of developing RTAs. There was no significant effect for Kenya and Tanzania on one hand; however Uganda was negatively influenced by EAC on the other hand (Coulibaly, 2004).

The impact of EAC CU on Uganda includes a net trade creation at an aggregate level; however, results vary at a product level (Khorana, et al., 2009). Assessing the welfare effects of the East African Community customs union's transition arrangements on Uganda particularly for products classified as sensitive products from the Ugandan perspective. This study used a partial equilibrium model to simulate the net gains and losses from tariff reduction in year one (i.e. 2006) and year five (i.e. 2010) under EAC CU. The findings in year one indicated a trade creation of US\$11,897,172 and a trade diversion of US\$1,313,408 resulting into a net trade gain of US\$10,583,764. For the second scenario in year 2010, simulation results were US\$17,434,343 as trade creation, US\$1,909,843 for trade diversion and a net trade effect of US\$15,524,501

A much more comprehensive study on East African trade cooperation was done by Kirpatrick and Watanabe (2005) to examine the pattern of trade over the period of 1970-2001 of EAC trade. Using a Tobit model to estimate a gravity model, the results indicated a positive effect of East Africa Cooperation on the intensity of regional trade flows, and an absence of trade diversion. Coefficients of economic size variables (GDP, absolute difference in GDP and distance) displayed expected signs and were significant; and so did geographical parameters (land area,

population size, common border) in most cases. The coefficient of intra-EAC dummy was positive and significant for some years following the development of East Africa integration, i.e., before the collapse in 1970s, after it was revived in 1999. This study was intended to capture intra-EAC trade, EAC overall bloc imports, and EAC overall exports in addition to the standard variables of the gravity model

#### 2.4. Overview of Literature Review

The net welfare effect of regional integration and trade agreements is ambiguous. With the use of gravity model, evidence from the regional integration in and outside Africa in the literature reviewed showed that real GDP influences positively bilateral trade while the higher the distance between trading partners, the lower the trade volume. Empirical work has also shown that total intra-trade in SSA was low, and the literature on EU/ACP used partial equilibrium to simulate the trade agreements' impact on trade flows. Concerning EAC, not only are studies carried out on this regard few but also they restricted attention on EAC impact on individual countries while at the same time covering the period before EAC expanded membership to Rwanda and Burundi. The question remains on the static effects of EAC on member countries even after 2007, the period when Rwanda and Burundi joined EAC.

The methodology that has been used to evaluate regional integration effect on trade in the literature reviewed differs. On one hand, simulation models for ex-ante studies used partial general equilibrium models. On the other hand, econometric models for ex-post analyses of bilateral trade made use of gravity model. Advantages of using general partial equilibrium models are numerous but these models suffer from the problem of obtaining data, and parameters are not estimated econometrically instead they are deterministically gotten (Södersten and Reed,

200 Kepaptsoglou, 2010). This makes the gravity model popular and appropriate for predictions in case past information about variables is available. This study uses a gravity model to assess the static effects of EAC. This study therefore adds knowledge on regional integration effects by analyzing trade creation and diversion of EAC since its re-establishment in 2000 and after its expansion in 2007 when Rwanda and Burundi became members.

## CHAPTER THREE

### METHODOLOGY

#### 3.1. Introduction

This chapter gives details on the methods and techniques that were used in data collection and analysis. The literature reviewed used gravity model and simulation methods to analyze bilateral trade. This study analyzed panel data on multilateral trade flows of EAC countries and estimated an extended gravity model which includes dummy variables to capture the effects of EAC. Before the discussion of results, different diagnostic tests were run; they included Hausman and Breuch Pagan Lagrange Multiplier Tests.

#### 3.2. Conceptual Framework

Trade creation and diversion were analyzed based on the extended gravity model. From the Newtonian laws of gravity in Physics, the gravity model shown in equation (1) introduced first by Tinberg (1962) to explain the determinants of trade (Agbodji, 2008).

