Master's Degree in International Studies(International Area Studies)

ELASTICITY ANALYSIS OF RWANDA'S ECONOMY WITH RESPECT TO EAC COUNTRIES TRADE RELATIONS:

AN EMPIRICAL APPROACH.

August, 2015

Program in International Development Policy

Graduate School of International Studies

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Chris NGUGABE

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THESIS ACCEPTANCE CERTIFICATE

The undersigned, appointed by

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Have examined a thesis entitled

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AN EMPIRICAL APPROACH.

Presented by **Chris NGUGABE**

Candidate for the Degree of Master of International Studies(International Area Studies) that is worthy of acceptance

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ABSTRACT

This dissertation is an empirical study which analyses the elasticity of Rwanda's Economy with respect to EAC countries Trade relations. The study aims at scrutinizing how Rwanda's Economy is responsive with respect to Trade with EAC; and particularly to know if Rwanda's exposure to EAC Trade has been a significant contributor to its Economic Growth.

The study found primarily that there is a positive relationship between Rwanda's Trade with EAC and Rwanda's Economy. Therefore it is certain that Rwanda's Economy and its Trade with EAC move together in the same directions (whether up or down).

Furthermore it was found that Rwanda's Economy (GDP) is inelastic vis-à-vis Trade with the EAC. This means that the elasticity is greater than zero but less than one. Therefore Rwanda's Economy (GDP) responds to changes in Trade with the EAC in the same direction although in smaller proportions.

And finally from the study it was also clear that Rwanda's Economic Growth (GDP Growth) was moderately sensitive with respect to Growth of Trade with the EAC. This means that the relationship between these two variables is not yet a one to one. Therefore Rwanda's Economic Growth (GDP Growth) adjusts somewhat slowly (in the same direction) to the variation in the Growth of Trade with the EAC in the Long Run.

Thus in general Rwanda's exposure to Trade with EAC has been moderately a significant contributor to its Economic Growth.

One major policy implication of these results, as the study emphasizes, is stronger/robust Pro-EAC Trade policies by the Government of Rwanda which will increase Trade with the EAC, above all Rwanda's Exports to EAC, this will have a significant and positive impact on Rwanda's overall Economy particularly its performance with regards to EAC Trade.

Key words: **Rwanda's Economy**, **EAC Trade**, **International Trade**, **Growth Rate**, **Elasticity**.

Student Number: 2013 – 24008

ABBREVIATIONS AND ACRONYMS

AEO: African Economic Outlook

AfDB: African Development Bank

ARDL: Autoregressive Distributive Lag

CET: Common External Tariff

COMESA: Common Market for Eastern and Southern Africa

CM: Common Market

CU: Customs Union

EAC: East African Community

ECCAS: Economic Community of Central African States

GFC: Global Financial Crisis

LDC: Least Developed Countries

MU: Monetary Union

NTBs: Non-tariff barriers

PF: Political Federation

REC: Regional Economic Community

SADC: Southern African Development Community

WB: World Bank

WC: Washington Consensus

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CHAPTER I: GENERAL INTRODUCTION

The Background of the Study

Today, Development is the main aim of any economy. The base of this economic development is economic growth. Economic Growth has always been one of the major concerns of countries and their governments all over the world, and Positive growth rates indicate cumulative increases in real incomes, implying that two countries with similar levels of GDP (Gross Domestic Product) but small differences in growth rates can over time build up large differences in levels of real GDP per capita (Clarence, 2012). One factor frequently designated as a possible source of economic growth is international trade or in other words Foreign Trade.

In the East African region particularly in the EAC (East African Community), closer trade ties are strengthening. In the early 2000s the intra-EAC trade was around only 10% but this percentage was around 25% as of May 2014 as highlighted by the EAC Secretary General Dr. Richard Sezibera at the African Development Bank (AfDB) conference in Kigali-Rwanda, May 20, 2014. Dr. Sezibera further noted that this volume is expected to increase as regional integration is widening and deepening.

He attributed the trend to the reduction of trade barriers within the EAC, which he noted it has consequently reduced the cost of doing business in the region. Citing an example, Dr. Sezibera said it would have previously cost 1,500 US dollars to ship a container from Japan to the Kenyan port of Mombasa and 4,500 dollars to move the same container to Kigali from the port.

"Much of the cost was due to administrative hurdles. The cost (from Mombasa to Kigali) has since gone down by 1,075 dollars," Dr. Sezibera said. The EAC boss called for further removal of Non-Tariff Barriers, saying that the move had proven to be an effective way to ease intra-regional trade.

Although the relationship between trade and growth still a moot issue the flourishing regional integrations whether in Africa or elsewhere seem to signal that the trade-growth link is present and positive.

Rwanda's trade with EAC has been previously analyzed through various studies, such as: The Effects of the East African Community Customs Union on Rwanda by the United Nations Economic Commission for Africa (2012) and the Impact Assessment Study of the EAC Common Market on the Rwanda's Economy by M.A Consulting Group (2011). The main approach of these two studies was analyzing regional Integration stages (Customs Union, Common Market, etc.) therefore a disaggregated approach. However

the present study applies an aggregated approach to this subject by analyzing profoundly the relationship between Rwanda's Economy and Rwanda's Trade with the EAC.

The Empirical Outcomes and Implications of the Elasticity analysis of Rwanda's Economy vis-à-vis EAC (East African Community) Countries Trade Relations will be the special benefits from this Study.

1.1 Statement of the problem

Since Rwanda joined the East African Community (2007) up to the present date (2014) its average economic growth rate is 7.7 % while the share of Rwanda's trade with EAC in its Total Trade with the rest of the World is 33.7 %.

Although, there are some disaggregated studies which mostly focus on the regional integration stages as mentioned above, to date, the relationship between Rwanda's Economy (GDP and GDP Growth) and Rwanda's Trade with EAC on the aggregate level is yet to be explored/Scrutinized.

This is a shortage/gap in information because Rwanda is integrated with these countries for a number of years now but there are no clear statistics or information on how its GDP and GDP Growth behave, or how sensitive they

are vis-a-vis EAC countries trade relations, in this sense the GDP and the Growth rate behaviors are still unclear or unknown.

As a matter of fact, this is exactly the gap which this study seeks to fill.

1.2 Research Objectives

The objectives of this study are divided into general and specific ones.

1.2.1 General objective

Generally this study intends to empirically analyze the Elasticity and Sensitivity of Rwanda's economy when it comes to Rwanda's trade with the EAC in particular.

Then in the conclusion part of this study the researcher will draw/highlight important implications according to the empirical results of the analysis.

In the end all this work is intended to positively impact Rwanda's policy making outcomes when it comes to trade with other EAC Partner States or any other EAC matter.

1.2.2 Specific objectives

The tittle of this study signals that there may be a relationship between Rwanda's GDP Growth and EAC countries trade relations. Therefore the analysis of these two parts of interest will help us understand how EAC trade may be affecting Rwanda's GDP and GDP Growth.

The starting point of this project is to examine if there is a relationship between Rwanda's GDP and GDP Growth and its Trade vis-à-vis EAC Partner States, and then study the depth of that relationship which will be illustrated through Elasticity and Sensitivity analyses.

Let's then elucidate the Specific objectives of this study one by one.

a. Specific objective 1: <u>Elasticity analysis</u> of the relationship

In the principles of economics edition six wrote by the professor of economics at Harvard University N. Gregory Mankiw, He defined elasticity (whether of demand or supply) as a measure of the responsiveness of the quantity demanded or quantity supplied to the change in one of its determinants such as price. He further noted that with the elasticity one can know and measure not only the direction of the responses or effects but also the magnitude as well (N. Gregory Mankiw, 2012).

We import this idea of elasticity into our present study except that we are not dealing with demand, supply or prices but rather with Trade and GDP (s). Therefore we stick to the fundamental idea of elasticity but we divert in the sense of what is influencing the other!

We first "assume" that there is a relationship between the variables. A relationship has to be there for us to be able to analyze the elasticity.

