

**COMPARATIVE ADVANTAGE AND TRADE PERFORMANCE OF
SELECTED EAST AFRICAN COMMUNITY COUNTRIES
TRADING COFFEE UNDER “EVERYTHING BUT ARMS”
EXPORT REGIME**

ABEL PAUL

**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF MASTER OF
SCIENCE IN AGRICULTURAL AND APPLIED ECONOMICS OF
SOKOINE UNIVERSITY OF AGRICULTURE.
MOROGORO, TANZANIA.**

ABSTRACT

The main objective of the study was to assess the comparative advantage and trade performance of selected East African Community (EAC) countries trading coffee under the Everything But Arms (EBA) export regime. The specific objectives were to analyze the comparative advantage of selected EAC countries trading coffee in the European Union (EU) market before the EBA export regime; to analyze the comparative advantage of selected EAC countries trading coffee in the EU market during the EBA export regime; to analyze the effect of EBA on selected EAC countries' trade performance attributed by coffee export in the EU market. RCA analysis was used to calculate the comparative advantage of these countries. Data from 1995 to 2000 was obtained from the UNCTAD database and from 2001 to 2019 was obtained from the WITS-UN COMTRADE database. Also, the study estimated the augmented gravity model using panel data from 1995 to 2019 to capture the effect of EBA in bilateral trade flows between trading countries. The findings show that all selected countries (Burundi, Uganda, Rwanda and Tanzania) have a comparative advantage in exporting coffee to the EU but decreased during the EBA regime. Using the gravity model, the results found that preferential trade agreements under EBA have a negative effect on coffee export performance of the selected EAC countries. These findings thus defeat the aim of EBA of increasing trade exports for LDCs at individual countries level. Therefore, EAC countries need to diversify their exports to reduce the effects of any future uncertainties of these given preferential agreements.

DECLARATION

I, **ABEL PAUL** do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted for degree award in any other institution.

Abel Paul

(MSc. Candidate)

Date

The above declaration is confirmed by;

Prof. Khamaldin D. Mutabazi

(Supervisor)

Date

COPYRIGHT

No part of this dissertation may be reproduced, stored in any retrieval system, or transmitted in any form or by any means without prior written permission of the author or Sokoine University of Agriculture in that behalf.

ACKNOWLEDGEMENT

Special thanks should go to Almighty God for his blessings in my life.

Writing a dissertation is not an easy task and several hands have poured the ink and dedicated their time and efforts in this work. Although it is not possible to mention everybody by name, it is justice to pay special compliments to some of them.

I am highly beholden to my supervisor, Prof. Khamaldin D. Mutabazi from School of Agricultural Economics and Business Studies (SAEBS) at Sokoine University of Agriculture (SUA) for his guidance, criticism, challenges, encouragement and excellent advice throughout the study period which resulted into a successful completion of this dissertation despite his tight schedule.

I owe my deeply thankful to the African Economic Research Consortium (AERC) and TRADE-Hub Project for their financial and materials support that made my research work soundly accomplished. My genuine gratitude and appreciations are acknowledged to my father and family for their encouragement, moral and financial support throughout my study.

Finally, special acknowledgement extended to my colleagues for the honor to learn from them and I appreciate everybody who in any way contributed to the success of this dissertation.

DEDICATION

To the Almighty God, I dedicate this work for his blessings in my entire life. Also, to my father for his fatherliness, love and all supports in my life. I will always appreciate your love and bravery.

TABLE OF CONTENTS

ABSTRACT.....	ii
DECLARATION.....	iii
COPYRIGHT.....	iv
ACKNOWLEDGEMENT.....	v
DEDICATION.....	vi
TABLE OF CONTENTS.....	vii
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
LIST OF APPENDICES.....	xii
LIST OF ABBREVIATIONS AND SYMBOLS.....	xiii
CHAPTER ONE.....	1
1.0 INTRODUCTION.....	1
1.1 Background Information.....	1
1.2 Everything but Arms (EBA).....	3
1.3 Problem Statement and Justification.....	5
1.4 Objectives of the Study.....	7
1.4.1 General Objective.....	7
1.4.2 Specific objectives.....	7
1.5 Hypotheses.....	7
1.6 Research Questions.....	7
1.7 Organization of the Dissertation.....	8
CHAPTER TWO.....	9
2.0 LITERATURE REVIEW.....	9
2.1 Operationalization of Key Terms.....	9

2.1.1 Everything But Arms (EBA).....	9
2.1.2 Revealed Comparative Advantage (RCA).....	9
2.1.3 Trade performance.....	10
2.1.4 Harmonized System (HS).....	10
2.1.5 East African Community (EAC).....	11
2.1.6 European Union (EU) 28 Countries.....	11
2.2 Theoretical Framework.....	12
2.2.1 Theory of absolute advantage.....	12
2.2.2 Theory of comparative advantage.....	13
2.2.3 Theory of opportunity cost.....	13
2.2.4 Theory of Heckscher-Ohlin (H-O).....	14
2.3 Empirical review.....	15
2.3.1 Comparative Advantage (CA).....	15
2.3.2 Trade performance.....	19
2.4 Conceptual Framework.....	22
CHAPTER THREE.....	25
3.0 METHODOLOGY.....	25
3.1 Overview.....	25
3.2 Type and Sources of Data.....	25
3.3 Study Countries.....	26
3.4 Data Analysis.....	27
3.4.1 Analysis of Comparative Advantage before EBA trading regime.....	27
3.4.2 Analysis of comparative advantage during EBA trading regime.....	28
3.4.3 Analysis of sectoral trade performance.....	29
3.5.4 Variables measurement and direction of causality.....	32
3.4.5 Method of estimation.....	33

CHAPTER FOUR.....	36
4.0 RESULTS AND DISCUSSION.....	36
4.1 Overview.....	36
4.2 Comparative Advantage of Selected EAC Countries before and During EBA Regime.....	36
4.4 Effect of EBA on Tanzanian Trade Performance.....	42
4.4.1 Diagnostic tests.....	42
4.4.2 Gravity model estimation.....	44
4.4.2.1 Burundi coffee exports to EU.....	44
4.4.2.2 Rwanda coffee exports to EU.....	47
4.4.2.3 Tanzania coffee exports to EU.....	49
4.4.2.4 Uganda coffee exports to EU.....	50
CHAPTER FIVE.....	53
5.0 CONCLUSIONS AND RECOMMENDATIONS.....	53
5.1 Overview.....	53
5.2 Conclusions.....	53
5.3 Recommendations.....	55
REFERENCES.....	57
APPENDICES.....	66

LIST OF TABLES

Table 1: Variables measurement and direction of causality.....	33
Table 2: Descriptive statistics of RCA for selected EAC countries before and during EBA.....	37
Table 3: Poisson Pseudo Maximum Likelihood (PPML) estimates of gravity model.....	47

LIST OF FIGURES

Figure 1: Conceptual framework.....	24
Figure 2: RCA Index for each country in exporting coffee in the EU before EBA.....	38
Figure 3: Value of coffee and total exports by each country before EBA.....	38
Figure 4: RCA Index for each country in exporting coffee in the EU during EBA.....	39
Figure 5: Value of coffee and total exports by each country during EBA.....	40
Figure 6: Coffee export as a percentage of country's total export to the EU.....	42

LIST OF APPENDICES

Appendix 1: Variables and Data sources used in RCA computation.....	66
Appendix 2: Variables and Data sources used in Gravity model.....	67
Appendix 3: EAC countries exporting under EBA trading regime.....	68
Appendix 4: Normality test.....	68
Appendix 5: Q-Q plots for normality test.....	69
Appendix 6: Correlation coefficient.....	70
Appendix 7: Heteroscedasticity test.....	71
Appendix 8: Serial correlation test.....	71
Appendix 9: OLS estimates of Gravity model.....	72
Appendix 10: Importing countries: EU 28 countries.....	73

LIST OF ABBREVIATIONS AND SYMBOLS

ACP	African, Caribbean and Pacific
AERC	African Economic Research Consortium
AfCFTA	African Continental Free Trade Area
CGE	Computable General Equilibrium
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
EAC	East African Community
EBA	Everything but Arms
EU	European Union
FEPA	Framework Economic Partnership Agreement
GDP	Gross Domestic Product
GSP	Generalized Scheme of Preferences
H-O	Heckscher-Ohlin
HS	Harmonized System
ITC	International Trade Centre
LDCs	Least Developed Countries
MARKUP	Market Access Upgrade Programme
NRCA	Normalized Revealed Comparative Advantage
ODA	Official Development Assistance
OLS	Ordinary Least Squares
PE	Partial Equilibrium
PPML	Poisson Pseudo-Maximum Likelihood
PTAs	Preferential Trade Agreements

Q-Q	Quantile-Quantile
RCA	Revealed Comparative Advantage
RTAs	Regional Trade Areas
SADC	Southern African Development Community
SAEBS	School of Agricultural Economics and Business Studies
SI	Symmetric Index
SITC	Standard International Trade Classification
SMART	Single Market Partial Equilibrium Simulation Tool
SUA	Sokoine University of Agriculture
UN COMTRADE	United Nations Commodity Trade
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USD	United States Dollar
WB	World Bank
WCO	World Customs Organization
WITS	World Integrated Trade Solution

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Coffee is one of the most produced, exported and widely consumed crops worldwide and is one of most commercial crops relevant for economic growth and poverty reduction in the world (International Coffee Organization, 2015). The largely produced and commercialized varieties of coffee worldwide are Arabica (*Coffea Arabica*) and Robusta (*Coffea canephora*).

The leading coffee producers worldwide are Brazil, Vietnam, Colombia, Indonesia, Ethiopia, Honduras, India, Uganda, Mexico and Guatemala accounting 2 592, 1 650, 810, 660, 384, 348, 348, 288, 234 and 204 (000 metric tons), respectively (Farrer, 2019). Tanzania ranks 18th worldwide in coffee production with 48 000 metric tons valued at 105 821 000 pounds (Szenthe, 2019). Likewise, the major coffee importing countries are the European Union, Japan, Norway, the Russian Federation, Switzerland, Tunisia and the United States (International Coffee Organization, 2019). As presented by International Coffee Organization (2019), the quantity imported by these countries individually are; European Union, with 5 196 000 tons; Japan, with 492 000 tons; Norway, with 480 000 tons; Russian Federation, with 348 000 tons; Switzerland, with 186 000 tons; Tunisia, with 330 000 tons and the United States, with 1 890 000 tons.

Ndayitwayeko *et al.* (2014) reported that the coffee export has declined due to internal and external forces of supply and demand. The International Coffee Organization monthly export statistics for member and non-members show that in 2018/19 the total export was 1 230 000 tons, while in November 2019/20 it was 1 098 000 tons. This shows a decline of

approximately 132 000 tons. USDA (2019) shows that a primary reason for this decline in the world market was Brazil's Arabica trees entering the off-year of two years production cycle.

In Africa, average coffee production reflects negative growth and its share in the world market is low. ICO (2015) shows that African coffee production shares in the world have declined from 27.2% in the 1970s to an average of 13% in the 2000s. Nevertheless, the African region possesses a large number of countries cultivating coffee. However, the largest share of world coffee production is from Asia and Oceania and South America which account for 11 and 8 countries, respectively. Apart from this experienced decline in coffee production in Africa, some countries, such as Ethiopia and Uganda, record stable growth in coffee production, regardless of some disturbances.

Coffee in East African Community (EAC) is produced by all countries except South Sudan. According to the International Coffee Organization (2019), in 2018 the major coffee producer was Uganda followed by Tanzania then Kenya. The least producers member States were Rwanda and Burundi. Based on the International Coffee Organization (2019), Uganda produced 282 000 tons, Tanzania produced 66 000 tons and Kenya's production was 53 400 tons. The productions of Rwanda and Burundi were only 16 200 tons and 11 400 tons, respectively.

More generally, a noteworthy percentage of intra and extra-regional trade in the EAC is in agricultural commodities including tea, coffee, cocoa, horticultural products, tobacco, cotton, rice, maize and wheat flour (EAC, 2019; MARKUP, 2019). Europe accounts for nearly 30% of global coffee consumption. The European market is mainly increasing for speciality coffee with high quality and high value. The value of EAC

exports of coffee increased to 1bn USD in 2017, accounting for 20% of food exports mostly to the European market (MARKUP, 2019).

Tanzania is endowed with abundant land with appropriate altitude, temperature, rainfall and soil suitable for high-quality Arabica and Robusta production (Mtaki, 2017). Arabica accounts for 70% of all coffee production in Tanzania, while Robusta accounts for only 30% (TCB, 2019). Tanzanian Arabica coffee is grown on the slopes of Mount Kilimanjaro and Mount Meru in the Northern areas, under the shade of banana trees, as well as in the Southern Highlands of Songwe, Mbeya and Ruvuma regions where coffee is both intercropped with bananas and in some areas are pure stand. Robusta coffee is grown in the western areas alongside Lake Victoria in Kagera region (TCB, 2012).

The marketing system of coffee in Tanzania has a unique form of conduct. According to the TCB (2019) and Mtaki (2017), coffee marketing in Tanzania has three systems; internal or farm gate market, coffee auction and direct export market. The large proportion of coffee produced in Tanzania is exported to the foreign market with less consumed domestically (93% exported, while 7% consumed locally) (Tanzania Coffee Board (2019). The major importers of coffee from Tanzania are Japan, Italy, United States, Germany, Belgium, and Finland. In 2016/17 Tanzania exported 5 581, 5 772, 3 053, 2 743 and 2 537 tons to Japan, Italy, United States, Germany, and Belgium respectively (Mtaki, 2017).

1.2 Everything but Arms (EBA)

Everything but Arms (EBA) was established in 2001 as a trade preference between European Union (EU) and Least Developed Countries (LDCs) based on the United Nations (UN) definition of LDCs. EBA is a scheme that grants the Least Developed

Countries (LDCs) full duty-free and quota-free access to the EU single market for all products except arms and armaments (European Commission, 2019), with the goal of increasing export earnings, promoting industrialization, and encouraging economic growth in the least developed countries. Currently, there are 48 beneficiaries under this arrangement and five EAC partner states; Tanzania, Uganda, Rwanda, Burundi and South Sudan (European Commission, 2019). Only Kenya is under the Generalized Scheme of Preferences (GSP) arrangements since Kenya is no longer a least developed country with elimination from duty-free and quota-free.

EBA is a special and different preference regime aimed at promoting the exports of Least Developed Countries with no impact of tumbling their home industries into a higher competition, hence termed an important catalyst for growth. A country shall be withdrawn from the list of EBA beneficiaries when it is considered by the UN as a non-least developing country. The removal of a country from the arrangement and the establishment of a transitional period of at least three years shall be decided by the European Commission (EC), in accordance with the procedure referred in the GSP Regulation (European Commission, 2019).