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

Where:

F = attractive force between two masses

M<sub>i</sub> = the first mass

M<sub>j</sub> = the second mass

D<sub>ij</sub> = the distance between the centers of the two masses

G = gravitational constant

introducing the determinants of trade, the gravity model of bilateral trade becomes:

$$T_{ij} = K \frac{Y_i^\alpha Y_j^\beta}{D_{ij}^\gamma} \dots\dots\dots (2)$$

Where

$T_{ij}$  represents trade between country  $i$  and country  $j$ ; exports, imports or total trade

$Y_i$  is the economic size of country  $i$  (normally measured using GDP and number of population)

$Y_j$  is the economic size of country  $j$  (normally measured using GDP and number of population)

$D_{ij}$  represents the distance between country  $i$  and  $j$  (sometimes used to proxy trade costs in general)

$K$  is a constant

$\alpha$  and  $\beta$  are partial elasticities of bilateral trade with respect to  $Y$

Equation (2) states that bilateral trade is positively related to the GDP of trading partners and negatively influenced by the distance separating them. The micro foundation of the gravity model evolved from Anderson's work in 1979 based on imperfect market assumption, Bergstrand (1985) and the link between factor endowments and bilateral trade, Krugman and Helpman's (1980s) matching old and new trade theory; and recently by Anderson and Van Wincoop (2001) (Baldwin and Tagrioni, 2006).

### 3.3. Analytical Framework

#### 3.3.1. Model Specification

The empirical model is derived from equation (2), by taking the logarithm on both sides and by expanding it with introduction of dummy variables to capture regional integration effects:



$$\ln T_{ij} = \ln K + \alpha \ln Y_i + \beta \ln Y_j - 2 \ln D_{ij} \dots\dots\dots (3)$$

The variable Y represents the economic sizes of trading countries, in this study; economic size is measured using GDP and the number of total population. The volume of imports between countries was used to represent T, bilateral trade variable. Since the main objective of this study was to assess possible trade creation and trade diversion that is likely to have resulted from EAC, two dummies were introduced to capture these effects.

$$\ln M_{ij} = \alpha_0 + \alpha_1 \ln GDP_i + \alpha_2 \ln GDP_j + \alpha_3 \ln POP_i + \alpha_4 \ln POP_j + \alpha_5 \ln D_{ij} + \alpha_6 EAC (I) + \alpha_7 EAC (II) + u_{ij} \dots\dots\dots (4)$$

### 3.3.2. Definition of Variables and Expected Signs

$M_{ij}$  is the imports from country i to country j. The gravity model does not provide details on the choice of a variable to represent bilateral trade, that is imports, exports or total trade. However Elbadawi (1995) argued that imports and exports are determined by the same factors (Agbodgi, 2008). This study uses imports to represent trade because of two reasons. First, apart from Kenya, other countries experienced a trade deficit for a period of not less than five years after joining EAC, indicating that intra-EAC imports outweigh intra-EAC exports. The second is linked with the first, Kenya is most benefiting from EAC market, and this was one among the reasons of 1977 EAC break up.

$GDP_i$  and  $GDP_j$  are the real gross domestic product of country i and j respectively. Based on the gravity model theory, economic size variables are positively related to trade, therefore coefficients of  $GDP_i$  and  $GDP_j$  are expected to be positive, i.e.,  $\alpha_1, \alpha_2 > 0$ .

$POP_i$  and  $POP_j$  represent the population of country  $i$  and  $j$ . Agbodgi (2008) argued that based on the magnitude of absorption effect and economies of scale, population can influence positively or negatively bilateral trade. A big population and high absorption effect is associated with a negative effect on trade, whereas a big population and large economies of scale, is linked with a positive effect. Therefore  $\alpha_3, \alpha_4 > 0$  or  $< 0$ .

$D_{ij}$  is the distance measured in kilometers between capital cities of the two countries. From the gravity model, there exists a negative relationship of distance between trading partners and volume of trade, because distance increases transport costs. Therefore  $\alpha_5 < 0$ .