Then, second, there are econometric techniques (such as running logarithmic equations with E-Views[1]) to explore the idea of elasticity as touched up on above which will help us to analyze the responsiveness of Rwanda's GDP with respect to Trade with EAC Partner States.

b. Specific objective 2: Sensitivity Analysis

The second specific objective is to investigate whether Rwanda's exposure to EAC trade has been a significant contributor to Rwanda's Economic Growth. This supposes that there is a positive relationship between Rwanda's Economic Growth and Growth of Rwanda's Total Trade with EAC Partner States.

1.3 Research Questions

This study is centered on the following research questions:

a. How is the relationship between Rwanda's Total Trade with EAC Countries and Rwanda's Economy? (Direction: Positive or Negative).
b. How elastic is Rwanda's Economy (GDP) with respect to EAC Countries Trade Relations (Rwanda's Total Trade with EAC countries)?

[1] E-Views (Econometric Views): is a statistical package for Windows, used mainly for time-series oriented econometric analysis.

c. Further, how Rwanda's Economic Growth (GDP Growth) does behave when it comes to its trade (Growth) with EAC? In other words, how sensitive is Rwanda's GDP Growth with respect to EAC Countries Trade Relations (Growth of Rwanda's Total Trade with EAC countries)?

1.4 Research hypotheses

The present study is founded on the following hypotheses:

1. Following the Trade ties in the East African Community, we expect that Rwanda's GDP will be at least inelastic vis-à-vis Trade with EAC Partner States.

2. There is a Positive relationship between Rwanda's GDP Growth and the Growth rate of Total Trade with EAC Partner States. Therefore, Rwanda's exposure to EAC Trade has been a significant contributor to its Economic Growth.

1.5 Significance of the Study

The significance of this study is grounded on the following reasons:

1.5.1 A Monetary Union Deal in the East African Community (EAC)

The initial work road for the EAC was a Customs Union in 2005, a Common Market in 2010, a Monetary Union in 2012 (already missed!) and a Political Federation in 2015 (Konrad, 2011).

Note that the Monetary Union was supposed to be implemented in 2012, but According to Reuters[2] November 2013, the EAC meeting which took place in Kampala Uganda Saturday, November 30, 2013, Heads of state of Kenya, Tanzania, Uganda, Rwanda and Burundi, who had already signed a Common Market and a Customs Union, signed a protocol laying the groundwork for a monetary union within 10 years.

The reasons of these 10 years are, among others, that the EAC Partner States need to harmonize monetary and fiscal policies and establish a common central bank. Kenya, Uganda, Tanzania and Rwanda already present their budgets simultaneously every June. Another important reason is for the EAC to fully internalize the lessons from the Eurozone crisis as it is one of the regional blocs to have achieved a monetary union but have been going through significant amount of difficulties related to the Euro!

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[2] http://www.reuters.com/article/2013/11/30/: East African trade bloc approves monetary union deal.

A Monetary Union is a crucial stage of integration but also very tricky just as has been demonstrated by the Eurozone, therefore, for Rwanda which is a member of the EAC, it is very crucial to possess every bit of information on trade relations, influence to and from other EAC Partner States for the sake of domestic better policing.

Therefore, Rwanda has 10 years to fully master its internal affairs because once it enters a Monetary Union every detail will count for the stability of the economy. That is why this study is important.

The implications of a Monetary Union are diverse; one of them is that all Rwanda's Trade with other member states will use that single currency. The immediate consequence of this is that the trade amount will increase significantly because of the removal of exchange rate barriers or as Kenneth Kitariko, chief executive officer at African Alliance Uganda puts it "In a monetary union, the absence of currency risks provide a greater incentive to trade," as noted by Reuters in November 2013.

Therefore, a study like this and others like it will be quick to give a precise idea about the significance/impact of the increase in trade among Partner States on Rwanda's Economy.

1.5.2 Safeguard the image of the institution (ability to deliver)

The Ministry of East African Community (Rwanda) is in charge of coordinating EAC policies on the side of Rwanda. It is supposed to have all critical information when it comes to EAC matters. Therefore, it is the duty of the Ministry to deliver for the institutional safety with regard to the central government. This then also shows the importance of this study.

1.6 Scope of the study

This study will be limited on Rwanda's economy especially its trade relations with the other EAC Partner States. The researcher used Rwanda's economic data and materials on the EAC, mainly trade statistics to explore the Elasticity and Sensitivity of Rwanda's Economy vis-à-vis EAC Partner States Trade Relations.

1.7 Organization of the study

This study is composed of six chapters;

Chapter one gives the general introduction on the study, a precise explanation of what the research is about; why it is important and interesting; the research problem, objectives, questions and hypotheses are also stated.

Chapter two is the presentation of the literature review related to the study. As in the economic literature the Trade-Growth relationship is still a hot and controversial issue, this chapter will review the existing controversial

literatures with the purpose of providing a foundation for the understanding of the present study.

Chapter three entitled “Rwanda’s Economic Growth and its Trade with EAC: A Quick Overview” provides a picture of Rwanda’s economic growth and offers a statistical view on Rwanda’s Trade with the EAC from the moment it joined this community. Moreover, it also provides a synopsis on the EAC. All of this is for the reader to understand first what the EAC is and why Trade with the EAC is central to this study.

Chapter four describes the methodology and techniques employed in data collection and analysis. It provides an explanation of what data the researcher collected, how they were collected and how they were analyzed so as to both achieve the research objectives and produce reliable information.

Chapter five displays the study findings, analysis and the meaning of the findings. In essence it presents the contribution to the knowledge, and also points out the weaknesses/limitations of the study.

Chapter six concludes the study. This is an overview of the entire study, with emphasis on answers to the study questions, essentially, the insight gained from conducting the research.

CHAPTER II: LITERATURE REVIEW

The present chapter is an evaluative report of information found in the literature related to our selected area of study. This chapter will describe, summarize, evaluate and try to clarify the existing literature. It will give a theoretical foundation for the reader to understand the nature of the study.

In general the existing literature shows that the link between trade and growth remains unclear.

2.1 CONCEPTUAL FRAMEWORK

2.1.1 International Trade

International trade is the exchange of capital, goods, and services across international borders or territories. In most countries, such trade represents a significant share of gross domestic product (GDP).

2.1.2 Economic Growth/Economic Growth Rate

Economic Growth Rate is a measure of economic growth from one period to another in percentage terms. This measure does not adjust for inflation; it is expressed in nominal terms.

In practice, it is a measure of the rate of change that a nation's Gross Domestic Product goes through from one year to another.

$$\text{Economic Growth} = \frac{GDP_2 - GDP_1}{GDP_1}$$

The economic growth rate provides insight into the general direction and magnitude of growth for the overall economy.

2.2 HOW IS THE TRADE-GROWTH RELATIONSHIP THEORETICALLY SUPPORTED?

The economic profession remains divided about the influence of international trade on economic growth. Some economist believe that the idea that trade promotes growth is fundamentally valid; however some others concluded that this idea is no more than an illusion!

2.2.1 Supporters of the Trade-Growth positive relationship

Babula Ronald and Lill Andersen (2008) in their paper "The Link between Openness and Long-Run Economic Growth" critically reviewed the most cited empirical analyses of the relationship between international trade and economic growth and the more recent empirical analyses of the link between trade and productivity growth. As their paper showed international trade still one of the primary sources of growth. They gave the example of the East Asian countries that have experience faster economic growth.

However they pointed out that the most fundamental question is how strong the relationship between trade and economic growth is, and also whether

international trade will always be sufficient to lead the improvement of standards of living especially in developing countries.

They therefore reviewed two types of studies:

a. Empirical Studies of the Link between Trade and Economic Growth

Andersen and Babula reviewed well known conventional trade theories such as: comparative advantage which is a classical Ricardian model; the Heckscher-Ohlin theory explaining that these theories are based on the differences between countries which become a reason for trade. It reviewed also the third theory of economies of scale where even industries producing differentiated products can trade between them therefore leading countries to trade and providing more variety to consumers (Internal economies of scale), and thereafter positively impacting growth.