Unlike the GSP, entry into the EBA is involuntary and the EBA has no time limit regarding when a particular country is considered “least developed country” by the United Nation. This shows that EBA countries would use this preference to produce and trade more with EU countries. Thus, a study on the comparative advantage is necessary for a country or group of countries to benefit from international trade (Chingarande *et al.*, 2013).

In discussions on the possible effects of Regional Trade Areas (RTAs) in the context of trade liberalization, studies have focused on investigating the comparative advantages RTAs member states have in international markets based on different product lines (Mzumara *et al.*, 2012; Chingarande *et al.*, 2013; Ndayitwayeko *et al.*, 2014; Dyegula and Lwesya, 2018). Little attention has been paid on the comparative advantage of individual commodities that partner states have in the specific export markets under preferential trade agreements.

To address this research gap, this study examines the comparative advantage of selected EAC countries trading with EU under EBA, and assesses the trade performance of these countries. This study also explores and suggest ways for better sectoral performance in international trade under the EBA trade regime, hence increasing competition and domination of these countries in the EU coffee market share.

1.3 Problem Statement and Justification

Trading blocs or individual countries enter into international agreements through bilateral, multilateral or special trade preferences systems to seek incentives including trading opportunities. Chingarande *et al.* (2013) argues that all economies regardless of their size depend to some extent on other economies and are affected by events outside their borders.

The world expected much from the EBA initiative, with the hope that the poorest countries in the world would receive the breakthrough in the economic development under this new scheme (Gradeva and Martínez-Zarzoso, 2016). Existing studies debate on the full abolition of duty and quota by the EU to the LDCs that changed the position of the partner states as winners or losers. Huan-Niemi and Kerkelä (2006), for example, found

that the nature of the homogeneity of the products would create more losers than winners and seriously damage their insubstantial economy.

Cernat *et al.* (2003) study, which used the Single Market Partial Equilibrium Simulation Tool (SMART) model, showed moderate welfare and trade gains from the EBA initiative. The largest gains were recorded for Sub-Saharan Africa (SSA) and the EU sugar market as the single most important source of change. Brenton (2003) found that LDCs are underutilizing the EU trade preferences. This was due to the factor of rules of origin which is likely to enhance the impact of EU trade preferences both in terms of improving market access and in stimulating diversification towards a broader range of exports. By comparison, works by Huan-Niemi and Kerkelä (2006); Holmgren (2012); Gradeva and Martínez-Zarzoso (2016) show that trading under EBA preferential regime has failed in increasing the export performance of EBA eligible countries to the EU.

Despite the laudable benefits from incentives provided by EBA, there is still much debate surrounding its effects on LDCs. Therefore, this current study assesses the comparative advantage of selected EAC countries' coffee sector before and during the agreement, and analyzes each country's trade performance attributed by the sector in the EU market. This study hypothesizes that EBA, as a special and different arrangement, has had trade performance effects in these countries.

A country that has a comparative advantage in producing a particular good is usually found to export a higher portion of that good relative to other countries (Obadi, 2012). By assessing the comparative advantage of selected EAC countries trading coffee under EBA, this present study evaluates how the country's Revealed Comparative Advantage (RCA) index in coffee sector has changed over time. Moreover, in analyzing the

additional trade flow attributed by EBA, this research examines the bilateral trade relations between EAC countries and individual countries of the EU. Based on the EBA effect analysis, this study provides evidence to policymakers to determine if the bilateral trade is either influenced or restricted by preferential agreements under EBA.

1.4 Objectives of the Study

1.4.1 General Objective

To assess the comparative advantage and trade performance of the Tanzanian coffee export relative to other EAC coffee-growing member states trading under the EBA regime.

1.4.2 Specific objectives

- i. To analyze the comparative advantage of selected EAC countries trading coffee in the EU market before EBA export regime.
- ii. To analyze the comparative advantage of selected EAC countries trading coffee in the EU market during EBA export regime.
- iii. To analyze the effect of the EBA on selected EAC countries' trade performance attributed by coffee export in the EU market.

1.5 Hypotheses

- i. EBA initiative stimulates coffee export trade performance to selected EAC countries trading under EBA export regime.

1.6 Research Questions

- i. Does selected EAC countries have high comparative advantages of exporting coffee to the EU market before the EBA export regime?

- ii. Does selected EAC countries have high comparative advantages of exporting coffee to the EU market during the EBA export regime?

1.7 Organization of the Dissertation

This report is organized into five chapters. The introductory chapter outlines the background to the study, problem statement and justification, research objectives, hypotheses and research questions. In chapter 2 the relevant theoretical and empirical works documented in the literature are reviewed. In chapter 3 the methodological approach and methods undertaken are described, whilst chapter 4 presents the results and discussion. Finally, the conclusion and recommendations are illustrated in chapter five.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Operationalization of Key Terms

2.1.1 Everything But Arms (EBA)

EBA is a scheme that grants the Least Developed Countries (LDCs) full duty-free and quota-free access to the EU single market for all products except arms and armaments (European Commission, 2019), with the goal of increasing export earnings, promoting industrialization, and encouraging economic growth in LDCs. Currently, there are 48 beneficiaries under this arrangement and five EAC partner states; Tanzania, Uganda, Rwanda, Burundi and South Sudan (European Commission, 2019). Entry into the EBA is automatic and, unlike other Generalized Scheme of Preferences arrangements, EBA has no time-limit. A country shall be withdrawn from the list of EBA beneficiaries when it is considered by the UN as a non-LDC. The removal of a country from the arrangement and the establishment of a transitional period of at least three years shall be decided by the European Commission (EC), in accordance with the procedure referred in the GSP Regulation (European Commission, 2019).

2.1.2 Revealed Comparative Advantage (RCA)

RCA is the ratio of the share of a country's total export in particular good to the share of world export of that product in total world exports (Balassa, 1965). RCA takes values between zero and positive infinite. A country has a comparative advantage if its RCA value is equal to or greater than one. An RCA less than one shows a country has a comparative disadvantage. Chingarande *et al.* (2013) used RCA to investigate comparative advantage and economic performance in the East African Community

member states, whilst Abteu (2015) employed RCA to analyze the growth pattern of trade flow and trade comparative advantages of leather industry products between various African economies.

2.1.3 Trade performance

Trade performance is the analysis of changes in trade patterns, factors of export growth and developments in intra-industry intensity of trade (WB, 2010). The trade performance of individual countries tends to be a good indicator of economic performance since well performing countries tend to record higher rates of GDP growth (Mimouni *et al.*, 2007). Trade performance is characterized by rough indicators, such as the level of openness or growth of export over a given period, product availability, level of market and economic diversification (ITC, 2015). Trade performance compares countries by calculating the competitiveness level and diversification of a particular products and markets. Trade performance provides a country portion for the latest available year and changes in export performance in recent years.

2.1.4 Harmonized System (HS)

The HS is an international nomenclature for the classification of products and allows participating countries to classify traded goods on a common basis for customs purposes (UN, 2018). According to Yu (2008), HS is an internationally standardized nomenclature for the description, classification and coding of goods. HS is also a useful instrument developed and maintained by the World Customs Organization (WCO) to address the need of government to categorize what is being traded and is updated every four to six years. The amendments of HS intents are necessary to keep it updated with the current international trade patterns, technological progresses and customs practices (Yu, 2008).

2.1.5 East African Community (EAC)

EAC was established in 1999 through the Treaty for the establishment of the East African Community that entered into effect in 2000. According to the Treaty, the areas of cooperation are Customs Union, a Common Market, then a Monetary Union and eventually a Political Federation (EAC, 2016).

EAC is a regional bloc mandated by the governments of Tanzania, Kenya, Uganda, Rwanda, Burundi and South Sudan to spearhead the East African economic, social and political integration agenda. EAC countries can enter into international agreements either through bilateral or multilateral systems to seek trading opportunities.

2.1.6 European Union (EU) 28 Countries

The EU is the union of 28 countries (before the withdrawal of the United Kingdom on 31 January, 2020) that form European Union and governing common economic, social, and security policies (EU, 2021). Under the study period 1995 to 2019, the EU was formed by 28 member states before exclusion of the United Kingdom in last year. These states are; Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom. The EU was created by the Maastricht Treaty, which entered into force on November 1st 1993. The treaty was designed to enhance European political and economic integration by creating a single currency (the euro), a unified foreign and security policy and common citizenship rights by advancing cooperation in immigration, asylum and judicial affairs.

2.2 Theoretical Framework

Mwasha and Kweka (2014) stipulated that for any business to grow theories are necessary as they provide road maps and answers to significant questions such as ‘why to trade?’, ‘which category of goods and services to trade?’ and ‘how can participants benefit from trading?’. As well as other intentions, the basic motivation of international trade is that of benefits to the trade participants (Dunn and Mutti, 2004; Salvatore, 2013). Several classical, neo-classical and new trade theories explaining the variations in international trade that can influence comparative advantage. These are explored in the following sub-sections.

2.2.1 Theory of absolute advantage

The theory originated in 1776 by Adam Smith in his famous book “*The Wealth of Nations*”. According to the theory, a country is said to have an absolute advantage if it can produce a particular product at a lower absolute cost than another country. Smith assumed that each country could produce one or more commodities at a lower real cost than its trading partners (Dunn and Mutti, 2004).

Smith’s theory states that a country that trades across its borders can benefit from trade by specializing in producing and exporting products that it can produce at lower absolute cost than other countries and importing products that it has an absolute disadvantage, hence increasing its welfare (Markusen *et al.*, 1995; Krugman and Obstfeld, 2003; Dunn and Mutti, 2004; Smit, 2010; Salvatore, 2013).

Based on the assumption of the Smith’s theory that every country has an absolute advantage over another, the theory raises the following questions: What if a nation has an absolute advantage in producing everything? Will the country continue to produce all the

products for domestic consumption and exports? Will it be possible for both countries to trade and have mutual benefits when one country produces all the goods? A Comparative advantage theory has answered these questions.

2.2.2 Theory of comparative advantage

Ricardo presented the theory of comparative advantage in his publication of “*Principles of Political Economy and Taxation*” in 1817. Ricardo argued that countries would still mutually benefit from trade even though one country has an absolute disadvantage in the production of all commodities it trades relative to another country. One country has to specialize in the production and export of the product of its comparative advantage and import the product which is disadvantageous off (Salvatore, 2013).

Ricardo explained the theory of comparative advantage using the labour theory of value, although he did not believe in it. Ricardo used the labour theory of value only as a simple way to explain the theory of comparative advantage (Salvatore, 2013). Furthermore, labour is not the only factor of production, it can be substituted with capital and other factors in the production of most commodities. Labour is also not homogeneous as it varies greatly in areas of training, production and wages.

2.2.3 Theory of opportunity cost

Gottfried Haberler in 1936 rescued the theory of comparative advantage based on opportunity cost theory. According to the theory, a country would have a comparative advantage in the production of a commodity, if a particular commodity can be produced at a lower opportunity cost in respect to the other country. The cost of a commodity is the amount of another commodity that must be foregone to proclaim just enough resources to produce one additional unit of the first commodity (Salvatore, 2013).

The theory of comparative advantage, as discussed so far, does not explain the direction of the trade (Smit, 2010). This suggests the need for an alternative model of comparative advantage to explain the direction of trade, which is explored in the following theoretical literature.

2.2.4 Theory of Heckscher-Ohlin (H-O)

The H-O theory was first coined by Swedish economists, Eli Heckscher and Bertil Ohlin in 1933. H-O theory examines differences in factor endowments as a source of international trade. A country will have a comparative advantage in producing a product that is intensive in a relative factor that a country is abundant of. Salvatore (2013) maintains that a nation will export the commodity concentrated in its relative abundant and cheap factor and import the commodity intensive in its relative scarce and expensive factor.

H-O theory works on the underlying assumptions of constant returns to scale, two factors of production (labour and capital), equal technology in production, perfect competition in commodities and factor markets between countries, no market distortions and perfect factor mobility within each nation but factor immobile across countries (Markusen *et al.*, 1995; Krugman and Obstfeld, 2003; Salvatore, 2013).

Most of the modern international trade theories such as intra-trade theory, international product life cycle trade theory and theory of Porter's national competitive trade theory are modifications and extensions of H – O theory. Their modifications do not, however, reduce the rationality of the theory in enlightening the direction of trade between nations. However, all classical, neo-classical and new theories of trade agree that nations engage in international trade because of the benefits receiving from trading.

2.3 Empirical review

2.3.1 Comparative Advantage (CA)

Revealed Comparative Advantage (RCA) hold different characteristics for judging the comparative advantage of the country. RCA determines how a country is specialized in the production and trade of a certain product. RCA hypothesizes that a country is said to have revealed comparative advantage if RCA index is greater or equal to one, otherwise a country has a comparative disadvantage. There has been a number of key studies conducted using RCA demonstrating its utility as the best tool used in the dynamic competitive market economy, and these studies are explored in greater detail below.

Geda and Yimer (2019), for instance, examined the effects of the African Continental Free Trade Area (AfCFTA) agreement tariff reduction protocol on intra-Africa's merchandise trade to identify the effects on trade creation and diversion. They found that trade indices, including RCA, revealed restrictive effects of the AfCFTA on trade creation, but a strong possibility in affecting trade diversion.

Chingarande *et al.* (2013) investigated the Comparative Advantage of the EAC member states using data from the International Trade Centre (ITC) at Harmonized System 6-digit level. They found that Kenya has comparative advantage in 778 product lines, followed by Tanzania (471 product lines), Uganda (437 product lines) and Rwanda (275 product lines). Burundi had the least with 152 product lines.

Mwasha and Kweka (2014) also utilized RCA to analyze the revealed comparative advantage for the highest export sectors and commodities in Tanzania from 2009 to 2012. In analyzing the revealed comparative advantage of Tanzania in the face of international trade, Balassa's (1965) index was computed for various sectors at the Harmonized System

4-digit disaggregated level of commodity classification from the UN's COMTRADE statistics database and International Trade Centre (ITC). Their results demonstrated that traditional cash crops sectors, such as coffee, tea and spices, commodities and mineral resources experience RCA greater than one and became the leading export sector and commodities under the study period.

In his study, Abtew (2015) used RCA to empirically analyze the revealed comparative advantage of Ethiopian leather industry products relative to Kenya, Egypt and Tunisia. The Balassa index was calculated using leather industry data from 2004 to 2013, which classified at the HS code 41 and 42; 2 digit level. HS 41 stands for raw hides and skins and HS code 42 is for leather and leather products. The findings revealed that Ethiopia had a high RCA in raw hide and skins exports over the selected African countries. This suggests that Ethiopia has significant potential growth for specification in both raw hides and skins and leather product export.

Gupta and Kumar (2017) used Balassa Revealed Comparative Advantage (RCA) index to analyze the revealed comparative advantage of the exports of Rwanda based on 2001-2015 export data disaggregated at 4 digit and 6 digit level HS-1996 classification. They found that coffee, tea, mati and spices experienced a RCA index of 81.46 in 2015, which occupied a top ten products position with highest RCA for Rwanda.