$EAC(I)$  is a binary variable which is unity if both trading partners  $i$  and  $j$  belong to EAC, and equals zero otherwise. This variable captures trade creation, its coefficient is expected to be positive, i.e.,  $\alpha_6 > 0$ .

$EAC(II)$  is a binary variable which is unity if the importer (country  $i$ ) belongs to EAC and the exporter (country  $j$ ) to the ROW and  $EAC(II)$  is zero otherwise. A positive coefficient or zero of this variable would mean that there is no trade diversion, whereas, a negative coefficient indicates a reduction in imports volume from the rest of the world.

$U_{ij}$  is the error term

### 3.4. Type of Data and Source

This study used panel data for the period 2002-2010. Data on imports was collected from IMF Direction of Trade Statistics (DOT); data on distance between trading partners from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) while economic size variables (real GDP and population) were obtained from World Bank Development Indicators. Dummies, i.e., EAC (I) and EAC (II) were assigned values depending on the time countries joined EAC.

### 3.5. Problems with Data and Diagnostic Tests

The use of panel data in a study is advantageous in the sense that it considers both path and space. Whereas cross-sectional analysis is a snapshot at a point in time and ignores time, time series analysis observes the values of one or more variables over the period of time  $t$  and thus ignores snap shot. Panel data is known for the ability to control for heterogeneity or individual effects. Therefore the first test will be to ensure that there are no individual effects by running an F test with the following hypotheses:

$H_0$ : OLS model is appropriate (restricted model) or no individual effects

$H_1$ : Fixed Effects model is appropriate (unrestricted model)

If the alternative hypothesis is rejected, there will be no need of panel model because individuals, in these case countries, will be homogeneous (Kunst, 2009). On the other hand if the null hypothesis is rejected, the presence of individual effects will require more tests. If individual effects are correlated with regressors, OLS estimator will be biased and inconsistent; in this case a fixed effect model will be required to solve the problem (Greene, 2003). When individual effects are not correlated with regressors, a random effect model may be appropriate (Gujarati

and Sangeetha, 2007). To diagnose these problems, a Hausman test would be carried out and based on test results, a choice between random and fixed effects models are made. Hausman test statistic follows a  $\chi^2$  distribution under the null hypothesis that random effects (RE) and fixed effects (FE) models do not differ substantially, or individual effects are uncorrelated with other regressors in the model (Gujarati and Sangeetha, 2007; Hausman, 1978; Wooldridge, 2004; Kunst, 2009; Greene, 2003; Hausman and Taylor, 1981). In case the null hypothesis is rejected, RE model is not appropriate and therefore FE model should be used.

## CHAPTER FOUR RESULTS AND DISCUSSION

### 4.1. Introduction

This chapter highlights a brief statistical description of data and the results from different statistical tests that have been carried out. It focuses on presenting the results and their interpretation with an aim of answering the research questions. Data analysis was done on the basis of two different time periods following the expansion of EAC: 2002-2006, the period when EAC was made of three countries and 2007-2010, when Rwanda and Burundi were also EAC members. The study considered only top ten trading partner states with each EAC member states because they account for over 40% of EAC countries' total imports (EAC, 2010). They include UAE, EU, India, China, Japan, Indonesia, Saudi Arabia, South Africa, Zambia and USA.

### 4.2. EAC during 2002-2006

#### 4.2.1. Descriptive statistics

During 2002-2006, EAC was made of three member countries: Kenya, Tanzania and Uganda. A summary of descriptive statistics in Table 5 shows that all variables are scattered around the mean given their low standard error.