For this section numerous studies showed that there is a positive relationship between trade and growth but that the size of the relationship seemed to be different case by case.

b. Studies of the Link between Trade and Productivity Growth

This section explained the particular channels through which trade may affect the growth rate of a country which are the capital accumulation and

productivity growth. Trade affects the latter through faster technological progress.

In this section, from the reviewed studies, the research showed that international trade affects the growth rate of productivity through 3 channels.

The first one is that it gives access to foreign technologies, the second is that it enlarges markets for new product varieties, and the last one is that trade facilitate the wider diffusion of general knowledge.

In conclusion, their paper answered yes to the question that asked whether there was a positive relationship between trade openness and economic growth and this finding was based on the results included in numerous reviewed empirical studies.

The critical empirical studies they reviewed were: Baldwin, R.E (2003); Helpman, and A. Hoffmaister (1997); Dollar, D (1992); Dollar, D., and P. Collier. (2001); Dollar, D., and A. Kray. (2003); Edwards, S. (1998); Frankel, J.A., and D. Romer. (1999); Grossman, G. M., and E. Helpman. (1991); Krugman, P.R. (1980); Mankiw, N.G. (2004); Rodriguez, F., and D. Rodrik. (2001); Sachs, J. D., and A. Warner. (1995) etc.

Jeffrey Frankel and David Romer (1999) in their paper entitled “Does Trade Cause Growth?” noted that from Adam Smith’s economic theories on

specialization and the extent of market to the debate about import substitution versus export oriented strategies and to the works on economies of scale economists interested in the determination of standard of living has also started to be interested in trade. It is in this spirit that their study empirically investigated on the impact of international trade on the standard of living and therefore economic growth.

The paper argued that the instruments used to measure the effect of trade on growth were problematic and it set as a purpose to propose alternative instrument to measure the effect of trade on economic growth.

The instrument it proposed was related to geography arguing that the distance between countries will give much information about how they trade, therefore, geographic characteristics could be used to obtain instrumental variables estimates of trade's impact on income and their paper made it a case to go deeper and explain why. Its main research question was to know if really trade does cause growth.

The results obtain from the gravity model where distance was used revealed that as usual it had a negative relationship with trade. The paper interpreted the results in terms of elasticity and the estimated elasticity of trade with respect to distance was slightly less (in absolute value) than -1. Most of the

results for the gravity model run were interpreted in terms of elasticity in the paper.

From cross-country regressions on the relationship between trade and income per person, the results showed that the impact of trade on income per person was substantial.

On the other hand the instrumental variables estimates of the effect of trade were larger than the ordinary least squares estimates often by a considerable margin.

Frankel and Romer**'s** paper investigated mainly on how international trade affects the standards of living and therefore, growth. To answer to this question, the paper focused on the component of trade that is due to geographic factors.

They concluded that even through the geographic channel trade was found to raise income and therefore growth. In this sense the results supported the case for the importance of trade and trade promoting policies.

Ann Harrison (1996) in her paper "Openness and Growth: A Time-Series, Cross-Country analysis for Developing Countries" she highlighted that the new interest in economic development and its expansion has revived the debate on openness and growth. In the new models of economic

development theories openness exposes the country to imports of inputs which embody new technologies, increase the size of the market facing producers which raised the returns to innovation and which affect country's specialization in intensive research in its production processes and capacities. The new growth theories in line with the above new interest on economic development however did not unambiguously specify that trade openness will affect growth. That is why Harrison embarked in her research to empirically study the trade-growth relationship using panel data from developing countries.

The aim of her research was therefore to empirically verify if there is a positive relationship between trade openness and growth while using various measures of trade openness (7) compared to other previous researches in this area. The paper also extended the analysis to analyze the relationship between trade openness and investment.

The **7** trade openness proxies were: "the first measure (TR I), an annual index of trade liberalization for 1960-84, was derived using country-specific information on exchange rate and commercial policies (source: Papageorgiou et al., 1991). A second index of trade liberalization for 1978-88 (TR I) was calculated using country sources on tariffs and nontariff barriers (source: Thomas it al., 1991). The third measure is the Black-Market Premium

(BLACK), which is defined as the deviation of the black-market rate from the official exchange rate (source: International Currency Analysis, Inc., various years). The fourth measure (TR Share) is simply the share of trade in GDP, defined as the ratio of exports plus imports to GDP (source: World Bank). The fifth measure calculates movements toward international process (MTIP). The MTIP index was derived from the relative price of a country's tradables, which was computed using current and constant national accounts price indexes (for more details, see Bhalla and Lau (1992)). This variable uses as a benchmark the relative price of consumption goods for 1980 from Summer and Heston (1988). It is then transformed to measure the movement toward unity. The sixth measure (DOLLAR) is a modified version of the price distortion index use in Dollar (1991). The relative price of consumption goods from Summers-Heston is 'purged' of its non-traded component by taking the residual from a regression of this index on urbanization, land, and population. Countries with high values for the Dollar index have high relative prices for consumption goods, which suggest a more distortionary trade regime. The seventh indicator (INDIRECT) measures the indirect bias against agriculture from industrial sector protection and overvaluation of the exchange rate (source: Schiff and Valdes, 1992). A higher value of INDIRECT suggests lower industrial protection and overvaluation of the exchange rate". Harrison (1996:9).

The fundamental question of her paper was to know and to see if all major proxies of trade openness (as listed above) yield the same results, that is, show a significant positive relationship with economic growth as many different studies which used only one proxy of trade openness seemed to argue.

The first results of the cross-country regressions showed that 6 out of 7 proxies for openness were not statistically significant. Economic growth being the dependent variable. The only proxy which was statistically significant was the market premium.

A second cross-country regression controlled for country specific conditions, such as high level of technological know-how, cultural differences and others, was performed and **4** proxies out of 7 of trade openness were found statistically significant.

In conclusion, not all proxies were found to be statistically significant especially when the time period of the analysis was changed. In cases where openness was found significant it was also realized that greater openness did influence higher growth rates.

Omoju Oluwasola and Adesanya Olumide (2012) also studied the trade-Growth relationship in their paper “Does Trade promote Growth in Developing Countries? Empirical Evidence from Nigeria”. Their paper

studied the impact of trade on economic growth using Nigeria as a case study. It emphasized the role of foreign trade on economic growth as mentioned by neoclassical economist since these regarded trade as an engine for growth.

The theories referred to in the paper, explained that over the decades the drive for trade has been the difference between countries which allowed them to exchange and enjoy the variety of goods and services and improve their people's standards of living.

They showed that, even though there are many theories about trade-growth relationship they diverged about the opinion on this relationship and the paper tried to research further on that controversial relationship while using Nigeria as a case study. Therefore in that sense it tried to find out if foreign trade promotes or hinders economic growth from the Nigeria's perspective.

The general aim of the research was to investigate the relationship between trade and economic growth in Nigeria but also to identify other factors influencing economic growth with research questions to know whether there is positive or negative relationships between trade and growth, and then growth and those other factors.

Their main findings were as follows:

Log GDP = 2.197 + 0.560log TT + 0.323log GEXP + 0.338log FDI + 0.004log EXCHR + e

t (6.016) (6.159) (3.219) (3.896) (3.853)

Adjusted R^2 = 0.84; F-statistic = 1683.65; DW = 1.755

Where EXCHR= Exchange rate, and TT meant total trade, Gross Domestic Product (GDP), Foreign Direct Investment (FDI), and Government expenditure (GEXP).

In short, Since the main focus of the paper was the Trade-Growth relationship, the coefficient of total trade (TT) was very significant and a unit increase in foreign trade, other things being equal, would increase GDP by 0.56.

The adjusted R-square of 0.84 depicted a high explanatory power of the model.

Omoju and Olumide concluded that trade affects positively economic growth in Nigeria and in a very significant way and recommended to the Nigerian Government to initiate appropriate economic policies that would improve Nigeria's trade status.