In a more recent study, Dyegula and Lwesya (2018) examined the extend of trade liberalization in the Southern African Development Community (SADC) regional trade area, and the economic benefits derived by Tanzania's membership between 2000-2009. Their study used RCA to investigate the products which the region had a comparative advantage with. The results revealed that coffee was not among the top ten products in

which the SADC region has a revealed comparative advantage. Instead, the results suggested that SADC had a RCA on products like live trees, other plants, edible fruit and nuts, tobacco, ores, slag and ash, precious metals and base metals. These were agricultural, intermediate goods and ores and minerals products.

In another study, Muchanyuri and Mzumara (2013) analyzed the inter-sectoral comparative advantage of Tanzania and the impact on international purchasing. The study adopted the Balassa RCA index to analyze export data for 2008-2010 which was disaggregated at 6 digit level. Regarding the inter-sectoral comparative advantage analysis, Tanzania's vegetable products sector ranked number one with 90 products with RCA greater or equal to one, followed by the textiles sector (75 products) and machinery/electronic sector (52 products). The study's other key findings revealed that cashew nuts, cloves and coffee were top three products in Tanzania's vegetable sector with RCAs of 587.80, 322.75 and 302.92, respectively. This suggests that Tanzania's vegetable products sector is the country's most competitive sector. Therefore, in terms of international purchasing, other SADC countries would benefit by importing products from Tanzania's vegetable products sector.

Abtew (2017) examined the RCA of the footwear sector in Ethiopia, Egypt, Kenya, Nigeria, Tanzania and Uganda using Balassa (1965) RCA and 2003-2014 export data at the 2-digit level with HS code 64 to investigate the RCA exhibition among selected African countries. The findings suggested that only Kenya has the mean RCA of greater than one, with the remaining countries RCAs below one which implies a comparative disadvantage.

Ndayitwayeko *et al.* (2014) used an improved Normalized Revealed Comparative Advantage (NRCA) to investigate the comparative advantage of Burundi's coffee sector (which accounts for 75% of the country's total exports in international markets). Their analysis was conducted based on coffee exports data of Standard International Trade Classification (SITC) 3; 4 digit level for the period 2000 to 2012. Their empirical findings suggested that EAC countries had a comparative advantage in the specialization of coffee exports. Burundi exhibited the least comparative advantage for coffee among all EAC coffee growing member states behind Uganda in first place, followed by Kenya and Tanzania.

Another study which employed the use of RCA is Katunze and Kuteesa's (2016) study in Uganda. They examined RCA by using Symmetric Index (SI), which was first engineered by Laursen (1998) to account for the asymmetry problem. The SI takes values from -1 to +1 with -1 meaning having comparative disadvantage, +1 having comparative advantage and 0 being comparative advantage neutral. An SI closer to one, for example, indicates that the Uganda has an RCA in the particular product chapter. The aim of Katunze and Kuteesa's (2016) study was to evaluate the stability of Uganda's revealed comparative advantage in Common Market for Eastern and Southern Africa (COMESA). Their evaluation was done using data from 1997 to 2014 using 6 digit level HS export and re-exports data extracted from the World Integrated Trade Solution (WITS). Their findings revealed that Uganda had RCA in all 16 industries evaluated at the product chapter level, which meant that Uganda is stable in exporting animals, vegetables, food production, wood, textiles and cloth, stone and grass and metals to the COMESA regional trade area.

In a different study, Mkenda (2014) examined the Tanzania's structural transformation using RCA based on global and country export data of 2001, 2002 and 2011 that

classified at 2 digit level of the HS. The study compared the comparative advantage of agricultural products, fish and minerals against other product groups. The study's RCA values showed that for 2001 and 2011 Tanzania's comparative advantage was strongly dominated by the agricultural products - 70% of the product groups were agricultural - with the remaining products being mineral based. Coffee, tea, mati and spices with HS-code 09 was a top most product group in 2001, and in 2011 the product group was in top three among top ten product groups with the highest RCA indices.

Whilst there are copious studies on and using RCA in African countries, none of the studies reviewed have focused on measuring the effects of special trade agreements on the benefiting member states, especially those which offer duty-free and quota-free like EBA. As labor intensive sector, the coffee sector of selected EAC countries have a better potential to attract resources for specialization and export performance. When LDCs grant duty-free and quota free in a particular sector, resources will move towards that sector. Therefore, this study estimates the revealed comparative advantage to provide insight on how duty and quota freeness has attracted EAC countries to sell more coffee to EU.

2.3.2 Trade performance

Various studies have assessed trade performance and economic welfare effects of EBA initiative. In general, studies use Partial Equilibrium (PE) models, Computable General Equilibrium (CGE) models or Gravity models. CGE models tend to be most appropriate in assessing trade and welfare effects at the aggregate level, although sometimes it is difficult to apply CGE due to the complexity and comprehensive information required for some variables included in models.

Partial Equilibrium (PE) model is applicable at the sectoral level. PE considers only those product markets affected by the policy changes and exclude non-affected product markets. CGE and PE are accountable for ex-ante studies, where they are used to estimate the probable impacts of the Preferential Trade Agreements (PTAs) in the future. PE modeling involves the analysis of trade and welfare effects in both parties of the agreement.

In comparison, Gravity models are generally used to explain bilateral trade flows between different countries or in examining trade creation and diversion effects of free trade areas (Gradeva and Martínez-Zarzoso, 2016). Gravity modelling was introduced in the early 1960s to analyse goods moving across national or regional boundaries. In gravity models the flow of trade between two countries can be determined by supply or demand factors. More pointedly, supply factors in the exporting country and demand factors in the importing country as well as forces that may either arouse or restrict the bilateral trade (Nielsen, 2013). Several studies have estimated different specifications of the gravity model to assess the effect of the EBA agreement on determining trade flows. The following are some studies which used a gravity model to analyse the effects of EBA agreement between trade partners.

In a recent study, Geda and Yimer (2019) used the gravity model to examine the effects of the AfCFTA agreement tariff reduction protocol on intra-Africa's merchandise trade during 1993-2017. Using the Pseudo Poisson Maximum Likelihood (PPML) approach to estimate the gravity model, the study found a positive effect of the AfCFTA on net trade creation. In another study, Huan-Niemi and Kerkelä (2006) forecasted that trade liberalization of sugar imports from the LDCs will be a major threat to the EU sugar regime, but the EU's welfare will gain due to cheaper imports of sugar. Gradeva and Martínez-Zarzoso (2010) utilized the gravity model to examine the effect of the EBA

trade preferences regime on exports from ACP LDCs countries to the EU using 1995-2005 panel data. Their empirical analysis revealed a negative effect of the EBA regime on exports, while the interaction effect between EBA and aid flows on exports reveal positive impact. This suggests the inclusion of both trade preference and aid to support the EU development strategy.

Other studies that applied the gravity model to capture the impact of the EBA include; Gradeva and Martínez-Zarzoso (2016) and Holmgren (2012). Gradeva and Martínez-Zarzoso (2016) estimated the gravity model for exports from the 79 ACP countries to the EU-15 using 1995-2013 panel data to examine the effect of the EBA trade preference regime on exports from ACP countries to the EU. Their results provided no evidence that EBA agreement had a positive effect on the export performance of the ACP LCDs. That is EBA eligibility was not associated with an increase in exports to the EU-15 countries. Truly, exports from EBA countries to the EU-15 were on average lower than exports from non-EBA countries. However, this study concluded that the mixed effect of EBA eligibility and Official Development Assistance (ODA) had a significant and positive effect on exports. Moreover, the study focused on bilateral exports from ACP countries to each EU-15 countries.

Holmgren (2012) used the gravity model to analyze the effects of EU's EBA agreement on the 50 LDCs recorded by the UN against a set of non-EBA developing countries, taking into account the change between the year before the reform; 2000 and 2004 after the reform. The study intended to explore if exports from EBA benefiting countries have improved or if exports remain in a non-positive increase status. Holmgren (2012) hypothesised that the EBA initiative has increased the import value to the EU from the LDCs and comparatively diminished import value from other developing countries. Their

findings disapproved that the EBA agreement is effective in increasing exports of the LDCs to the EU.

Cernat *et al.* (2003) assessed the aggregate worldwide distribution of pattern effects of the EU's EBA initiative for both LDCs and third developing countries under different circumstances. Using the SMART model, the study shows moderate welfare and trade gains from the EBA initiative. The study recorded that the largest trade gains are observed in Sub-Saharan Africa and the EU sugar market is the single most important source of change. The effects of EBA on the EU side are recorded at a minimal level because the increased market access for LDCs comes mostly at the overhead of non-EBA countries. The analysis assumed no effect of non-tariff barriers that may impede LDCs from increasing their exports to the EU market. However, the study suggests that for long-run trade insight, supply side factors limitations have to be considered more rather than market access constraints for international trade robust.

2.4 Conceptual Framework

The framework briefly illustrates the comparative advantage of selected EAC countries' coffee sector and sectoral trade performance. The framework for this study is presented in Figure 1. The Figure illustrates that EAC countries trading to the EU market under the EBA preferential trading regime are competing to each other for the market share. Under EBA the selected coffee-growing EAC countries export their agricultural products including coffee to the EU market under duty and quota-free arrangements.

The country's comparative advantage or disadvantage is determined by the revealed comparative advantage which illustrates how a country's coffee export dominates the market in contrast to other EAC countries. Revealed comparative advantage is regarded as

the ratio of the share of a country's export in coffee in its total exports to the share of the world export of coffee in total world exports in the EU. RCA index is constituted by variables including the value of coffee exports of EAC selected individual countries, total export values of the EAC selected countries, value of coffee exported by the world in the EU market and lastly with the total export values of the world in the market. The country having RCA index equal to or greater than one has a comparative advantage in coffee specialization and exportation, while a comparative disadvantage is evidenced by RCA index less than one.

Determinants of sectoral trade performance can be divided into supply side factors and demand side factors. Supply factors are in the EAC countries to determine the production and export capacity of a country. Given the free market access in the 28 EU countries, better work in supply side factors are likely to affect the export value of a country. Supply conditions are potentially affected by factors like economic sizes of selected EAC countries. The export performance of a country is affected by preferential policies, such as whether a country is eligible for EBA or not. Furthermore, the supply capacity of a country can be affected by its population.

Demand conditions are pulling factors in the importing countries. These are factors grounded in the EU countries to influence the bilateral trade flow between EAC selected countries and the EU countries. There are many factors grounded by this framework that have a potential effect on demand capacity. Firstly, the economic size of the EU countries that determine the likelihood of the internal market to affect the demand capacity. For instance, the framework assumes that EU economic size expected to affect coffee export performance positively. Second, the increase in the number of people influences trade performance as more people will demand more products to consume. Third, the demand

capacity of a country can be affected by the strength of its currency. An exchange rate can deteriorate the export value of exporting country if its currency is weak against the currency of her trading partner, whilst, the exchange rate affects positively the import volume of importing countries.

Therefore, with the theoretical basis of H-O theory and variables relationship illustrated in the framework. The study computed the ratio of the share of coffee to a country total export to the share of coffee to the world total export in the market to manage the determination of the country comparative advantage or disadvantage. Moreover, through estimating gravity model under a theoretical basis of H-O theory, the study captured the additional trade that occurred to EAC selected countries after being trading under EBA.

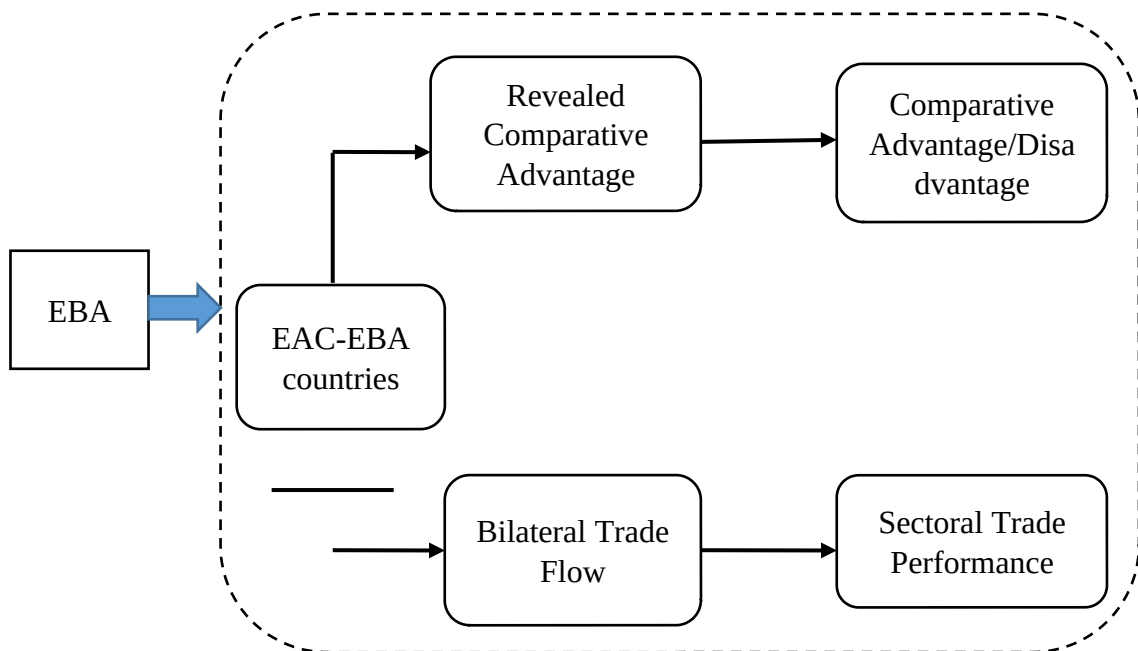


Figure 1: Conceptual framework

CHAPTER THREE

3.0 METHODOLOGY

3.1 Overview

This chapter presents the methodology used in this study. This chapter dwells on type and sources of data collected, research design, the study countries, data processing and analysis and model estimation.

3.2 Type and Sources of Data

The study employed panel data by compiling and analyzing trade data of EAC selected countries and the EU 28 countries. Data retrieved from WITS, United Nations Conference on Trade and Development (UNCTAD), World Bank (WB) and other online sources for the period 1995 to 2019. Appendix 1 and 2 indicate variables used and data sources.

To analyze Tanzania's comparative advantage at EAC level in exporting coffee to the EU market before EBA agreement, coffee data at Standard International Trade Classification (SITC) Revision3; 2 digits with Harmonized System (HS) code 71, were compiled from United Nations Conference on Trade and Development (UNCTAD) and analyzed using Microsoft Excel by computing RCA index for the period 1995 to 2000.

To analyze Tanzania's comparative advantage in exporting coffee to the EU market in contrast to other EAC coffee-growing member states during EBA regime, coffee data with HS-Code 71 were compiled from WITS and analyzed via Ms Excel by calculating RCA scores for the year 2001 to 2019. The data compiled includes countries coffee and total exports, world coffee and total exports to the EU.