**Table 5: Summary of the Descriptive Statistics of Variables**

Variable	Observations	Mean	Standard Deviation	Min	Max
logim	150	4.865701	1.206811	0	7.126754
loggdpim	150	23.17411	.2725701	22.68098	23.50408
logpopim	150	17.31352	.1405193	17.06567	17.50248
loggdpex	150	26.68579	1.861936	22.89527	30.06888
logpopex	150	17.90734	2.116802	13.37245	20.99407
logdis	150	8.484643	.7557052	6.226653	9.405251
eaci	150	-	-	0	1
eacii	150	-	-	0	1

Source: Author

#### 4.2.2. Diagnostic tests

First we run a Hausman test to make a choice between random effect and fixed effect models. The resulting chi-square statistic is  $-48.06$ ; therefore we fail to make a decision about the null hypothesis that the difference in coefficient is not systematic. A negative Hausman statistic when variance differences of the estimated coefficients are not positive semi-definite (Schreiber, 2008). One among the provisional solutions is to take this statistic as a small chi-square in favor of random effects. Second a Breuch Pagan Lagrange Multiplier (LM) test for random effects is run to confirm if there is any presence of random effects. The resulting chi-square was 1.13 with a p-value of 0.2871. Compared with 5% confidence interval, we fail to reject the null hypothesis that there are no random effects, which means that random effect model is not appropriate. From these two tests, we conclude that for this period of 2002-2006, a pooled OLS regression gives consistent estimators. Robust standard errors are used to control for heteroskedasticity.

### 4.2.3. Discussion of the results

The results got from running a simple pooled OLS are presented in Table 6. In addition, fixed effect and random effect results were shown for comparison purposes. Since the Breuch Pagan LM test revealed that there is no evidence of significant differences across countries, and that the interclass correlation coefficient ( $\rho$ ) is zero; OLS and random effect models have the same results. The variable  $eac_{ij}$  ( $eac_{ij} = 1$  if  $i$  is EAC member and  $j$  from the rest of the world;  $eac_{ij} = 0$  otherwise) was omitted because of collinearity. Table 6 presents the econometric estimation results of equation (4) for the period 2002-2006.

Table 6: Results of the Extended Gravity Model for EAC Imports during 2002-2006

Variable	ols	fixed	random
loggdpim	4.5844494*** (0.4729)	-4.6204794 (5.0171)	4.5844494*** (0.4729)
logpopim	-3.4510182*** (0.9197)	21.193497 (12.1886)	-3.4510182*** (0.9197)
loggdpex	.26036867*** (0.0732)	-.12996749* (0.0521)	.26036867*** (0.0732)
logpopex	.03485775 (0.0433)	.10524355* (0.0424)	.03485775 (0.0433)
logdis	-1.0694401*** (0.2094)		-1.0694401*** (0.2094)
eaci	-.26421621 (0.4411)		-.26421621 (0.4411)
cons	-40.106479*** (10.8448)	-253.40924* (97.8068)	-40.106479*** (10.8448)
N	150	150	150
r2	.56359301	.22874495	0.5636 (overall)

Legend: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; Robust Standards Errors in brackets

Source: Author

The standard variables of the gravity model are expressed in logarithms; therefore their coefficients are interpreted as elasticities. Generally, it is evident that economic masses variables have the expected signs and a p-value of 0.000. The estimated coefficient of the importing country's GDP indicates that a 1% increase in importer's GDP will induce imports by 4.58%, while a 1% increase in GDP of the exporter will lead to 0.26% raise in EAC member countries' imports. This confirms with other studies findings that the economic size influences positively trade: the higher the GDP of the importer the higher the demand for imports and the higher the resulting imports volume; a high GDP of the exporter country is an indication of high production and potential supply of exports. Based on this evidence, it is apparent that EAC GDP is important in contributing to increased imports for the period 2002-2006.

Population coefficient of the exporter is insignificant; this suggests that EAC imports are not determined by changes in trading partners' population. However the importer's is significant with a negative coefficient. This indicates that a 1% increase in population of EAC member countries reduces their imports by 3.45%. The theory predicts a positive or negative coefficient for this variable. This negative relationship is explained by the fact that an increase in population leads to a low GDP per capita and reduces the capacity to imports, which leads to reduced imports. Whereas some studies found a positive relationship between population of the importer and the imports (Agbodji, 2008), others found that population influences negatively trade (Ekanavake et. al., 2010).