Lin Shuanglin (2000) in "Foreign Trade and China's Economic Development: A Time-Series Analysis" examined the Trade-Growth relationship based on China's national data for the period of 1952 to 1997.

As he indicated various studies previously studied and found a positive relationship between trade and growth rate. Some studies employed cross-sectional data while others used time-series data.

On the other hand some economists he mentioned in his paper pointed out that trade expansion may not always be a beneficial policy for all countries at all times!

Shuanglin's aim of the research was to examine the relationship between the growth rate of exports, the growth rate of imports, and the growth rate of the volume of trade with respect to the growth rate of per capita GDP based on China's data early mentioned. And the main question was to know how and to what extent the former variables affect the latter one.

For the methodology, regression analysis was used relying on the neoclassical aggregate production function in which capital, labor, government expenditure, and the level of technology are inputs. But the paper altered this original model to let foreign trade be a proxy for the level of technology. Then output divided by population gave GDP per capita which then became the dependent variable.

His main findings showed all the variables of the regressions but with a special focus on the relationship between the GDP per capita and the growth rate of exports, imports and the growth rate of the volume of trade. All the

three variables were found statistically significant at the 1% level in this case of China. But not all other variables included in the model were found significant. Some variables, such government expenditure, took a trend which was even against what the mainstream theories predict.

Shuanglin concluded that all the 3 variables (the growth rate of exports, imports and the growth rate of the volume of trade) were found to be positively related to economic growth and then he recommended that for china to keep its high level of economic growth it should continue to actively engage in the world economy and also continue its trade promotion policy.

Doraisami, Anita (1996) in her paper "Export Growth and Economic Growth: A Reexamination of Some Time-Series Evidence of the Malaysian Experience" emphasized on that the way in which developing countries can increase their growth rates is of crucial importance. Many of newly industrialized countries believe that export promotion can be an effective strategy for development. This way of thinking is in accordance with the mainstream macroeconomic theories where exports are thought to be injections in the economy.

In the neoclassical theories export are believed to be crucial in the situation where they increase productivity in an economy. In this case exports are said to increase foreign earnings which will be used to import intermediate and

capital goods or inputs. The imports could embody new technologies which may not be available to domestic producers. This in turn may improve domestic productivity performance.

Against this background, some previous studies on Malaysia, as she noted, did not find empirical support for a positive relationship between exports and economic growth. This is why she aimed at reexamining the relationship between exports and economic growth in the Malaysian contest to try to find support for the export-led strategy.

In the end her paper again stresses on the issue that previous time series studies did not find supporting evidence on that export oriented strategies affected positively economic growth in Malaysia. In contrast to previous studies however, her results provided strong empirical support for bi-directional relationship between exports and output and a positive long-run relationship between exports and growth. As she noted her results were consistent with the widely held consensus in Malaysia that exports have been the "engine for growth".

Similarly Reza Ahmadi and Nazila Mohebbi (2012) in their paper with the tittle "Trade Openness and Economic Growth in Iran" concluded that trade openness had a positive effect on Iran's economic growth.

And finally,

Khan, Dilawar at al. (2012) in “Exports, Imports and Economic Growth Nexus: Time Series Evidence from Pakistan” noted that International trade has been one of the important factors influencing economic growth in Pakistan. A successful and sustained economic growth requires both exports and imports. It is in this regard that they conducted a time series study to investigate on the trade-growth nexus.

To obtain the correct results, the study used the Granger causality and the co-integration tests to examine the long run relationship between trade and economic growth as well as to check the specification direction or the causality.

The econometric results based on the error-correction models confirmed the existence of long run relation between exports, imports and economic growth. Both exports and imports were found essential for Pakistan’s economic growth.

The study further revealed a bi-directional relationship since it found that economic growth is also crucial for exports and imports of Pakistan. And therefore, they concluded that their empirical evidence revealed a bi-directional relationship between trade and growth meaning that For Pakistan not only trade is important for growth but also growth is important for trade.

2.2.2 Skepticisms or rather Skepticists about the Trade-Growth positive relationship

As early mentioned the economic profession remains divided about whether international trade promotes economic growth. The following section will cover different studies of different economist who are still skeptic on this relationship.

Prabirjit Sarkar (2008) in his comprehensive study titled "Trade Openness and Growth: Is There any Link?" highlighted that the old Ricardian theory of comparative advantage provided a basis for the 19th and early 20th century pattern of trade between colonies, semi-colonies and the colonial masters. The colonies and semi-colonies traded or supplied food and raw materials while the colonial masters traded or supplied finished industrial goods to their colonies. Latter, protectionism and Imports Substitution Industrialization (ISI) strategy were advocated for since in the end the orthodox free trade was basically only benefiting the colonial masters.

ISI latter caused acute balance of payments crises in developing countries since they had to import at least machines and technologies from industrialized countries. Their exports earnings were less than the foreign reserves they needed. This is when the IMF (International Monetary Fund) and WB (World Bank) came in to provide the finances needed and in the process imposed some "conditionalities" to developing countries. This last

development was nicknamed the “Washington Consensus” (WC) by the economist John Williamson.

The WC advocated primary for openness of the countries and hence more trade. Many WB (World Bank) reports tried to convince the world that outward looking policies were better than inward looking policies such as the ISI.

It is in this free trade historical development that Professor Sarkar, an Indian economist, studied if really trade openness (international trade) did affect positively economic growth.

The aim of the paper was therefore to examine the relationship between trade openness (Trade to GDP ratio) and economic growth. His main question of the study was to know if there is any link between openness and growth.

His first regression using the between-effects model for panel data analysis revealed that the more openness there is the more growth a country will experience.

For time series analysis conducted the results shown that for the middle income countries trade openness affected GDP growth but for all other country groups the relationship was not statistically significant.

For individual country time series analyses, for some countries the relationship was positive and significant but for some others the relationship was even negative!

Therefore Sarkar concluded that since the findings were mixed, it is not yet clear that trade openness lead to great economic growth. And he warned that many studies in this area concluded in favor of WC which greatly advocated for trade liberalization and many of the editors of journals publish only journals which support a positive relationship and ignore any other paper!

Van Hendrik (1996) also studied the trade-growth relationship in his paper "Trade as the Engine for Growth in Asia". He studied this relationship by trying to overcome the shortcomings found in other papers especially on the methodology used.

He pointed out that the economic success of the so called Asian tigers still often taken as a proof that international trade works for promoting growth, however he pointed out also that the evidence is not such a clear cut since there are also other factors which may be at the origin of growth in the Asian tigers. Therefore trade together with these other factors makes it difficult to single out the effect of trade.

Hendrik argued that because of methodological problems, the relationship between trade and growth was mixed, therefore he set as purpose to

reconcile the mixed economic evidences on the trade-growth relationship with the popular view that trade has been a key factor in promoting growth in the so called Asian tigers.

On the other hand his main concern was also that statistics did not offer clear verification of the trade-growth connection, this led many researchers, including himself, to ask themselves the question of what would the result be if all the shortcomings in the methodology were addressed.

He utilized the regression analysis method especially relying on the neo-classical production function model and tried to overcome the early shortcomings found in different previous studies found on the relationship between international trade and economic growth in East Asia.

After trying new techniques to overcome the shortcomings shown in the previous studies, Hendrik found that the relationship between trade and economic growth seemed to be more pronounced in countries which applied more outward oriented policies than in countries which applied more inward oriented policies. Thus the mentioned positive relationship was found even in non-Asian tigers in East Asia.

But overall, Hendrik concluded that improved methodology and model revealed that methodological shortcomings were not the causes of the mixed results derived in the past because even with the improved methodology the

paper still found a non-statistically significant trade-growth relationship in two of 10 Asian economies investigated on, the two were India and Pakistan. Therefore the best way to conclude as he pointed out was that the precise nature of trade-growth relationship varies with each country, hence the emphasis on the use of single country time series regressions.