In analyzing the effect of EBA in EAC countries trade performance, Gross Domestic Product (GDP), Population and Exchange rate data as well as the distance data were obtained. GDP and exchange rate data were obtained from UNCTAD database whereas the number of population of trading countries were obtained from World Bank Development Indicators database. From EU and WorldAtlas web pages are where EBA eligibility of EAC countries were observed. Distance data were calculated from <http://www.distancefromto.net/>. The distance between trading partners was calculated from their capital cities.

Export flows, Gross Domestic Product and exchange rate values were in nominal terms because they are effectively deflated by the multilateral resistance terms, which are unobserved price indices. Deflating these values using different price indices, like Consumer Price Index (CPI) and GDP deflator, would imperfectly seizure the unobserved multilateral resistance terms, hence results are likely to be misleading.

3.3 Study Countries

The study was conducted in selected EAC countries trading to the EU market under the EBA preferential regime focusing on Tanzania coffee sector in contrast to other EAC coffee-growing member states. Currently, there are five EAC partner states beneficiaries under this arrangement; Tanzania, Uganda, Rwanda, Burundi and South Sudan. This study excluded South Sudan because the country does not produce coffee, hence the study covered only four countries; Tanzania, Uganda, Rwanda and Burundi as shown in appendix 3. EAC was established in 1999 through the Treaty for the establishment of the East African Community that entered into effect in 2000. According to the Treaty, the areas of cooperation are Customs Union, a Common Market, then a Monetary Union and eventually a Political Federation (EAC, 2016).

EAC is a regional bloc mandated by the governments of Tanzania, Kenya, Uganda, Rwanda, Burundi and South Sudan to spearhead the East African economic, social and political integration agenda. EAC countries can enter into international agreements either through bilateral or multilateral systems to seek trading opportunities. Focusing on the coffee export this study reveals how selected EAC countries have comparative advantages in the region in exporting coffee to the EU 28 countries and how EBA has impacted their bilateral trade flow by estimating the additional effect of the EBA in their export values.

3.4 Data Analysis

3.4.1 Analysis of Comparative Advantage before EBA trading regime

RCA methodology was employed to estimate a country's comparative advantage or comparative disadvantage in coffee export to the EU market before the establishment of EBA initiative in 2001. RCA indices use trade pattern to analyze regional, sectorial or commodity comparative advantage or disadvantage by contrasting the country of interest trade profile with the rest world's average. Therefore, the study adopted Balassa index of 1965 to analyze selected EAC countries' comparative advantage before EBA (1995-2000) using international trade data to compare coffee exports with other EAC coffee-growing member states particularly exporting in the EU.

RCA is the ratio of the share of a country's export in particular good in its total exports to the share of world export of that product in total world exports.

$$RCA_{ij} = (X_{ij} / X_{it}) / (X_{wj} / X_{wt}) \dots\dots\dots (i)$$

Where;

RCA_{ij} – represent the Revealed Comparative Advantage of country i for product j

X_{ij} – export of good j by country i

X_{wj} – world's export of product j

X_{it} – country i's total exports

X_{wt} – total world exports

RCA takes values between zero and positive infinite. A country has a comparative advantage if its RCA value is equal or greater to one and with RCA less than one, a country has a comparative disadvantage. For commodities with RCA greater or equal to one, a country reveals comparative advantage in exporting those commodities.

The use of revealed comparative advantage index has it is advantageous and disadvantageous effects. The advantage of using RCA index to reveal a country's comparative advantage is that the methodology is abided with the changes in an economy's relative factor endowment and factor intensity. However, its disadvantage is that it might be affected by any intervention that distorts the trade pattern.

3.4.2 Analysis of comparative advantage during EBA trading regime

In establishing comparative advantage that selected EAC countries' coffee sector has during the EBA arrangement, this study adopted Balassa's RCA. Data for selected EAC countries exporting coffee to the EU market from 2001 to 2019 were collected and RCAs were calculated in Microsoft excel spreadsheet and comparison was done to all EAC selected countries performing the EAC – EU marketing under the EBA trading regime as the competitors. By measuring the RCA of each country, it was possible to rank its coffee sector in the region.

RCA becomes relevant after the application of the neoclassical H-O theory when one wants to measure the comparative advantage of a nation due to the unobservable relative price and production costs under closed economy (Ndayitwayeko and Ndimanya, 2015). In contrast to Normalized Revealed Comparative Advantage (NRCA), RCA is very

sensitive to the level of classification in the scores of less disaggregated products than in more disaggregated. In this case, coffee are relatively less disaggregated since they are drawn at 2 digit level. So the use of RCA index is valid.

For this study, the RCA analysis was represented by this model which developed by Balassa in 1965;

$$RCA_{ij} = \left(X_{ij} / X_{it} \right) / \left(X_{wj} / X_{wt} \right) \dots\dots\dots (ii)$$

Where;

RCA_{ij} – represent the Revealed Comparative Advantage of country i for product j

X_{ij} – export of good j by country i to the EU

X_{wj} – world's export of product j to the EU

X_{it} – country i's total exports to the EU

X_{wt} – total world exports to the EU

3.4.3 Analysis of sectoral trade performance

Gravity model was introduced since early of the 1960s to analyze factor goods moving across national or regional boundaries. According to Tinbergen (1962), trade flow between trading countries is augmented directly by their national incomes, inversely influenced by geographical distances between trading partners.

$$X_{ij} = g \frac{GDP_i GDP_j}{DIST_{ij}} \dots\dots\dots (iii)$$

Where;

X_{ij} = Trade value between country i and country j

GDP_i = Gross Domestic Product of country i

GDP_j = Gross Domestic Product of country j

$DIST_{ij}$ = Distance between country i and country j

g = Gravitational constant

Tinbergen was the first pioneer who used Newton's law of Universal Gravitation to explain the international trade flows between the two nations. Tinbergen (1962) estimated gravity model to empirically analyze trade between countries by determining the foreign trade pattern that would prevail in the absence of trade complaints.

Linnemann (1966) figured out that bilateral trade flows between two countries are determined by prospective supply conditions at the exporting country, prospective demand conditions at the importing country and stimulating or restraining forces existing between the two trading countries. Linnemann (1966) considered national incomes and population as factors for prospective demand and supply and geographical distance and preferential trade as the trade resistance factors.

$$X_{ij} = \gamma_0 \zeta_i^{\gamma_1} POP_i^{-\gamma_2} \zeta_j^{\gamma_3} POP_j^{-\gamma_4} DT_{ij}^{-\gamma_5} PT_{ij}^{\gamma_6} \dots \dots \dots (iv)$$

Where;

X_{ij} = Trade value between country i (exporter) and country j (importer)

ζ_i = National Income of exporter

ζ_j = National Income of importer

POP_i = Population size of exporter

POP_j = Population size of importer

DT_{ij} = Geographical Distance between exporter and importer

PT_{ij} = Preferential Trade between exporter and importer

γ_0 = Constant term

γ_{1-6} = Coefficients to be estimated

Gravity model hypothesized by Tinbergen (1962) and Linnemann (1966) provides a reference line for most studies that have established their models by compressing gravity models.

Some studies have used the same gravity models as postulated by Tinbergen (1962) and Linnemann (1966) but this study has modified the model by adding other explanatory variables which are EBA eligibility and exchange rate to capture their effects in bilateral trade flows between trading countries.

In this context, the analysis attempt to identify the contribution of these factors beyond the observed changes in trade flows. This was done to capture additional trade that occurred to EAC selected countries trading under EBA.

$$X_{ij} = \beta_0 + \beta_1 GDP_i + \beta_2 GDP_j + \beta_3 POP_i + \beta_4 POP_j + \beta_5 DIST_{ij} + \beta_6 EBA + \beta_7 EXCH_{ij} + \varepsilon_{ij} \dots\dots\dots$$

Where;

X_{ij} = Bilateral Exports between EAC selected countries and the EU 28 countries

GDP_i = Gross Domestic Product of EAC selected countries (i = 1, 2, 3, 4)

GDP_j = Gross Domestic Product of the EU 28 countries (j = 1, 2,, 28)

POP_i = Number of Population in selected EAC countries (i = 1, 2, 3, 4)

POP_j = Number of Population in the EU 28 countries (j = 1, 2,, 28)

$DIST_{ij}$ = Geographical Distance between selected EAC countries and the EU 28 countries

EBA = Everything but Arms eligibility

$EXCH_{ij}$ = Exchange rate between EAC countries and the EU 28 countries

β_0 = Constant term

β_{1-7} = Coefficients to be estimated

ε_{ij} = Error term

Most modellers assume the application of log-linearized gravity model to enable the use of standard estimation techniques. Equation (v) was transformed into a logarithm form of the equation as;

$$\ln X_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln DIST_{ij} + \beta_6 EBA + \beta_7 \ln EXCH_{ij} + \varepsilon_{ij} \dots$$

3.5.4 Variables measurement and direction of causality

Basing on the theoretical framework of the gravity model, it is expected that bilateral trade flows between trading partners is impacted positively by their national incomes. The influence of populations was determinative. The coefficient of the exporter's population can have a negative sign in affecting the bilateral trade flow between trading partners, while the positive coefficient of the importer's population can appear as this variable can influence the coffee demand through increase in consumption.

Distance variable is expected to bear a negative sign as countered to be a trade resistance factor since it shows the transportation cost between EAC countries and their trading partners. The bilateral exchange rate variable is expected to have a positive direction of causality, meaning that any increase in the importer's currency value, leads to an increase in trade flow with its partners. In the case of EBA, its causality direction is expected to have positive sign, since it's widely believed that countries' membership to the EBA is a milestone in increasing trade volume and values. 0 assumed 1995 to 2000 when countries were not under EBA and 1 when countries were trading under EBA from 2001 to 2019. Table 1, illustrates.

Table 1: Variables measurement and direction of causality

Variable	Measurement	Direction of causality
Bilateral export, X_{ij}	All export values at current market prices (in USD million)	NA

GDP _i	Exporter's national income value at current market prices (in USD million)	Positive
GDP _j	Importer's national income value at current market prices (in USD million)	Positive
POP _i	Total population of exporting country measured in million	Negative
POP _j	Total population of importing country measured in million	Positive
DIST _{ij}	Bilateral distance between countries' capital measured in kilometers	Negative
EXCH _{ij}	Measured in nominal exchange rate as price of domestic currency against foreign currency	Positive
EBA	Dummy variable; 1 if the EAC country is trading under EBA and takes 0 otherwise	Positive

3.4.5 Method of estimation

The study used PPML method of panel data in estimating the gravity model. Mostly, panel data are suffering from unobserved heterogeneity problem, so when estimating the panel data using a gravity model, a researcher has to consider it. OLS method is simple to estimate, but it used log linearity of export values in estimating the coefficients. With this drawback, it leads to the dropping of zero trade values because the natural logarithm of zero is undefined.

Dropping of zero trade observations in OLS using the natural logarithm for several variables results to a risk of obtaining biased or inconsistent estimates. In bilateral trade flows, zero observations can contain valuable information, therefore non-linear panel data estimations techniques can in steady be used to allow for zero observations.

Estimating the gravity model using OLS rises the problems of unobserved heterogeneity and heteroscedasticity which when not controlled might influence the results to be biased and inconsistent. OLS regression does not consider heterogeneity across groups or time. If the unobservable individual characteristics are not included as explanatory variables in the form of dummies in the model, these characteristics would include an error term creating a correlation between errors (Sheikh *et al.*, 2019). In these circumstances, the standard errors will be unsound and consistency of the least squares estimators is suspicious.

Heteroscedasticity violates the constant variance assumption of OLS and cannot be dealt with OLS technique. Log linearizing the estimated model affects the error term and further makes the variance inconsistent for the observations used in the estimation (Gómez-Herrera, 2013) cited by Eggers (2017). Also, the major issue raised is the Endogeneity problem that some observed variables not included in the model are affecting the coffee export (dependent variable).

Presence of heteroscedasticity under the assumption of a multiplicative error term in the non-linear gravity model requires acceptance of an estimation technique that allows accounting for the effects of inward and outward multilateral resistance terms. Santos Silva and Tenreyro (2006) presented the PPML as a simple way to deal with the setbacks of the OLS estimator.

However, PPML estimator possesses a lot of desirable characteristics such as the estimator provides consistent estimates of the non-linear gravity model by including fixed effects when estimating the model specification to capture unobserved heterogeneity arises as a result of unobserved characteristics between country pairs, importers of product groups. Also, PPML estimates zero observations of the observed trade value which dropped from the OLS model since the logarithm of zero is undefined. However,

they are relatively common in the trade matrix since they contain valuable information as not all countries can trade all commodities with all trading partners. Thus the ability of PPML to include zero observations naturally and without any additions to the basic model is highly preferable (Shepherd *et al.*, 2019). Finally, PPML estimator is becoming steadily more popular in the literature and commonly used by applied researchers in international trade policy analysis.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Overview

This chapter presents the results and discussion of the study. This chapter is divided into two main sections. The first section analyses the comparative advantage of selected EAC countries' coffee sector has in the EU market before and during the EBA treatment for five years 1995 to 2000 before EBA and from 2001 to 2019 during the EBA. Section one discusses the empirical results from the RCA Model showing the country's RCA scores before and during the trading regime. The second section presents the empirical analysis from the gravity model that captures the contribution of the EBA partnership beyond observed changes in trade flows. Analysis in section two is done to capture additional trade that occurred after being trading under the EBA and putting more clarity on how EBA trading regime has potentially influenced selected EAC countries' coffee exports performance to the EU market.

4.2 Comparative Advantage of Selected EAC Countries before and During EBA

Regime

This section of the study developed to present RCA results estimated before and during the EBA. The aim of running this prior and during EBA estimation was to provide insights on how the selected EAC countries' coffee sector comparative advantage was before and during the establishment of EBA in 2001. The prior analysis intends to know the RCA of countries before receiving special and unilateral preference of exporting their products to the EU market under the elimination of quota and duties.

Table 2: Descriptive statistics of RCA for selected EAC countries before and during EBA

	Tanzania		Uganda		Rwanda		Burundi	
	Before EBA	Durin g EBA	Before EBA	Durin g EBA	Before EBA	Durin g EBA	Before EBA	Durin g EBA
Mean	76.94	29.91	217.79	94.48	198.21	68.25	251.31	193.80
RCA								
SD	15.28	13.66	16.46	17.79	75.28	49.61	64.43	75.19
Min.	56.98	1.46	194.65	42.16	93.12	0	186.31	167.35
Max.	98.36	61.62	214.95	122.02	217.31	167.35	373.90	319.53

Source: Author's computations based on UNCTAD and WITS-UN COMTRADE databases

The results in Table 1 show that the revealed comparative advantage indexes are greater than one ($RCA > 1$), which implies a potential growth of the selected EAC countries in coffee specialization and export in the EU market. Before the EBA, the comparative advantage of Burundi in coffee export to the EU is greater than other EAC countries, followed by Uganda, then Rwanda and lastly is Tanzania.