The distance variable coefficient is negative and statistically significant with 0.000 p-value. EAC imports decline by 1.069% when distance increases by 1%, indicating that trade in EAC is still constrained by transport costs. This is compatible with the gravity model theory that distance influences negatively bilateral trade.

Analyzing trade creation and diversion in EAC, the results indeed indicate that the EAC had an insignificant effect on bilateral trade of member states during 2002-2006. This contradicts other studies findings whose results indicated a positive effect (Coulibaly, 2009; Kirpatrick and Watanabe, 2005). The coefficient of *eaci* dummy which captures trade creation is not statistically significant. So is the dummy variable *eacii* which stands for trade diversion in case its coefficient is negative. This variable has been omitted in the regression because of collinearity, and therefore should be used as a benchmark in interpreting *eaci*.

#### **4.3.EAC during 2007-2010**

During the period of 2007-2010, Rwanda and Burundi were also members of EAC, and therefore the estimated model evaluates the impact of EAC on trade flows of five EAC partner states. After a summary of descriptive statistics, estimation results are presented and interpreted.

##### **4.3.1. Descriptive statistics**

The standard deviation is relatively low for all variables, which means there is no much variation from the mean. Table 7 displays a summary of variable descriptive statistics.

**Table 7: A Summary of Variable Descriptive Statistics for 2007-2010 Period**

Variable	Observations	Mean	Standard Deviation	Min	Max
logimp	200	4.880434	1.494444	.8878913	7.69508
loggdpm	200	22.58541	1.165313	20.57251	23.71728
logpopim	200	16.8727	.7114351	15.85774	17.61863
loggdpx	200	26.55174	2.095056	22.25311	30.08811
logpopex	200	18.04409	1.888073	13.73834	21.01467
lagdist	200	8.294478	.9471043	5.93206	9.405251

Source: Author

#### 4.3.2. Tests and diagnoses

The Hausman test run gives out a negative chi-square, and therefore, it is not possible to determine if there are fixed or random effects. The econometric theory stipulates that this happens for finite samples and even asymptotically (Schreiber, 2008). The solutions include taking the negative statistic as small and therefore fail to reject the null hypothesis. We keep the first solution and provisionally assume the existence of random effects. Testing for the presence of random effects vis-à-vis pooled OLS, the Breuch Pagan LM test results indicated the existence of random effects, that is a chi-square of 172.94 with a p-value of 0.0000 relatively smaller than 0.05. However for random effects model  $\sigma_u$  is zero, leading to a zero interclass coefficient  $\rho$ . Based on these grounds, pooled OLS is appropriate (Stata, 2011). In order to control for heteroskedasticity, robust standard errors are used.

#### 4.3.3. Discussion of the results

We present OLS, fixed effects and random effects models for comparison purposes. The estimated country specific error is zero ( $\sigma_u$ ), and so is the interclass correlation coefficient ( $\rho$ ). As a result, OLS and  $R^2$  results are the same.

**Table 8: Results of the Extended Gravity Model for EAC Imports during 2002-2006**

Variable	ols	p-value	fixed	p-value	random	p-value
loggdpim	0.7010	0.0002	2.1131	0.4707	0.7010	0.0002
logpopim	0.6720	0.0196	-0.7617	0.8912	0.6720	0.0186
loggdpex	0.1436	0.0911	-0.1606	0.0000	0.1436	0.0895
logpopex	0.0880	0.0691	0.1637	0.0000	0.0880	0.0676
logdist	-0.7494	0.0009			-0.7494	0.0008
eaci	-0.5022	0.1512			-0.5022	0.1496
cons	-21.3960	0.0000	-28.6819	0.4258	-21.3960	0.0000
N	200.0000		200.0000		200.0000	
Adjusted R <sup>2</sup>	0.7070		0.1198		0.7158 (overall)	

Source: Author

Evidence transpires that GDP of importer influences positively EAC multilateral trade and confirms the gravity model theory. Indeed, a 1% increase leads to 0.7% increase in imports.