Lastly, Prabirjit Sarkar and Brototi Bhattacharyya (2006) explored again the trade-growth nexus in their paper "Trade Liberalization and Growth: Case Studies of India and Korea". They reminded that in the period after the Second World War II, many Least Developed Countries (LDCs) implemented Import Substitution Industrialization (ISI) strategies following the then economic theories. In most cases most of these countries were predominantly agricultural and exported primary commodities. These strategies led to more and more import of machines and technologies for these countries to be able to produce import-competing products. This led to acute Balance of Payments (BOP) crises since these countries had less foreign reserves to be able to import machines and foreign technologies. This eventually led to external dependency on finances from the Breton Woods Institutions and this dependence was accompanied by conditionalities such as to open up their economies not only to reduce their BOP crises but also to experience higher growth rates. This caused the level of foreign trade of the LDCs to rise.

It is against this background that the study aimed at investigating whether or not trade liberalization worked to promote higher growth rates in India and Korea. The main question of the study was to know if there was any meaningful relationship between increased openness (as measured by the share of foreign trade in GDP) and growth rates.

For the findings, In the first stage of trend analysis application of the tests of stationarity (Augmented Dicky-Fuller tests and Perron tests), exhibited that all the series had deterministic trend except the "export share" of Korea. The trend analysis revealed that initially trade openness in India declined and grown after 1972. In Korea trade opened at a high rate up to 1972 and decelerated afterwards.

In the face of it, growth rates in India's GDP and per capita GDP shown rising trends possibly due to the presence of significant spike as the paper explained. They actually remained stagnant. On the other hand, the rates of growth of GDP and per capita GDP increased in Korea at a rapid rate up to the end of 1960 and fallen subsequently.

In the end, by means of the ARDL[3] (Autoregressive Distributive Lag) approach to co-integration, the study found no evidence of favorable impact of trade liberalization on real growth rates of India and Korea.

[3] **ARDL** was invented by **Professor M. Hashem Pesaran, Emeritus Professor of Economics, University of Cambridge, John Elliot Distinguished Chair in Economics, University of Southern California, Director, Center for Applied Financial Economics, USC.**

CHAPTER III: RWANDA'S ECONOMIC GROWTH AND ITS TRADE WITH EAC: A QUICK OVERVIEW

As this study is devoted to the analysis of Rwanda's Trade with the EAC and its impact on Rwanda's Economy (GDP and GDP growth), this chapter is destined to give, first a quick brief on Rwanda's economic profile and a picture of Rwanda's economic growth since 2000.

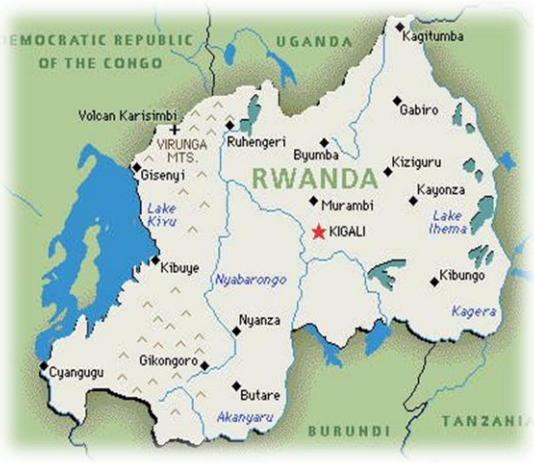
Then also, since this study will refer to the East African Community (EAC) in a number of times, this chapter likewise provides a synopsis on this Community plus Rwanda's trade with it. Therefore, in the final part of this chapter the researcher briefly analyses Rwanda's Imports and Exports to EAC, and presents also the current status of Rwanda's Trade Balance with respect to EAC whether in general or country by country.

All these elements will help the reader to deeply understand subsequent chapters since these will focus on how this Trade affects Rwanda's GDP and GDP growth.

3.1 Rwanda's Geographical Location

Rwanda is located in East-Central Africa, in the Great Lakes region. Stretching from latitude 1°04´ to 2°50´ South and from longitude 28°50´ to 30°53´ East, it shares borders with Uganda to the North, Burundi to the

South, Tanzania to the East, and the Democratic Republic of the Congo to the West (Adekunle, 2007).

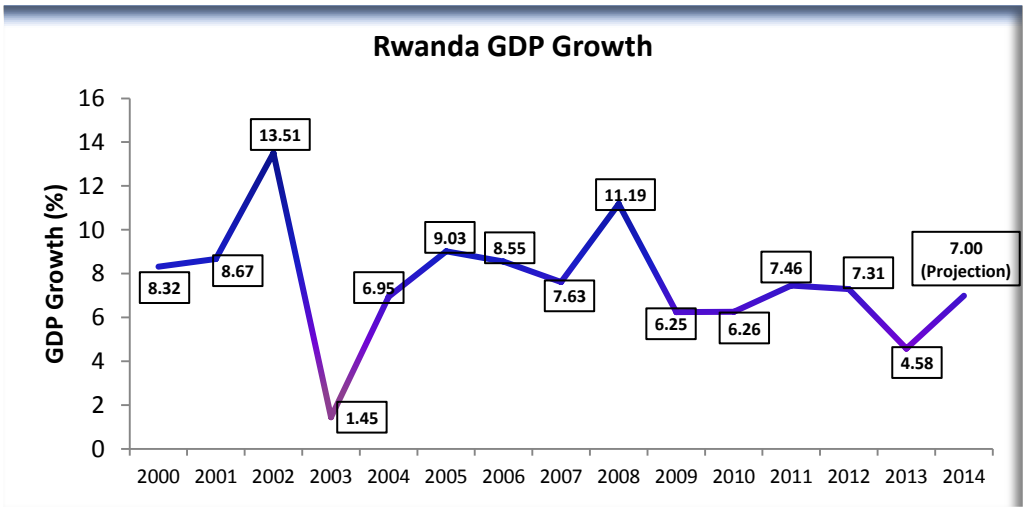


3.2 Rwanda's Economic Profile

- Doing Business (2014) Rank: 32nd
- GDP Per Capita (PPP,2013), US Dollars: US$ 1,591.71
- GDP Per Capita (Constant Prices, National Currency, 2013): RWF 275,747.76
- GDP Growth (Constant Prices, National Currency, 2013): 7.6 %
- Inflation (2013): 5.7%
- Mobile Phone Penetration (2013): 50%
- Population/Market (2013): 10.641 Million.
- Investment (% of GDP, 2013): 23.814 %
- General Government Revenue (% of GDP, 2013): 25.469 %
- General Government Total Expenditure (% of GDP, 2013): 27.619 %
- Aid Flows (2013): $1.3 Billion!

Sources: Doing Business 2014 (World Bank); Economy Watch (EW) 2013; the Africa Report 2013.

Figure 1. Rwanda GDP Growth (2000-2012)



Data Source: The World Bank Database

Rwandan Economy experienced high GDP Growth rates since 2000. The average growth rate of the 2000s decade was 7.95% compared to the 1990s decade average growth rate of 2.09%. The main reason behind is the devise (in 2000) and implementation of Rwanda's long term strategy: The Vision 2020.

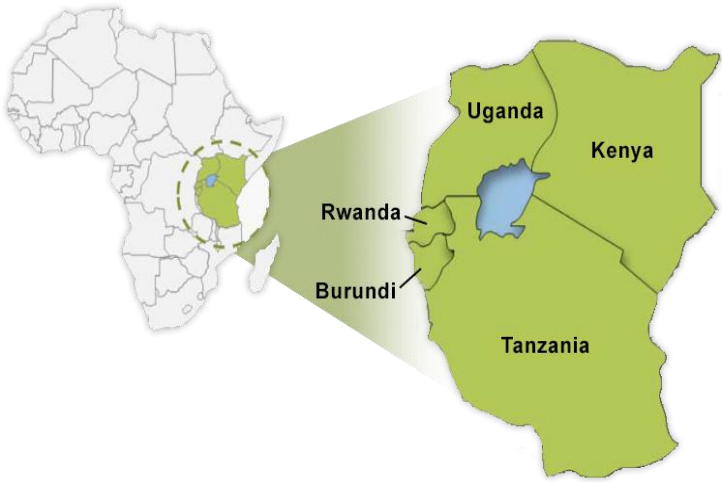
3.3 EAST AFRICAN COMMUNITY (EAC) SYNOPSIS

The East African Community (EAC) is an intergovernmental organization comprising of 5 Partner States in the African Great Lakes region in the eastern part of Africa: Burundi, Kenya, Rwanda, Tanzania and Uganda. The Organization was originally founded in 1967, and was officially revived on

July 7, 2000. EAC has a combined population of about 141.1 million (EAC Facts and Figures, 2013)[4].