Additionally, among the selected EAC countries Burundi and Uganda show higher comparative advantage index of above 150 in all years. Rwanda has comparative advantage index of below 100 only in 1997. For all years, Tanzania has comparative advantage index of below 100 in the export of coffee in the EU before the EBA trading regime, Figure 2 illustrates. This does not imply that Tanzania is disadvantageous in exporting coffee to the EU market, but it only means that the proportion of Tanzanian coffee to its total export is less compared to other EAC countries as denoted by Figure 3 below.

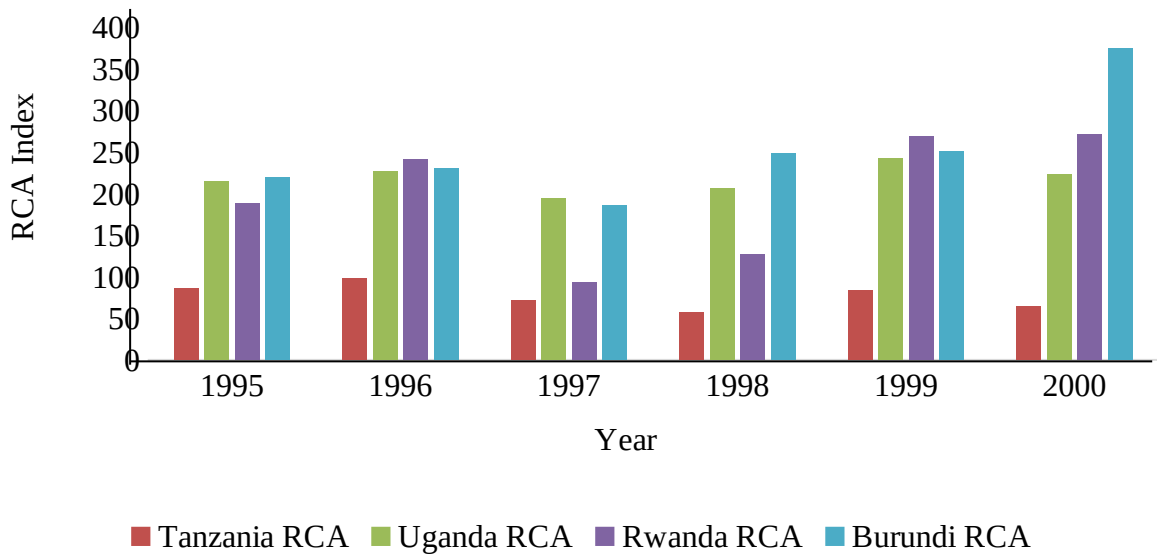


Figure 2: RCA Index for each country in exporting coffee in the EU before EBA

Source: Author's computations based on UNCTAD database

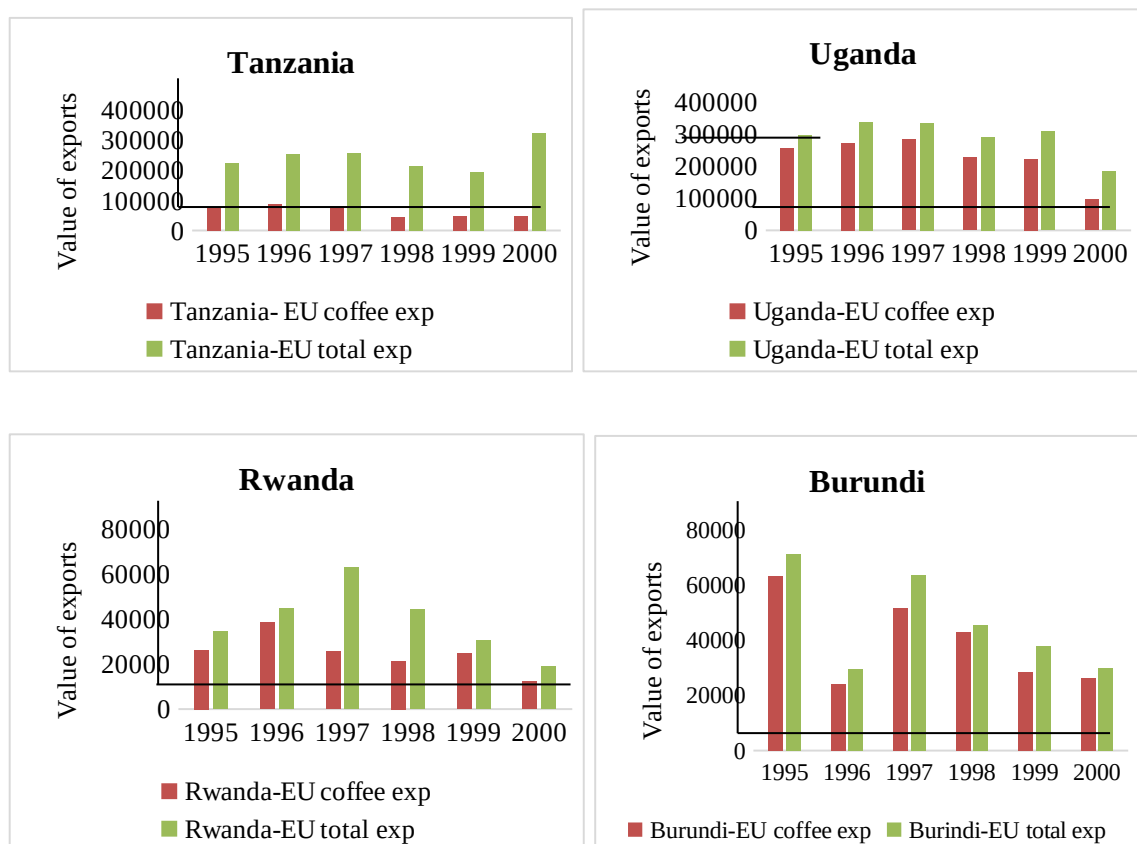


Figure 3: Value of coffee and total exports by each country before EBA

Source: Author's computations based on UNCTAD database

During the EBA, Burundi's mean value highlighting RCA of the coffee sector is the highest. Uganda and Rwanda follow Burundi by having RCA index values which are greater than 50 and 10, respectively. Only in 2013, Rwanda's RCA index was 3.15, whereas in 2002 it was zero because no coffee export value was obtained from the data source. No clearness has proven if in the particular year the country exported no coffee to the EU or if data was just not provided. In contrast, Tanzania has the least mean value among the selected EAC countries, revealing least RCA toward the coffee sector under EBA preferential regime. Besides, the less mean value of Tanzania relative to other EAC coffee-growing member states trading under EBA, the country still has a comparative advantage in the coffee sector. The important and noticeable point is that in Figure 4 there is a variation in RCA values for all countries showing increase and decline of coffee export in the EU market but their values are not less than one to imply comparative disadvantage.

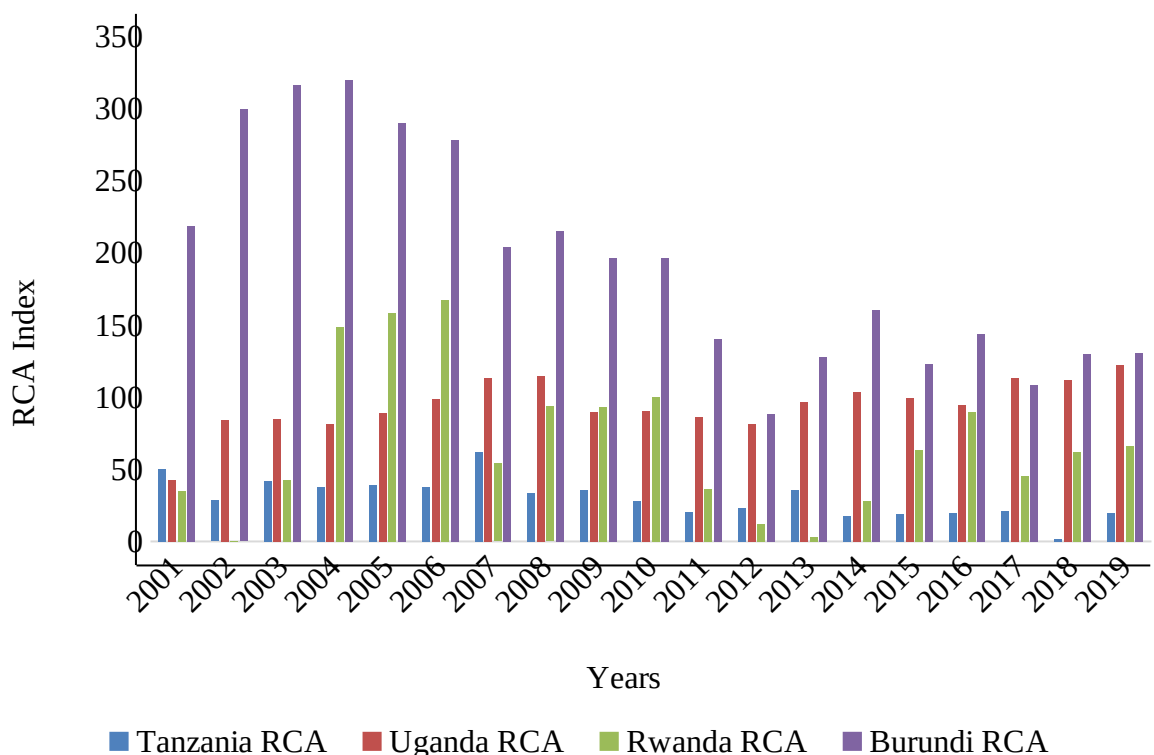


Figure 4: RCA Index for each country in exporting coffee in the EU during EBA

Source: Author's computations based on WITS-UN COMTRADE database

The large RCA index levels for Burundi depict that the country's total exports to the EU are dominated much by the coffee products, whilst, least RCA index levels for Tanzania imply that coffee does not possess a large portion of its export to the EU market. Figure 5 shows the level of coffee and total exports by each country during the EBA.

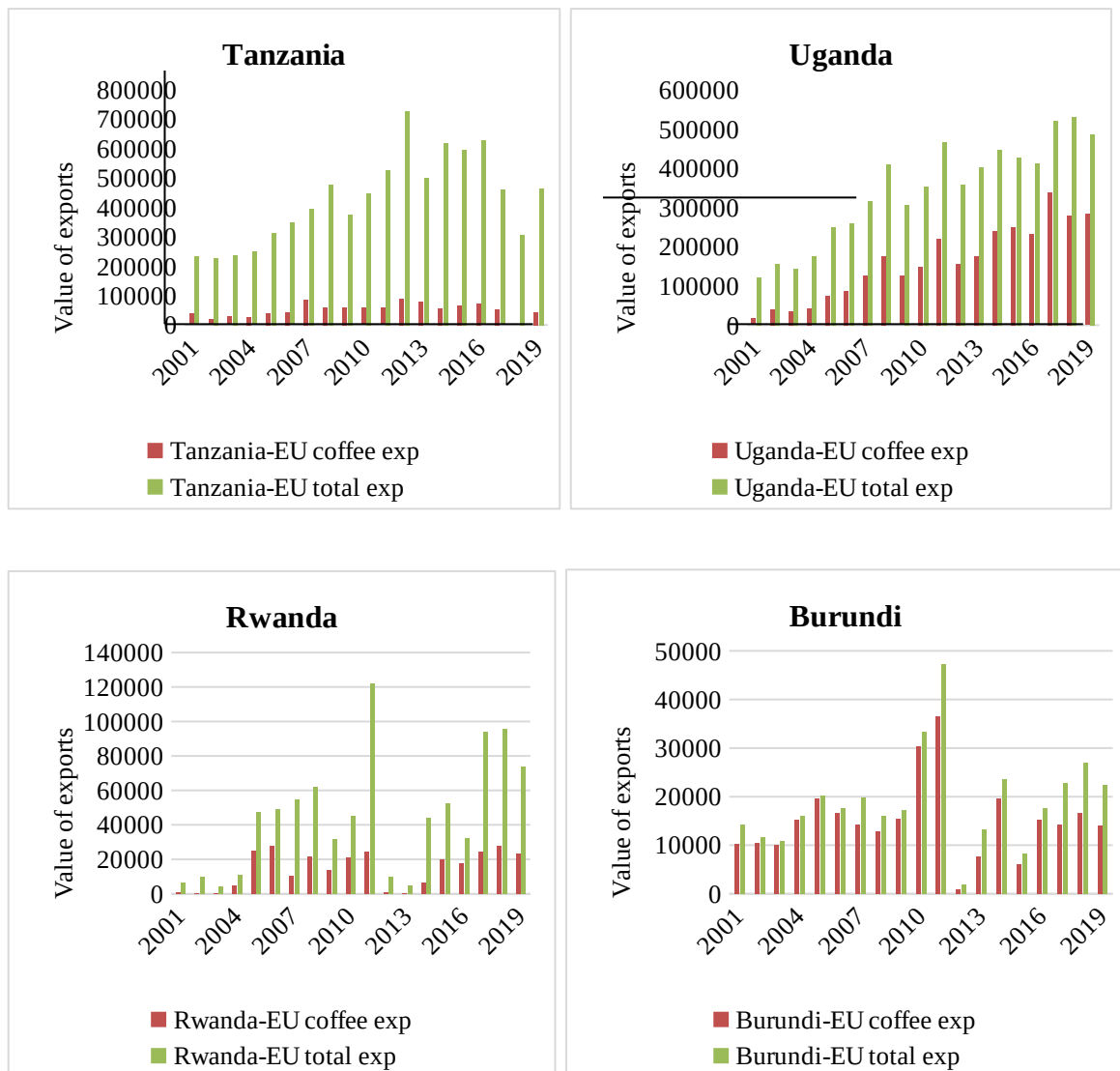


Figure 5: Value of coffee and total exports by each country during EBA

Source: Author's computations based on WITS-UN COMTRADE database

Despite Tanzania coffee having a comparative advantage in European Union market, Chingarande *et al.* (2013) findings on comparative advantage and economic performance of EAC member states advocate that in the world market coffee is none of the top 10

products with highest RCA in Tanzania. Moreover, EBA preferential trade regime in terms of coffee export is less beneficial to all selected EAC countries, since it shows that with trade preference under EBA, their RCA indexes decreased compared to those before the regime, hence export less coffee in the EU market than expected that it will increase as the regime released transaction costs which were restricting the trade flows.

The findings of this study go in mark with those of Mwasha and Kweka (2014), which reveals that in all years of their study (2009-2012), coffee, tea, mati and spices sector and coffee commodity with HS code 09 and 0901, respectively, experienced the RCA scores of greater than one. With these results, coffee contributes to the strength of the sector in the world market as it can stand itself from the competition with other related commodities in the international market. Mwasha and Kweka (2014) hit on the fact from Chingarande *et al.* (2013) that though coffee has $RCA > 1$, still is out of top 10 commodities with highest RCA exported to the world market from 2009 to 2012.