However, GDP of the exporter through 2007-2010 is statistically insignificant at 5% level.

Population of EAC has a positive significant effect on multilateral trade. A 1% rise in population induces a rise in imports by 0.67%, this indicates that as EAC member countries' population increase, they depend upon multilateral trade to meet the increased demand. The coefficient of exporter's population is again insignificant. The estimated coefficient of distance variable is negative and significant with a p-value of 0.001. This suggests that a 1% increase in distance between EAC member countries and their trading partners reduces imports by 0.75%. Because the larger the distance between trade partners, the bigger the transport costs, and therefore the lower the volume of bilateral trade.

On the static effects of EAC, the results indicate that there is no evidence of trade creation nor trade diversion. This again differs from other studies findings which showed a positive effect of EAC on multilateral trade of EAC partner states (Coulibaly, 2009; Kirpatrick and Watanabe, 2005). The dummy variable  $eaci$ 's coefficient although negative is insignificant. EAC trade diversion dummy  $eacii$  should have been used as a reference in interpreting  $eaci$  because it has been omitted because of collinearity.

#### **4.4. Trade creation and diversion in respective EAC member countries**

Estimated results for equation (4) in respective countries showed insignificant effects for almost all standard variables of the gravity model for the period after EAC extended membership to Rwanda and Burundi. The results that are discussed below are shown in the Appendix A.

Imports for Burundi and Uganda could not be explained by any variable of the extended gravity model, all coefficients were not statistically significant. Therefore increased tariff rates for Uganda after 2005 have not caused a diversion of trade. For Kenya, only population of the exporter had a significant impact. A 1% increase of population of trading partner with Kenya, results in a rise of Kenyan imports by 0.29%. This is explained by economic and demographic nature of top ten countries that constitute the origin of Kenyan's imports. They include emerging third world economies of China and India as well as developed economies such as United Kingdom and USA.

EAC has no effect on Rwanda's multilateral trade for the period of 2007-2010; this is indicated by the insignificant coefficient of  $eaci$  dummy variable. However, Rwanda's imports are determined by its GDP. Imports go up by 16.93% when GDP increase by 1%. All other variables have no significant effect. EAC has a negative effect on Tanzania's imports. The dummy  $eaci$  is

negative and statistically significant with a p-value of 0.000. This suggests that trading with EAC member as compared to trading with the rest of the world reduces Tanzania's imports by 350.2429% (calculated by taking  $\{e^{1.304417}-1\} \times 100$ ). Tanzania's imports are also significantly and positively influenced by the population of the trading partners. Distance variable coefficient reveals a significant and negative impact, this suggests that transport costs constitute a hindrance to multilateral trade.

## CHAPTER FIVE

### CONCLUSION AND RECOMMENDATIONS

#### 5.1. Conclusion

The motivation behind regional integration and trade agreements lies in the welfare effects that may accrue to member economies. EAC adopted a CET in 2005, five years after its reestablishment, which resulted into an increased tariff rate for Uganda. Higher tariff rates increase the cost of imports and lead to a decreased imports demand. Even if intra-EAC trade increased throughout 2000-2010, trade gains are unevenly distributed; only Kenya has been experiencing a favorable intra-EAC trade balance for this period.

In an effort to determine the effect of EAC on members' trade flows using the gravity model, the results show no evidence of trade creation or trade diversion for both period 2002-2006 and 2007-2010. The bilateral trade of EAC member states is determined by the standard variables of the gravity model. During 2002-2006, GDP of both EAC members and exporters had a positive impact on EAC trade flows; distance had a negative effect; whereas exporter's population coefficient was insignificant. EAC population negatively influences trade flows. Taking into consideration the period from 2007 up 2010, all standard gravity model have significant and expected signs except exporter's GDP and population which revealed no significant effect on multilateral EAC trade flows.