The EAC is a potential precursor to the establishment of the East African Federation[5], a proposed federation of its five Partner States into a single State. In 2010, the EAC launched its own Common Market for goods, services, labor, and capital within the region (Common Market Protocol, 2010), with the goal of creating a common currency and eventually a full political federation. According to Reuters, on 30th November 2013, a protocol was signed outlining EAC plan for launching a monetary union within 10 year.

Figure 2. EAC MAP



[4] See References
[5] Political Federation.

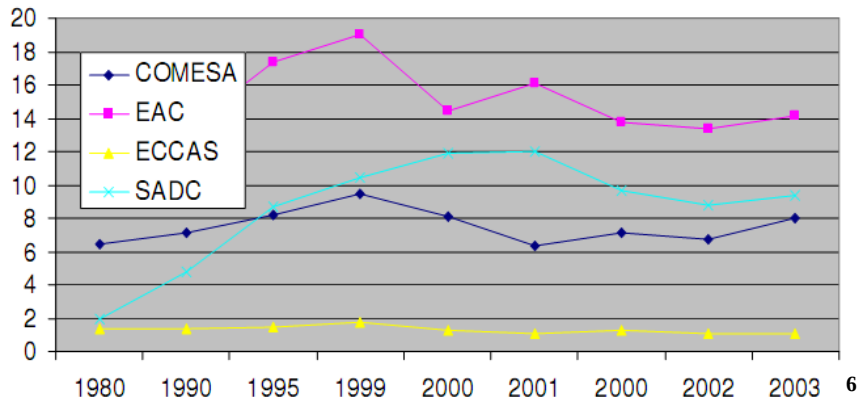
3.3.1 Rwanda's Accession to the East African Community

On 30 November 1999, the new EAC Treaty was signed by Kenya, Uganda and Tanzania; it came into force on 7 July 2000 upon ratification by the three Partner States.

The Republic of Rwanda applied to join the East African Community in 1996. She was admitted November 30th 2006 and the membership became effective July 1st 2007.

3.3.2 Why Rwanda Joined the EAC?

Figure 3. Intra-group-exports as a % of total group exports



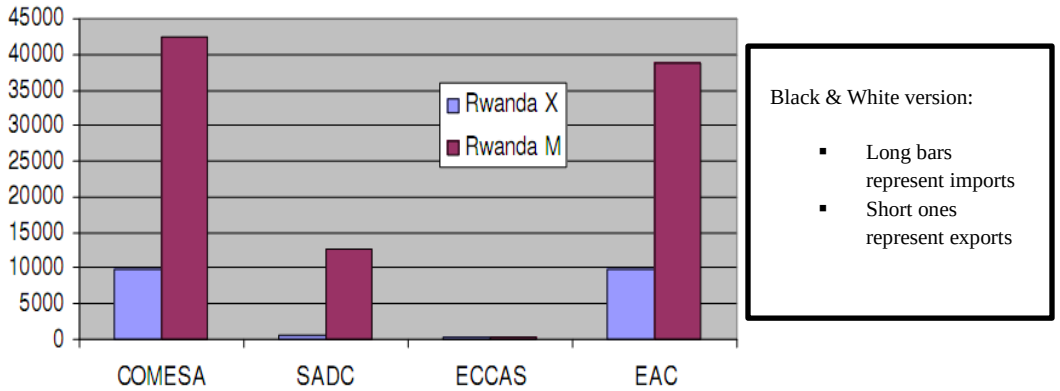
Source: Sezibera (2007)

From the graph above it is obvious to notice that since 1980s the EAC performance in terms of Intra-Regional Trade, when only exports are

[6] **COMESA**: *Common Market for Eastern and Southern Africa*; **ECCAS**: *Economic Community of Central African States*; **SADC:** Southern African Development Community.

considered, was higher and therefore far better than that of other Regional Groupings.

Figure 4. Rwanda's Trade by REC (Regional Economic Community), Millions (Rwandan Francs), 2003.



Source: Sezibera (2007)

From the above chart it is evident that the two REC Rwanda could join in the early 2000s were COMESA and EAC. Since Rwanda was already a member of the COMESA since 2004, the next step was to join the EAC on the basis of its trade connections with EAC.

3.3.3 Integration Process within EAC

The EAC Treaty states, "the EAC Partner States undertake to establish among themselves a Customs Union (CU), a Common Market (CM), subsequently a Monetary Union (MU) and ultimately a Political Federation (PF)". (Treaty for the Establishment of the East African Community, 1999).

3.3.3.1 Customs Union

The East African Community Customs Union Protocol was signed on 2nd March 2004, ratified end December 2004 and came into force on 1st January 2005. The Customs Union implied, among others, the elimination of internal tariffs (Free Movement of Goods), a Common External Tariff (CET) and Elimination of Non-tariff barriers (NTBs).

The Intra-EAC tariff liberalization started with Protocol implementation on 1st January 2005 and was supposed to be completed by January 2010, creating a fully-fledged EAC Customs Union. (The Protocol on the Establishment of the East African Community Customs Union, 2004).

3.3.3.2 Common Market

This was a legal and binding commitment to a deeper and stronger functional integration by member countries to;

- Remove all trade barriers on Goods and Services, and
- Liberalize the movement of factors of production amongst member countries.

EAC Common Market means that the Partner States' markets are integrated into a single market in which there is Free Movement of Persons, Labor, Services, Capital, Right of Establishment and Residence. (Protocol on the Establishment of the East African Community C ommon Market, 2009).

The Common Market Protocol was signed in November 2009 and entered into force July 1st 2010.

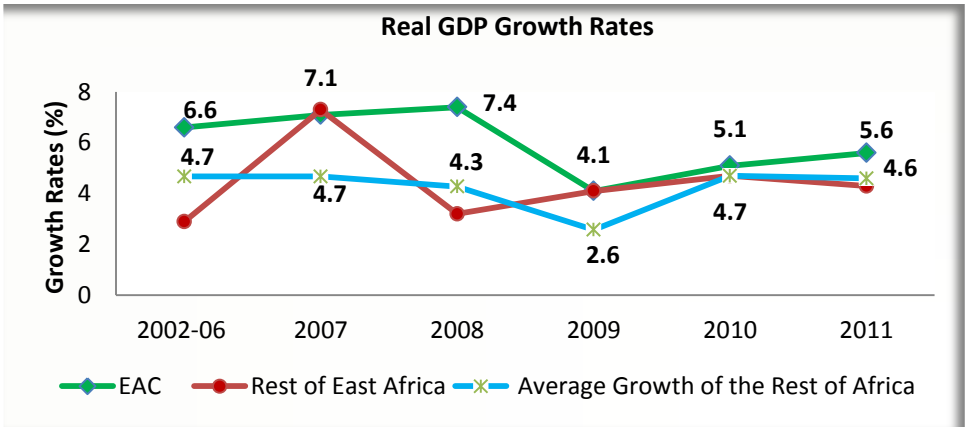
To date, The EAC is still a Common Market Area with the plan to establish a Monetary Union as the next stage. According to Reuters, 30th November 2013, a protocol was signed outlining the EAC plan for launching a monetary union within 10 year as early mentioned.