Burundi export shares 78.01% on average of the country's total export to the EU market and this percentage accounts for its foreign earnings from trade flows with EU in 2001 to 2019 (Figure 6). Beside Burundi, in the Ugandan coffee export share accounts 41.91% on average of its total export earnings from the EU under the EBA. Rwanda and Tanzania serve 28.45% and 12.13% on their total export earnings from the EU, respectively.

The export share of 78.01% on average of Burundi is higher than the rest of EAC selected countries, revealing that total export of Burundi to the EU is occupied by coffee product. However, for Tanzania, only 12.13% on average of its total export to the EU is contributed by coffee product and 87.87% of its total export is dominated by other products.

With these results it means EU is not a priority market for coffee from Tanzania. Statistics show coffee production in Tanzania is satisfactory and export kept on improving but export to the EU market is decreasing. For instance for three years 2016, 2017 and 2018 the average share of coffee in Tanzania total export to the EU market was 10.47% but the average share of Tanzanian coffee in its total export to Japan in respective years was 47.95% (International Trade Centre, 2019). Hence, Tanzania export more coffee in Japan than in the EU considering that EU consists of 28 member states.

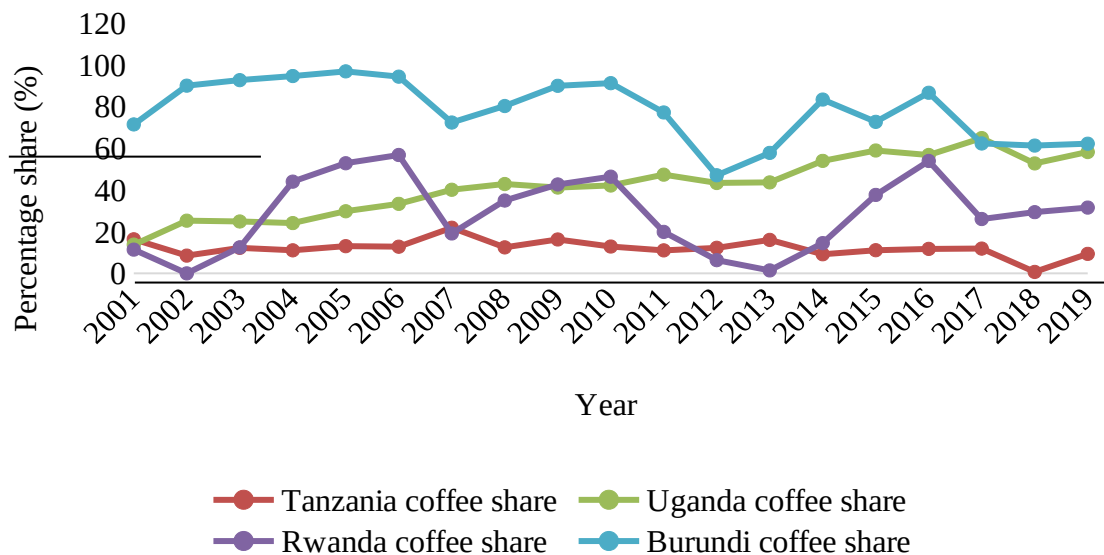


Figure 6: Coffee export as a percentage of country's total export to the EU

Source: Author's computations based on WITS-UN COMTRADE database

4.4 Effect of EBA on Tanzanian Trade Performance

4.4.1 Diagnostic tests

Diagnostic tests were performed to determine if the gravity model could be estimated using Ordinary Least Squares (OLS) or using PPML for country pairs fixed effect. The decision on the method to be used for estimation is based on the undertaken tests.

Testing the normality was done to know whether the results mean is a true representative value of the data or not. Normality of data can be assessed using numerical or graphical methods. Both methods were applied in this study. Normal distribution of the data was tested using a Shapiro-Wilk test it is appropriate in small sample size ($n < 50$) and more powerful in detecting the non-normality. The test assumed the null hypothesis: the data are normally distributed and alternative hypothesis: the data are not normally distributed. Hence the test rejected the null hypothesis that data were normally distributed. For the graphical method, the Q-Q (quantile-quantile) plot was applied. Results shown in appendix 4 and 5 indicates non-normality of data.

Since data are statistically different from zero, rank-based correlation coefficients were estimated by Spearman, which is special for non-parametric correlation. The test is suitable in estimating the correlation of the data that are obtained from the bivariate normal distribution. Results show that export and GDP of exporters and importers are positively correlated. The study found a determinative association of population of exporters and importers. The increase in population is associated with an increase in supply in the country of origin and a rise in demand in the destination part. By contrast, correlation of export and distance between EAC and EU 28 countries are inversely associated, documenting that distant countries trade less, conceivably because trade costs between them are higher (Appendix 6 denotes).

Test for heteroscedasticity was performed with the aid of the numerical method. The study used the Breusch-Pagan test to detect the validity of the homoscedasticity assumption of OLS. The test assumed the null hypothesis of homoscedasticity and the alternative hypothesis of no constant variance. The test found the presence of

heteroscedasticity hence lead to the rejection of the null hypothesis of homoscedasticity with a p-value of $2.2e-16$. The test results referred in Appendix 7.

The presence of autocorrelation was also performed. The study tested if the error term of one trade flow is correlated with the error term of another trade flow and Breusch-Godfrey test was applied. The study assumed no correlation and if by chance such a correlation is observed, it is referred to as autocorrelation. As shown in Appendix 8, the results indicate the existence of no serial correlation, hence the test failed to reject the null hypothesis with a p-value of 0.5759.

Endogeneity is the correlation between independent variable and the error term. Given the endogeneity, we cannot isolate the impact of independent variable on dependent variable and that of error term on the dependent variable. Endogeneity results to a biased and inconsistent OLS estimators.

4.4.2 Gravity model estimation

In analyzing the effect of the EBA, the study estimated gravity model using PPML and results are shown in Table 3. The coefficients of the augmented gravity variables are presented in Table 3 with some of them having the expected signs while others do not. The study can conclude that there is a major difference between the results obtained by OLS (OLS results appear in Appendix 9) and that of PPML. This implies that zero trade flows have a major impact on the estimates.

4.4.2.1 Burundi coffee exports to EU

Burundi's Gross Domestic Product (GDP_i), its population (POP_i), distance between Burundi and trading partners (DIST_{ij}) and exchange rate found to be significant factors

affecting Burundi's coffee export to the EU in the period between 1995 and 2019. Partner country's Gross Domestic Product (GDP_j), partner country's population (POP_j) and EBA are found to be insignificant in affecting Burundi's coffee export to the EU under the study period.

An increase in Burundi's GDP has a positive and significant effect on the performance of Burundi's coffee export as 1% increase in Burundi's GDP increases coffee export value by 2.4% at 1% statistical significant level. The positive causality has depicts the ability of Burundi to supply coffee in the EU. The result is consistent with the study conducted by Mwambe *et al.* (2019) which aimed at analyzing the impact of Economic Partnership Agreement (EPA) on EAC trade with EU. The study indicated that GDP of Burundi have a positive and statistically significant effect on country's coffee export performance at 95% confidence interval.

GDP of EU countries was found to be negatively related to coffee exports with statistically insignificant coefficient. This implies that it is unfavorable in influencing the trade flow between Burundi and EU countries. This is in contrast to the expectations of causality direction under gravity model where the economic size of the importer is expected to influence bilateral trade. Also, Mwambe *et al.* (2019) estimated the results with similar direction of causality. Meaning that GDP of EU was found to be statistically insignificant negatively related to Burundi's exports. Lohani (2020) stated that Engels's law allows for GDP in the destination country influence on demand for imports, hence it might be possible for GDP_j coefficient to be negative.

The impact of Burundi's population on trade performance is negative and statistically significant. 1% increase in Burundi's population tends to decrease trade flows by 8.5%.

This depicts the fact that negative coefficient of the country's population suggests a weak net effect of country size on exports and as it gets bigger, the country export less. The results was supported by the study of Emmanuel (2016) who found that exporting country's population was negatively determining the bilateral trade among African countries but its coefficient was statistically insignificant.

The coefficient of population variable of trading partner of Burundi is positive and insignificant, hence less valuable in determining Burundi's trade performance under the study period. The results contrast that of Emmanuel (2016) who obtained significant coefficient of importer population variable in determining bilateral trade flows between African countries. To consider the distance variable' it shows a significant negative sign at 5% as expected. As can be understood from the result, at *ceteris paribus*, a 1% increase in distance between Burundi and partner country will decrease Burundian coffee export by 2.4%. This implies that as trading partners gets far, reduces import demand by rising the goods price resulted from higher transport costs. Nsabimana and Tirkaso (2020) found the same results in their study of examining coffee export performance in Eastern and Southern African countries.

The effect of exchange rate on Burundi's bilateral trade is positive and statistically significant at 1% level. This is theoretically consistent and therefore, it has effect on the exports of coffee of Burundi. The coefficient of nominal exchange rate indicates that a 1% depreciation in the exporter country leads to 0.8% increase in bilateral trade flows. This follows the evidence in Abafita and Tadesse (2021).

For the first time in the EAC region, the impact of EBA on bilateral trade flows is analyzed. The results suggests that the impact of Burundi to trade under EBA makes a big

difference, it decreases coffee exports by 24% $[(\exp(-0.27)-1)*100\%]$ less than non-EBA countries but its impact is not determinative in influencing bilateral trade flows. This is in contrast to expectations of augmented gravity model where under duty and quota free market arrangements countries are expected to trade more.

Table 3: Poisson Pseudo Maximum Likelihood (PPML) estimates of gravity model
Dependent variable: X_{ij}

Variable	Burundi	Rwanda	Tanzania	Uganda
Intercept	7.0773	-24.1471	62.4464*	72.9755*
Ln(GDP _i)	2.3683**	0.2849	1.2674	7.6103***
Ln(GDP _j)	-0.4871	0.7439	1.5430***	0.9918
Ln(POP _i)	-8.4734**	-3.0045	-4.7063	-11.7159***
Ln(POP _j)	0.5311	-0.7928	-0.7876**	0.3117
Ln(DIST _{ij})	-2.3806*	-5.0484*	-2.7461**	-7.8256***
Ln(EXCH _{ij})	0.8389**	1.7270*	0.1105	0.5026
EBA	-0.2742	0.6258	-0.7639**	-2.9189**

Statistical significance at *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Source: Author's calculations

4.4.2.2 Rwanda coffee exports to EU

The variables which influence Rwanda coffee trade were distance between Rwanda and trading partners (DIST_{ij}) and exchange rate (EXCH_{ij}). The rest variables had no effects on Rwanda's exports due to statistical insignificant coefficients. The impact of distance between Rwanda and trading partners was negative and that of exchange rate was positive. Both were statistically significant at 5% level. This was compatible with

expectations of the theory and it suggests that these variables were key determinants of Rwanda's coffee export to the EU.

A negative coefficient of distance variable means the greater the distance the higher the transport costs and the higher the trading price, hence reduces the import ability since its costful to consume coffee as trading partners gets distant from Rwanda. An increase in exchange rate depicts the devaluation of Rwanda's currency as a result exports of coffee will become cheaper. These results are similar to those presented in Umutesi (2018) who failed to reject the hypotheses that geographical distance affects negatively Rwanda's trade and exchange rate variable affect positively the trade between Rwanda and its trading partners. Also, this is consistent with findings from Nsabimana and Tirkaso (2020) and Oparanya *et al.* (2019).

The coefficient of Rwanda and its trading partners' GDP are statistically insignificant with expected theoretical signs. This means that Rwanda and its trading partners' economic sizes are not considerable in influencing coffee sector trade performance in Rwanda, hence are economically meaningless in this study. The result of Rwanda's GDP is compromising that of Nsabimana and Tirkaso (2020), Oparanya *et al.* (2019) and Mwambe *et al.* (2019) who obtained positive and statistically significant GDPi coefficient. The trading partners' GDP result was similar to those of Mwambe *et al.* (2019) who found non statistical significant coefficient although was positive.

Estimation results of augmented gravity model reveal that Rwanda's coffee export to EU was negatively affected by its population and trading partners' population. The negative coefficients sign of Rwanda and trading partners' population imply negative effect on a unit change in the country's coffee export to EU. A 1% increase in Rwanda and trading

partners' population will reduce coffee export value by 3% and 0.8%, respectively insignificantly at all levels of significance. The studies of Oparanya *et al.* (2019) and Nsabimana and Tirkaso (2020) found a negative and statistical significant effect of exports population in trade flows, therefore, contradict this study. This means as exporters' population increases the local market size of that product increases too, hence reducing its exportation. The study of Oparanya *et al.* (2019) provides similar results as of this study. The direction of causality of trading partners' population was negative and statistically insignificant. But Umutesi (2018) and Nsabimana and Tirkaso (2020) found a statistical significant effects of trading partners' population in export flows as it represent the market size.

The EBA variable was not significant, which means the agreement terms need to be sorted or this reveal that EBA trading regime is non considerable factor in Rwanda's coffee export to the EU although it yield the positive sign as expected but is insignificant. The EBA cannot affect Rwanda's coffee export value due to the fact that the country is underutilizing the preferential agreement. This reveals that given a particular trade preference without meeting its trading terms and conditions cannot increase the export to the particular destination.

4.4.2.3 Tanzania coffee exports to EU

Results indicate that the national income of Tanzania was insignificant at all levels, while that of importers was highly significant at 0.1% level. Thus implies that income of the importing country carries more weight in influencing bilateral trade than the income of Tanzania. This contrast Mwambe *et al.* (2019) who show that the income of importing country was insignificant in determining Tanzania export to the EU.

Population of Tanzania was insignificant and that of importing country was statistical significant at 1% level. Increase in importers' population tends to decrease per capita income, hence causes total demand on imports to decrease. If the population of trading partner country increases by 1%, Tanzania coffee trade value will step down by 0.8%. Distance and EBA were significant at 1% level, while exchange rate was insignificant at 0.1%, 1% and 5% levels. Results suggest that bilateral trade between Tanzania and EU countries is negative and significant driven by distance between trading partners. These findings are not only broadly agreed with gravity theory but also consistent with other research findings across these countries. Oparanya *et al.* (2019), Pasara and Dunga (2020), Mahona and Mjema (2014) found the similar results.

Depreciation of Tanzania currency has no any economic impact in Tanzania bilateral coffee exports although it has positive sign. This was contradicted the findings of Abafita and Tadesse (2021) who show that depreciation of exporter's currency will increase more export flows. The study found that EBA preference system have a negative and significant impact on coffee exports. It decreases export from Tanzania by 53%. This implies that Tanzania traded coffee to the EU below the expected level as compared to non-EBA countries.