## 5.2.Recommendations

Based on the study findings, the following recommendations can be proposed:

- Since GDP of EAC members impact positively on trade flows, member countries should continue with policies that are geared towards economic growth in order to sustainably afford intra-EAC imports.
- The study found that there is no trade creation within EAC and therefore no welfare gains despite free movement of goods and services within EAC and CET. Therefore efforts should be put in place to reduce all types of non-tariff barriers because they contribute to increased cost of trade.
- The study found that distance influences negatively multilateral trade. Since transport cost is one of the costs of trade, infrastructure within EAC and with the rest of the world should be developed.

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## APPENDIX

### APPENDIX A: LIST OF COUNTRIES INCLUDED IN THE STUDY

#### EAC MEMBER COUNTRIES

1. Burundi
2. Kenya
3. Rwanda
4. Tanzania
5. Uganda

#### TOP TEN EAC TRADING PARTNERS

1. Bahrain (Kingdom of)
2. Belgium
3. China
4. France
5. Germany
6. India
7. Indonesia
8. Japan
9. Netherlands
10. Russian Federation
11. Saudi Arabia
12. South Africa
13. Sweden
14. United Arab Emirates
15. United Kingdom
16. United States of America
17. Zambia

APPENDIX B: RESULTS OF EAC EFFECT ON RESPECTIVE MULTILATERAL  
TRADE FLOWS OF MEMBER COUNTRIES

1. Burundi

Variable	OLS
loggdpim	36.212302
logpopim	-42.78889
loggdpex	-.18819874
logpopex	-.15666534
logdist	.78219227
eaci	.9920642
eacii	0
cons	-62.539103
N	40
r2	.19338161

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

2. Kenya

Variable	OLS
loggdpim	1.8619749
logpopim	-.71735761
loggdpex	-.14986102
logpopex	.29250076***
logdist	-.432347
eaci	0
eacii	0
cons	-22.271032
N	40
r2	.51418249

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

### 3. Rwanda

Variable	OLS
loggdpm	16.931197*
logpopim	-33.222179
loggdpx	.03979372
logpopex	.00058438
logdist	-.26580538
eaci	.51834362
eacii	0
cons	169.98937
N	40
r2	.48430976

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

### 4. Tanzania

Variable	OLS
loggdpm	27.759029
logpopim	-58.997039
loggdpx	.08280457
logpopex	.23427898*
logdist	-1.0035824**
eaci	0
eacii	1.504617***
cons	387.66412
N	40
r2	.45895465

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

## 5. Uganda

Variable	OLS
loggdpim	-3.1497534
logpopim	5.6421274
loggdpex	.3327085
logpopex	.07652015
logdist	-.97577909
eaci	.14062206
eacii	0
cons	-21.549027
N	40
r2	.27404469

Legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

### Note:

- i. The coefficient on eacii is zero of all countries because it has been omitted for collinearity, and will be used as a reference point in interpreting eaci
- ii. Where: logim is the natural logarithm of imports of country i from county j  
loggdpim is the natural logarithm of importer's GDP  
logpopim is the natural logarithm of importer's population  
loggdpex is the natural logarithm of exporter's GDP  
logpopex is the natural logarithm of exporter's population  
logdist the natural logarithm of the distance between importer i and exporter j



## 5. Uganda

Variable	OLS
loggdpim	-3.1497534
logpopim	5.6421274
loggdpex	.3327085
logpopex	.07652015
logdist	-.97577909
eaci	.14062206
eacii	0
cons	-21.549027
N	40
r2	.27404469

legend: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001

### Note:

- i. The coefficient on eacii is zero of all countries because it has been omitted for collinearity, and will be used as a reference point in interpreting eaci
- ii. Where: logim is the natural logarithm of imports of country i from county j  
 loggdpim is the natural logarithm of importer's GDP  
 logpopim is the natural logarithm of importer's population  
 loggdpex is the natural logarithm of exporter's GDP  
 logpopex is the natural logarithm of exporter's population  
 logdist the natural logarithm of the distance between importer i and exporter j