3.3.4 EAC Macroeconomic Performance (2002-2011)

According to Mafusire and Brixiova (2012) in their study entitled "Macroeconomic Shock Synchronization in the East African Community", the EAC grown faster than the rest of the African continent, both before and after the 2008 Global Financial Crisis (GFC). In Spite of the GFC East Africa registered a growth of 5.8 % real GDP Growth in 2009 and by 2010 and 2012 had already recovered some of the lost growth momentum. Rwanda, Tanzania and Uganda lead the Regional Economic Expansion alongside Ethiopia and Sudan (not yet part of EAC).

Kenya which grew faster in 2006-07 suffered a setback in 2008 due to the violence that broke out after the elections at the end of 2007. Among the EAC's member states, only Burundi's Growth has been low throughout the 2000s, reflecting in part the country's fragility. Figure 3.5 summarizes the situation.

Figure 5. Real GDP growth in East Africa (EAC) and other Africa sub-regions (annual rates in percentage)



Data source: African Economic Outlook (AEO) 2012, Mafusire and Brixiova (2012).

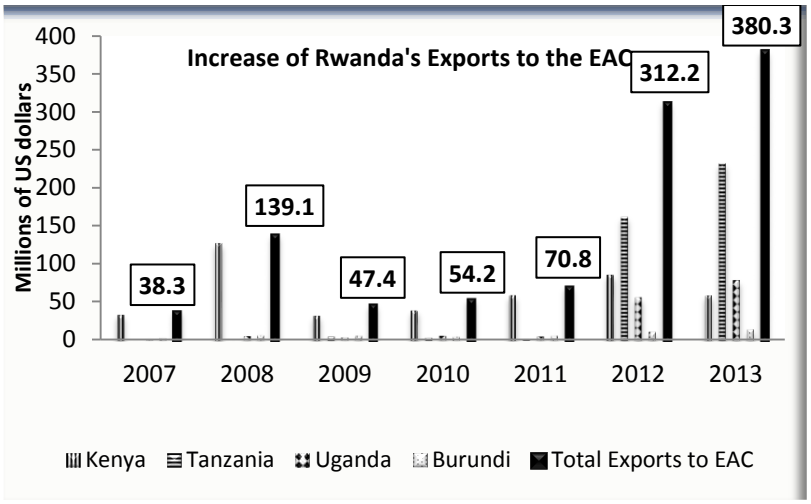
3.4 RWANDA'S TRADE WITH EAC (2007-2013)

Rwanda's trade with the EAC has been rapidly growing since the joining of the community in 2007. On average Rwanda's exports to the region have

been increasing more than the imports from the region since 2007. (Figure 6 and 8).

3.4.1 Rwanda's Exports to EAC

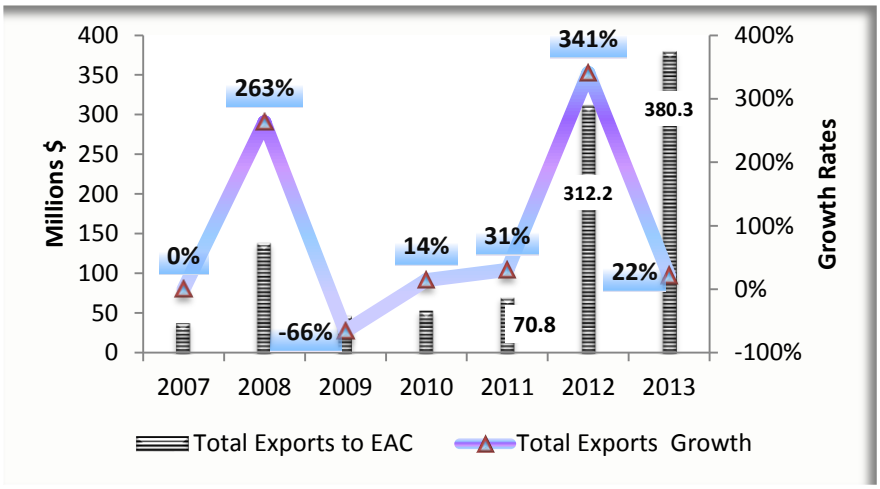
Figure 6. Increase of Rwanda's Exports to the EAC (millions of US $)



Data Source: Ministry of EAC Rwanda.

On average, Rwanda's Exports to the region increased by 893% from US$ 38.3 million in 2007 to US$ 380.3 million in 2013 (Total exports to EAC). At the beginning, the main destination of Rwanda's Exports to EAC was Kenya (2007-2011), but from 2012 Tanzania suddenly became the main destination of Rwanda's Exports. Kenya and Uganda followed Tanzania interchangeably.

Figure 7. Rwanda's Exports to the EAC (Growth Rates)



Data Source: Ministry of EAC Rwanda.

This chart was extracted from the previous one on Rwanda's Exports to EAC. What it intends to communicate is that although the Value increase of Rwanda's Exports to EAC may look impressive for the last two years (2012 and 2013) the percentage growth rates indicated by the blue line (line with a triangles) show that the growth's trend is not uniform or consistent.

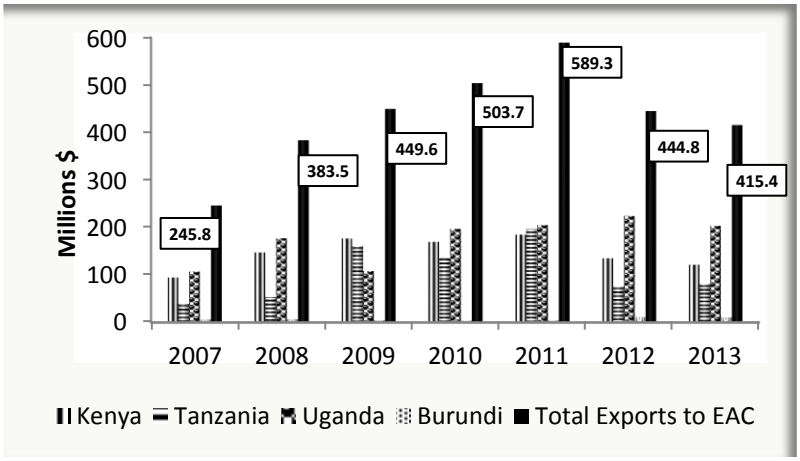
For instance, from 2010 to 2012 the growth of Exports was upward moving from 14% growth 2009-2010 to 341% for 2011-2012. But the growth's trend suddenly decelerated to 22% for 2012-2013. Therefore, although the value showed an increase but actually we lost severely on the growth rate speed at which we were moving previously. So the growth rate of 2013 (22%) is far

less than the growth rate of 2012 (341%) and also less than the growth rate of 2011 (31%).

This is important to highlight because as we shall see below Rwanda still has a large Trade deficit vis-à-vis EAC countries in general, therefore it is crucial for Rwanda to keep high Exports growth rates for it to reverse the current status.

3.4.2 Rwanda's Imports from EAC

Figure 8. Increase of Rwanda's Imports from EAC (millions of US $)



Black & White version:

For every year (example 2013):

Bar 1 is: Kenya

Bar 2 is: Tanzania

Bar 3 is: Uganda

Bar 4 is: Burundi

Bar 5 is: Total imports to EAC.

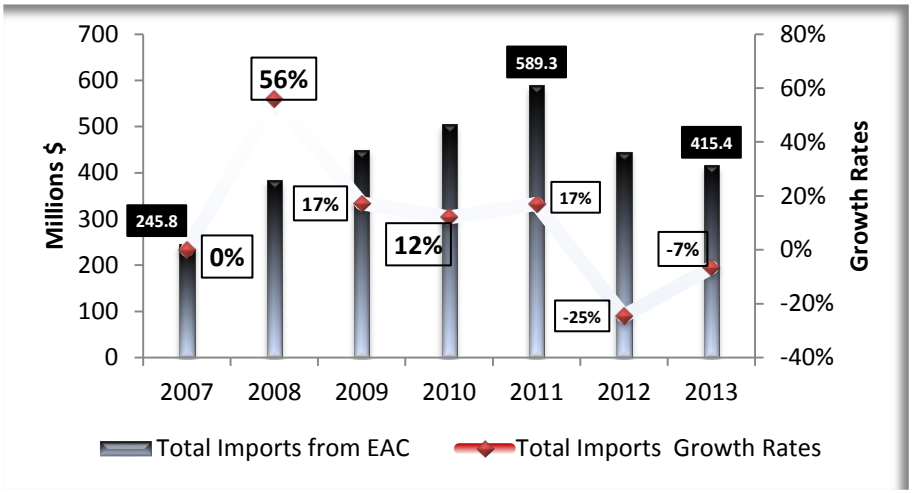
Data Source: Ministry of EAC Rwanda.