4.4.2.4 Uganda coffee exports to EU

As can be understood from the above PPML results, exporter gross domestic product (GDP_i), exporter population (POP_i), the distance between Uganda and trading partner (DIST_{ij}) and EBA dummy variable are found to be statistically significant determinants affecting Uganda's coffee export to the EU 28 countries in the period 1995 to 2019. Meanwhile, importer gross domestic product (GDP_j), importer population (POP_j) and the exchange rate between Ugandan shilling (UGX) and partner's currency (EXCH_{ij}) are

found to be insignificant in affecting Uganda's coffee export to the EU 28 member states under the study period.

From the results, exporter GDP tend to have a positive significant effect on Uganda's coffee export performance. At ceteris paribus, a 1% increase in Uganda's GDP would increase by 7.6% in country's coffee export. The results was similar of Mwambe *et al.* (2019) who show that real GDP of Uganda had positive and highly significant coefficient.

Partner's GDP is also found to have a positive coefficient but with statistically insignificant effect in coffee trade determination. This implies that increase of partners' income has no economic meaning in influencing Uganda coffee bilateral trade with EU. This study supported by Mwambe *et al.* (2019) who found the same insignificant coefficient but with negative direction of causality.

Exporter's population is found to be significant at 0.1% significant level with a negative impact on Ugandan coffee export. A 1% increase in the population of Uganda would affect its coffee export by 11.7%. This depicts the fact that negative coefficient of the country's population suggests a weak net effect of country size on exports and as it gets bigger, the country export less. The results was supported by the study of Emmanuel (2016) who found that exporting country's population was negatively determining the bilateral trade among African countries but its coefficient was statistically insignificant.

Furthermore, the partner's population has an insignificant positive effect in influencing bilateral trade between Uganda and trading partners. This means importers' market size does not matter in influencing Uganda's coffee export to EU. This finding is compared by those of Pasara and Dunga (2020) who employed the augmented gravity model to

determine the trade creation and trade diversion effects of economic integration and found that importers' population was less influential.

The distance between Uganda and trading partner countries is revealed to be negative and statistically significant at 0.1% which agreed with the basic gravity model. This implies that Uganda will trade less with further countries but it will trade more with countries which are closer to her. This findings are similar to that of Pasara and Dunga (2020), Mahona and Mjema (2014), Umutesi (2018), Nsabimana and Tirkaso (2020) who estimated the similar negative and significant distance variable in determining bilateral trade flows.

Appreciation of Uganda trading partners' currency has no any impact in influencing coffee trade flow although it was positive but does not influence anything in the study. This was contradicted the findings of Abafita and Tadesse (2021) who show that depreciation of exporter's currency will increase export flows.

The impact of EBA on coffee exports is found to be negative and significant at 1% significant level. This result is dissimilar with the augmented gravity model. The model expected positive causality of EBA variable in bilateral trade flow attributed by coffee export to EU. From the results, Uganda is 95% less than non-EBA countries in exporting coffee to the EU.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Overview

The study assesses the comparative advantage and trade performance of selected EAC countries trading coffee under EBA export regime. The specific objectives were (i) to analyze the comparative advantage of selected EAC countries trading coffee in the EU market before EBA export regime (ii) to analyze the comparative advantage of selected EAC countries trading coffee in the EU market during EBA export regime (iii) to analyze the effect of EBA on selected EAC countries' trade performance attributed by coffee export in the EU market over the period of study. Therefore, this chapter directs itself at presenting conclusion stemming from major findings of the study, giving recommendations and policy implications on how to strengthen the coffee sector in selected EAC countries.

5.2 Conclusions

The study analyzed the comparative advantage of the selected EAC countries; Tanzania, Uganda, Rwanda and Burundi which are trading with the 28 EU countries under the same preferential agreement, EBA. To apprehend the effect of EBA in comparative advantage, the study analyzed the comparative advantage of the selected countries before and during the EBA regime. To get the clear effect of the regime, Balassa RCA index has been employed to analyze exports of the coffee sector from 1995 to 2000 before EBA and from 2001 to 2019 during EBA as two separate periods.

According to analysis selected EAC countries coffee export performance is subsequently decreasing as it was found that their RCAs indexes during EBA regime were less than

though before EBA although was not less than one. The study has revealed that Burundi having the highest RCA scores in both separate periods, means that coffee dominates the country's exports to the EU market, it followed by Uganda and Rwanda. Furthermore, the results imply that Tanzania having least RCA scores compared to other EAC member states, it means that coffee occupies a small portion of the country's total exports to the EU market. Therefore, EU is not a major market of coffee from Tanzania, since its exports to the market is dominated by other products.

This study also attempted to analyze the EAC selected countries performance with respect to coffee trade to the 28 EU countries. Thus, the study tested the hypothesis that the EBA initiative stimulates EAC countries' coffee export flows to the EU market. To test this hypothesis, this study attempted to conduct an empirical analysis of the augmented gravity model of trade for EAC selected countries' direction of trade with 28 EU countries over the period 1995 to 2019. The study used the panel data at a product level as Lohani (2020) suggested that product level analyses are required to explore additional trade benefits. Therefore, the results validated the augmented gravity model in the context of selected EAC countries.

The analysis indicates that exporters GDP has positive impact on Burundi and Uganda coffee exports to EU but also Rwanda and Tanzania were positively impacted although the coefficients were statistically not significant at all levels. Only Tanzania coffee exports to the EU was impacted positively and significantly by GDP of importers. Rwanda and Uganda coffee exports were affected positively but insignificant while Burundi coffee export was impacted negatively statistically insignificant. Population of selected EAC countries affected their coffee export to EU negatively but only Burundi

and Uganda affected by their population negatively and significantly, whereas, Rwanda and Tanzania affected negatively but statistically not significant.

Tanzania and Rwanda coffee exports to EU influenced by importers' population negatively but only the effect on Tanzania was significant. Burundi and Uganda were affected positively and statistically insignificant. All selected EAC countries were impacted negatively and statistically significant by distance with their trading partners. This implies that distant trading partners are likely to trade less with these countries than closer countries as high distance implicate high transport costs.

Moreover, exchange rate had positive impact on increasing coffee export to all selected EAC countries but is statistical significant only to Burundi and Rwanda. This reveal that their currency depreciation influence coffee trade with 28 EU countries. The results found that preferential trade agreements under EBA have a negative effect on coffee export performance of the selected EAC countries. This implies that during EBA Tanzania and Uganda were trading below the expected level compared to the non-EBA countries. This findings thus defeats the aim of EBA of increasing trade exports for LDCs at individual countries level.

5.3 Recommendations

The key recommendations provided by the study to enrich EAC selected countries trade performance are as follows:

- i. Since RCAs indexes of selected EAC countries were less during EBA than before, countries are advised to revise EBA terms and conditions especially that of "Rule of Origin" which is reported as a major obstacle for most countries to utilize trade preferences agreements.

- ii. EAC countries can focus in developing good infrastructures to reduce transport costs with their trading partners, hence boost the export performance.
- iii. EBA may facilitates more exportation of green coffee. This benefit more EU members than EAC countries. Complementary policies should be adopted to correct EBA terms and conditions, since this defeats the whole purpose of the EBA.
- iv. To reduce the effects of any future uncertainties of these given preferential agreements, would be significant for EAC countries to seek opportunities of diversifying their exports.
- v. EAC countries can keep more emphasize on using improved coffee seeds, good farming methods and investing in advanced farming technologies to increase production, since we gain more foreign earnings by exporting more green coffee than roasted and grounded coffee. This will attract more local and foreign investment in the sector.

REFERENCES

- Abafita, J. and Tadesse, T. (2021). Determinants of Global Coffee Trade; Do RTAs Matter? Gravity Model Analysis. *Cogent Economics and Finance* 9(1): 1-22.
- Abtew, M. A. (2015). Revealed Comparative Advantage of Ethiopian Leather Industry with Selected African Economies. *International Journal of Business and Economics Research* 4(5): 229–237.
- Abtew, M. A. (2017). Revealed Comparative Advantage of Footwear Industry: An Empirical Analysis for Selected African Countries. *International Research Journal of Business and Management-IRJBM* X(13): 57–73.
- Bobkov, B. (2012). Gravity model estimation using panel data - is logarithmic transformation advisable?. Unpublished Dissertation for Award of Master Degree at Charles University in Prague. 58pp.
- Brenton, P. (2003). Integrating the Least Developed Countries into the World Trading System: The Current Impact of EU Preferences under Everything But Arms. *Journal of Chemical Information and Modeling* 53(9): 1689–1699.
- Cernat, L., Laird, S., Monge-Roffarello, L. and Turrini, A. (2003). The EU's Everything But Arms Initiative and the Least-Developed Countries, WIDER Discussion Papers, No. 2003/47, February. 64pp.

- Chingarande, A., Mzumara, M. and Karambakuwa, R. (2013). Comparative Advantage and Economic Performance of East African Community (EAC) Member States. *Journal Economics* 4(1): 39–46.
- Dunn, R. M. and Mutti, J. H. (2004). *International Economics* (Sixth Edition). Routledge, London and New York. 544pp.
- Dyegula, N., and Lwesya, F. (2018). Trade Liberalisation in SADC and the Economic Benefits of Belonging to an RTA : The Case of Tanzania. *Studies and Scientific Researches. Economics Edition* (27): 56–74.
- East African Community (2016). *East African Community Vision 2050: Regional Vision for Social-Economic Transformation and Development*. EAC Secretariat, Arusha, Tanzania. 112pp.
- Eastern African Community (2019). High Level Conference on Trade Integration 2019: Enhancing Trade Integration in East African Community. In: *Proceedings of East African Community (EAC) Conference*. 25th -27th September 2019, Nairobi, Kenya. 74pp.
- Eggers, A. R. (2017). The Trade Effects of Graduation in the EU's GSP Scheme. Unpublished Dissertation for Award of Master Degree at Lund University. 48pp.
- Emmanuel, S. A. (2016). The Determinants of Bilateral Trade Between African Countries based on Regional Trade Agreements: A Gravity Model Approach. Unpublished Thesis for Award of Master Degree at KDI School of Public Policy and Management. 45pp.

European Commission. (2019). List of Generalized System of Preferences (GSP) beneficiary countries. [<https://ec.europa.eu/trade/policy/countries-and-regions/development/generalised-scheme-of-preferences/>] site visited on 22/8/2020.

European Union (2021). The 28 countries of the EU. [https://europa.eu/european-union/about-eu/countries_en] site visited on 5/5/2021.

Farrer, J. (2019). Tea and Coffee Merchants; Top 10 coffee producing countries around the world. [<https://farrerscoffee.co.uk/top-10-coffee-producing-countries-around-the-world/>] site visited on 02/04/2020.

Geda, A. and Yimer, A. (2019). The Trade Effects of the African Continental Free Trade Area (AfCFTA): An empirical analysis. *ResearchGate*. 47pp.

Gómez-Herrera, E. (2013). Comparing alternative methods to estimate gravity models of bilateral trade. *Empirical Economics* 44(3): 1087–1111.

Gradeva, K. and Martínez-Zarzoso, I. (2016). Are Trade Preferences more Effective than Aid in Supporting Exports? Evidence from the ‘Everything But Arms’ Preference Scheme. *World Economy* 39(8): 1146–1171.

Gradeva, K. and Martínez-Zarzoso, I. (2010). The Role of the Everything But Arms Trade Preferences Regime in the EU Development Strategy. In: *Proceedings of the German Development Economics Conference*, Hannover 2010, No. 42, Verein für Socialpolitik, Ausschuss für Entwicklungsländer, Göttingen. 31pp.

Gupta, M. and Kumar, H. (2017). Revealed Comparative Advantage : An Analysis of Exports of Rwanda. *IOSR Journal of Economics and Finance (IOSR-JEF)* 8(3): 69–76.

Holmgren, E. (2012). EU Trade Preferences and Developing Countries: A Gravity Model Investigation of the Everything But Arms Treaty. Unpublished Thesis for Award of Bachelor Degree at Jönköping University. pp1 - 26.

Huan-Niemi, E. and Kerkelä, L. (2006). Winners and Losers in the World Sugar Market due to Trade Liberalisation in the EU Sugar Sector. *Suomen Maataloustieteellisen Seuran Tiedote* 21: 1–7.

International Coffee Organization. (2015). Sustainability of the coffee sector in Africa, International Coffee Council Report. 2 - 6 March, 2015, London, United Kingdom. 29pp.

International Coffee Organization. (2019). World Coffee Market Report. [<http://www.ico.org>] site visited on 12/4/2020.

International Trade Centre (2020). List of importing markets for a product exported by Tanzania, United Republic of Product: 0901 Coffee, whether or not roasted or decaffeinated; coffee husks and skins; coffee substitutes containing coffee in any proportion. [https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1%7c834%7c%7c%7c0901%7c%7c%7c4%7c1%7c1%7c2%7c2%7c1%7c2%7c1%7c1%7c1] site visited on 16/12/2020.

- Katunze, M. and Kuteesa, A. (2016). Uganda's Revealed Comparative Advantage in COMESA. *Journal of Sustainable Development* 9(3): 192–207.
- Krugman, P. R. and Obstfeld, M. (2003). International Economics: Theory and Policy. In D. Clinton, J. Tufts, J. Rigney, and A. Basso (Eds.), Pearson Education, Inc. (Sixth Edit). Elm street publishing services. 737pp.
- Linnemann, H. (1966). An econometric Study of World Trade Flows. North-Holland Publishing Co., Amsterdam. 234pp.
- Lohani, K. K. (2020). Trade Flow of India with BRICS Countries: A Gravity Model Approach. *Global Business Review* 2020: 1–18.
- Mahona, B. K. and Mjema, G. D. (2014). Determinants of Tanzania and Kenya Trade in the East African Community; A Gravity Model Approach. *Journal of Economics and Sustainable Development* 5(4): 13-23.
- MARKUP. (2019). EU-EAC Market Access Upgrading Programme. [<https://www.eacmarkup.org/products/coffee>] site visited on 14/4/2020.
- Markusen, J. R., Melvin, J. R., Maskus, K. E. and Kaempfer, W. (1995). *International Trade: Theory and Evidence*. In S. D. Stratford and L. H. Sutton (Eds.), McGraw-Hill, Inc, New York. 248pp.
- Mimouni, M., Fontagne, L. and Von Kirchbach, F. (2007). Trade Performance Index. ITC's Market Analysis Services. 54pp.

- Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C. and Keshri, A. (2019). Descriptive Statistics and Normality Tests for Statistical Data. *Annals of Cardiac Anaesthesia* 22(1): 67–72.
- Mkenda, B. K. (2014). Tanzania's Revealed Comparative Advantage and Structural Transformation. *Botswana Journal of Economics* 12(1): 59–81.
- Mtaki, B. (2017). Tanzania Coffee Annual Report. FAS, Dar es Salaam, Tanzania. 4pp.
- Muchanyuri, B. and Mzumara, M. (2013). Inter-Sectoral Comparative Advantage of Tanzania and Impact on International Purchasing. *Greener Journal of Business and Management Studies* 3(8): 361–368.
- Mwasha, N. A. and Kweka, Z. (2014). Tanzania in the Face of International Trade : The Analysis of Revealed Comparative Advantage from 2009 to 2012. *International Journal of Business and Economics Research* 3(1): 15–28.
- Mwambe, G., Ally, Z. and Prasad, D. (2019). The Impact of the Economic Partnership Agreement on East African Community Trade with European Union; A Gravity Model Approach. *Journal of Economics and Sustainable Development* 10(10): 199-209.
- Mzumara, M., Chingarande, A. and Karambakuwa, R. (2012). An Analysis of the Revealed Comparative Advantage in Southern African. *Journal of Sustainable Development in Africa* 14(8): 53–74.

- Ndayitwayeko, W. and Ndimanya, P. (2015). Dynamics of Tea Trade Competitiveness in EAC : Evidence from Tea Exports of Burundi. *Journal of Economics and Sustainable Development* 6(12): 154–161.
- Ndayitwayeko, W. M., Odhiambo, M. O., Korir, M. and Nyangweso, P. M. (2014). Comparative Advantage of the Eastern and Central Africa in the Coffee Export Sector : The Case of Burundi. *African Crop Science Journal* 22(Supplement s4): 987–995.
- Nielsen, C. P. (2013). Regional and Preferential Trade Agreements: A Literature Review and Identification of Future Steps. FOI Report, No. 155, Fødevareøkonomisk Institut, Copenhagen. 154pp.
- Nsabimana, A. and Tirkaso, W. T. (2020). Examining Coffee export Performance in Eastern and Southern African Countries; do Bilateral Trade Relations Matter? *Agrekon* 59(1): 46-64.
- Obadi, S. M. (2012). *Yemen's Revealed Comparative Advantage vis-à-vis both the EU and the USA* (No. 35; ISSN 1337-5598 (Elektronická Verzia)).
- Oparanya, A. W., Mdadila, K. P. and Rutasitara, L. K. (2019). The Determinant of Bilateral Trade in the East African Community; Application of the Gravity Model. *International Journal of Economics and Finance* 11(4): 1-15.
- Parasa, M. T. and Dunga, S. H. (2020). Trade Creation and Diversion Effects in the Tripartite Region; A Gravity Approach. *International Journal of Economics and Finance Studies* 12(2): 168-183.

- Salvatore, D. (2013). *International Economics*. In: J. Hollenbeck, J. Manias, E. Horowitz, and S. Hong (eds.): 11th Edit. John Wiley and Sons, Inc. New York. 836pp.
- Santos Silva, J. and Tenreyro, S. (2006). The Log of Gravity. *The Review of Economics and Statistics* 88(4): 641–658.
- Sheikh, M. R., Kattumuri, R., Chaudhry, I. S. and Kumar, A. (2019). What Determines Bilateral Trade Flows? Evidence from ECO Region. *Review of Economics and Development Studies* 5(1): 165–182.
- Shepherd, B., Doytchinova, H. and Kravchenko, A. (2019). The gravity Model of International Trade: *A User Guide [R version]*. Economic and Social Commission for Asia and the Pacific. 68pp.
- Smit, A. J. (2010). The Competitive Advantage of Nations: is Porter ' s Diamond Framework a new theory that explains the international competitiveness of countries ? *Southern African Business Review* 14(1): 105–130.
- Szenthe, A. (2019). Top Coffee Producing Countries. [<https://www.worldatlas.com/articles/top-coffee-producing-countries.html>] site vsited on 20/4/2020.
- Tanzania Coffee Board. (2012). Tanzania Coffee Industry: Development Strategy 2011/2021. 64pp.
- Tanzania Coffee Board. (2019). Tanzania Coffee Industry Profile. [<http://coffeeboard.or.tz>] site visited on 7/4/2020.

Tinbergen, J. (1962). An analysis of World Trade Flows. Shaping the World Economy. New York Twentieth Century Fund. 27-30pp.

Umutesi, M. S. (2018). An Analysis of the Causative Factors of Trade Flows between Rwanda and its main Trading Partners; East Africa Research Papers in Economics and Finance. 34pp.

UN-International Trade Statistics (2018). Harmonized Commodity Description and Coding Systems (HS). [<https://unstats.un.org/unsd/tradekb/Knowledgebase/50018/Harmonized-Commodity-Description-and-Coding-Systems-HS>] site visited on 5/5/2021.

World Bank (2010). Belarus Trade Performance and Competitiveness. Poverty Reduction and Economic Management Unit. European and Central Asia Region. 45pp

Yu, D. (2008). The Harmonized System-Amendments and their Impact on WTO Members' Schedules. World Trade Organization, Economic Research and Statistics Division. 25pp.

APPENDICES

Appendix 1: Variables and Data sources used in RCA computation

Variable	Description	Unit of measure	Data source
Dependent variable			
RCA_{ij}	Revealed Comparative Advantage of country i for product j		
Independent variable			
X_{ij}	Export of good j by country i in the EU (i=1, 2, 3, 4)	Current USD Thousand	WITS database (http://wits.worldbank.org) UNCTAD database (http://unctadstat.unctad.org)
X_{wj}	World's export of good j in the EU	Current USD Thousand	WITS database (http://wits.worldbank.org) UNCTAD database (http://unctadstat.unctad.org)
X_{it}	Country i's total exports in the EU (i=1, 2, 3, 4)	Current USD Thousand	WITS database (http://wits.worldbank.org) UNCTAD database (http://unctadstat.unctad.org)
X_{wt}	Total world exports in the EU	Current USD Thousand	WITS database (http://wits.worldbank.org) UNCTAD database (http://unctadstat.unctad.org)

Appendix 2: Variables and Data sources used in Gravity model

Variable	Description	Unit of measure	Data source	Expected effect
Dependent variable				
X_{ij}	Export of good i between EAC countries and EU	Current USD Thousand	WITS database (http://wits.worldbank.org)	
Independent variables				
GDP_i	Gross Domestic Products of selected EAC countries ($i= 1, 2, 3, 4$)	Current USD millions	UNCTAD database (http://unctadstat.unctad.org)	(+)
GDP_j	Gross Domestic Product of EU 28 countries ($j= 1, 2, \dots, 28$)	Current USD millions	UNCTAD database (http://unctadstat.unctad.org)	(+)
POP_i	Number of population in selected EAC countries ($i=1, 2, 3, 4$)	Million	World Bank Development Indicators database (http://www.worldbank.org)	(-)
POP_j	Number of population in the EU countries ($j=1, 2, \dots, 28$)	Million	World Bank Development Indicators database (http://www.worldbank.org)	(+)
$DIST_{ij}$	Distance between country i and country j	Kilometer	Distance between cities and places (http://www.distancefromto.net/)	(-)
$EXCH_{ij}$	Exchange rate between EAC countries and the EU countries	Currency	UNCTAD database (http://unctadstat.unctad.org)	(+)
EBA	Everything but Arms dummy	Bilateral variable; 1 if the country is trading under EBA otherwise zero	European Union Website (http://ec.europa.eu)	(+)

Appendix 3: EAC countries exporting under EBA trading regime

Exporter

Burundi

Rwanda

Tanzania

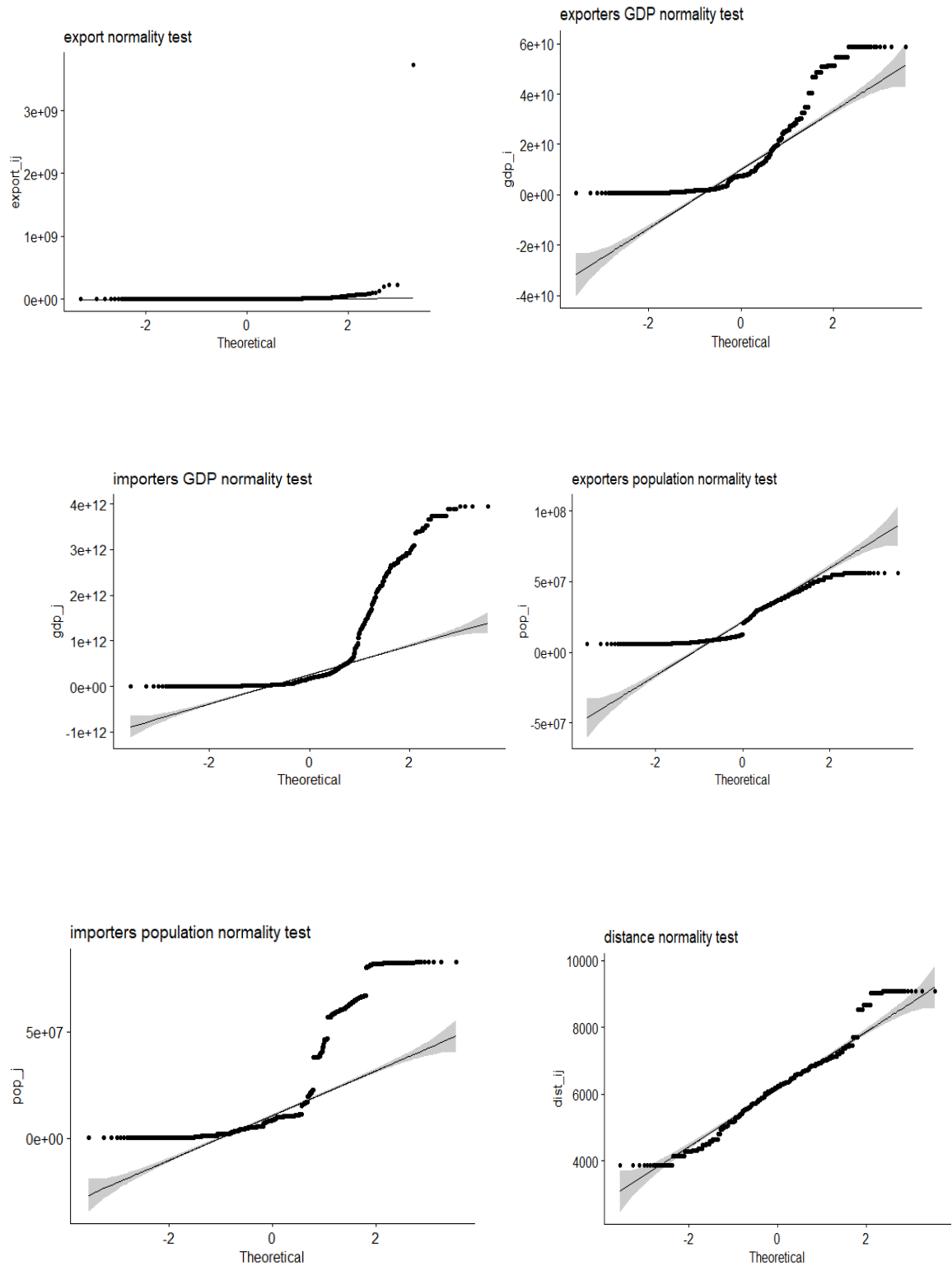
Uganda

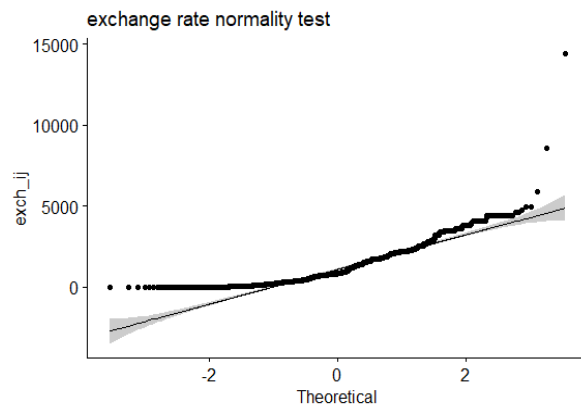
Variable	p-value
Exports	2.2e-16
GDP of exporter	2.2e-16
GDP of importer	2.2e-16
Population of exporter	2.2e-16
Population of importer	2.2e-16
Distance	2.2e-16
Exchange rate	2.2e-16

Appendix 4: Normality test

Source: Author's computations

Appendix 5: Q-Q plots for normality test





Appendix 6: Correlation coefficient

	export_ij	gdp_i	gdp_j	pop_i	pop_j	dist_ij	exch_ij
Export_i	1.000						
j							
gdp_i	0.067	1.000					
gdp_j	0.453	-0.167	1.000				
pop_i	0.055	0.966	-0.192	1.000			
pop_j	0.422	-0.241	0.868	-0.236	1.000		
dist_ij	-0.019	0.152	0.138	0.214	-0.094	1.000	
exch_ij	0.305	0.346	0.231	0.283	0.135	-0.161	1.000

Source: Author's computations

Appendix 7: Heteroscedasticity test

Breusch-Pagan test

data: export_ij ~ gdp_i + gdp_j + pop_i + pop_j + exch_ij + dist_ij + EBA + landlocked_i +
factor(reporter)

BP = 2752.3, df = 10, p-value < 2.2e-16

Source: Author's calculations

Appendix 8: Serial correlation test

Breusch-Godfrey test for serial correlation of order up to 1

data: export_ij ~ gdp_i + gdp_j + pop_i + pop_j + exch_ij + dist_ij + EBA +
landlocked_i

LM test = 0.31284, df = 1, p-value = 0.5759

Source: Author's calculations

Appendix 9: OLS estimates of Gravity model

Dependent variable: Ln(Xij)				
Variable	Burundi	Rwanda	Tanzania	Uganda
Intercept	-15.57734	-68.74351	166.26297****	-31.2711
Ln(GDPi)	0.82611	-1.12942	4.32903***	1.7041**
Ln(GDPj)	-0.07024	0.39579	0.73108**	0.5985
Ln(POPi)	-5.94174	2.01683	-15.86728****	-0.5659
Ln(POPj)	0.20325	-0.07564	-0.04784	0.6568
Ln(DISTij)	11.13788*	6.81015*	0.22615	-1.3487
Ln(EXCHij)	1.09283*	0.65927	0.17928	0.1748
EBA	-0.58674	0.43959	0.03043	-1.3895****
R2	0.4068	0.1814	0.3203	0.4826
F-statistics	7.722***	9.641***	8.26***	21.57***

Statistical significance at ****p<0.001; **p<0.01; *p<0.05

Source: Author's calculations

Appendix 10: Importing countries: EU 28 countries

Importer	
Austria	Italy
Belgium	Latvia
Bulgaria	Lithuania
Croatia	Luxembourg
Cyprus	Malta
Czech Republic	Netherlands
Denmark	Poland
Estonia	Portugal
Finland	Romania
France	Slovakia
Germany	Slovenia
Greece	Spain
Hungary	Sweden
Ireland	United Kingdom