Rwanda's imports from EAC countries increased on average by **69%** from US$ 245.8 million in 2007 to US$ 415.4 million in 2013 (Total imports to EAC). But as the chart illustrates Rwanda's imports from EAC increased by

140% (2007-2011; 245.8 to 589.3 $ millions respectively) and decreased by 30% thereafter (2011-2013, 589.3 to 415.4 $ millions respectively).

In General, Uganda continued to be the traditional main source of Rwanda's imports from EAC followed by Kenya.

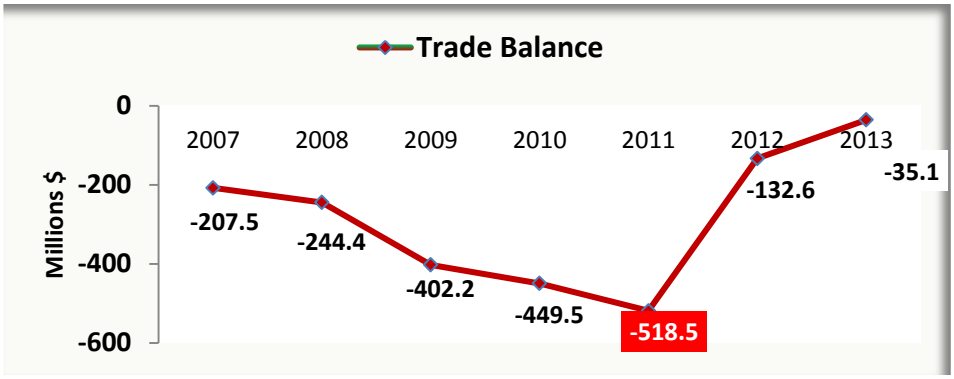
Figure 9. Rwanda Imports from EAC (Growth Rates)



Data Source: Ministry of EAC Rwanda.

3.4.3 Rwanda's Trade Balance with respect to EAC

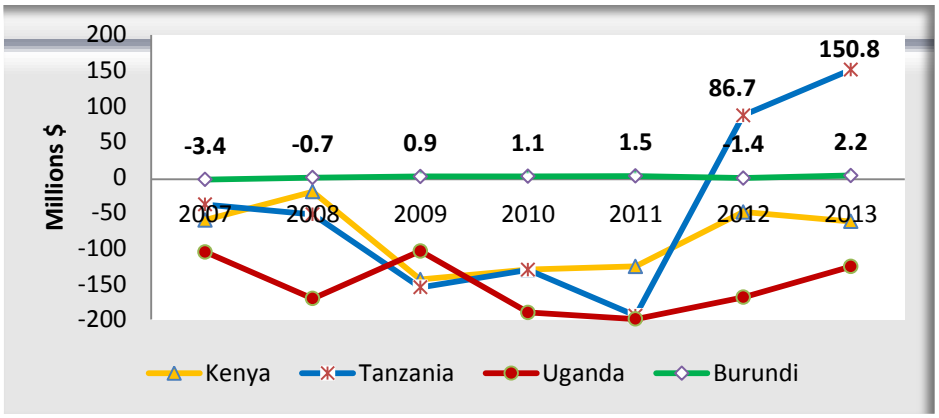
Figure 10. Rwanda's Trade Balance with respect to EAC (millions of US $)



Data Source: Ministry of EAC Rwanda

As it can be noticed from the above chart, Rwanda's Trade Balance vis-à-vis EAC continues to be negative although recently it stated to improve as it is illustrated from the figure in red to the one in yellow.

Figure 11. Rwanda's Trade Balance with respect to EAC Countries (millions of US $)



Data Source: Ministry of EAC Rwanda

Lastly the above chart illustrates Rwanda's Trade Balance with Each EAC country on average 'the picture is not so good'. It is very negative when it comes to trade with Uganda and Kenya and a part of Tanzania up to 2011. But it is positive mostly with Burundi and Tanzania although for Tanzania it is only from 2012.

CHAPTER IV: DATA AND METHODOLOGY

This section presents a discussion on the scientific approaches to this study, the method and techniques which were used in data collection and results interpretation in order to fulfill the objectives of the research carried out.

It discusses the data collected, the data sources, the way variables were calculated, all the variables used and specifies the models that were tested.

In short, it describes the scientific method and techniques applied in the study.

Hereafter in this study, Y refers to GDP or GDP Growth depending on the hypothesis being tested.

4.1 Time series data

The decision to focus on one country, Rwanda, implies that we have to use time series data.

Time series analysis gives better insight since they deal with individual country case. When enough data are available for a single country it is better to carry forward a case study.

In the following time-series analysis we shall examine the Rwanda case to examine whether a meaningful relationship exists between its GDP;

GDP Growth and Trade with EAC over a long period of time, 2006/2007 to 2014. We consider this as long period since we used quarterly data, therefore the number of observations vary between 28 and 32.

The study of a long-run relationships between two time-series variables requires a test of unit root - the test for the integration of the series- how many times the series are to be differenced to attain the stationarity property needed to carry forward a meaningful (as against spurious) regression analysis (the residuals of the regression are to be stationary to apply the standard t-tests of significance). Once, Nelson and Plosser (1982) argued that all the macroeconomic variables have unit root - they are long-memory series. In simple language, as Professor Prabirjit Sarkar explained, this observation implies that a temporary shock has a permanent effect (an econometric counterpart of the so-called real business cycle models of the "modern" macroeconomics).

The standard regression analysis is usually based on the assumption that the series are short-memory series - a temporary shock creates a transitory deviation from the path of the series. So instead of using the standard regression analysis one has to use a co-integration approach.

Subsequently the observation of Nelson and Plosser (1982) was questioned but it became a standard practice to conduct unit root tests before conducting any analysis of relationship between two variables.

But as Professor Sarkar continued, the problem is that different tests of unit root often give different results and the shorter the length of the series the lower is the power of the standard tests.

As you will notice, Rwanda time series are also shorter in the length, since some regressions have only 28 observations, which compromised tests of stationarity since different tests gave different results, but this did not stop our analysis.

To support the analysis of OLS, we used another rigorous methodology, the Autoregressive Distributive Lag (ARDL) approach to co-integration developed by Pesaran[7] and Shin (1999). This approach does not require such pre-testing and data-mining. This technique can be used to test for the existence of a long run relationship between two variables irrespective of whether they are stationary or not (having unit root or not).

[7] **Professor M. Hashem Pesaran: Emeritus Professor of Economics, University of Cambridge, John Elliot Distinguished Chair in Economics, University of Southern California, Director, Center for Applied Financial Economics, USC.**

We used this ARDL technique to ascertain the existence of a long run equilibrium relationship between Rwanda's Trade with EAC and Rwanda's GDP Growth.

$$Y_t = a + \sum_{i=1}^{p} b_i Y_{t-i} + \sum_{j=0}^{q} c_j X_{t-j}$$

Here Y_t is the Growth rate of GDP (GDPGr) in period t, Xt is the Growth rate of Trade with EAC variable (s) at time t and p, q are unknown lags to be determined by various criteria.

We have used four alternative criteria for choosing the values of the lags (p and q) of the ARDL (p, q) model: R - Bar Square Criterion (RBSQ), Akaike Information Criterion (AIC), Schwarz Bayesian criterion (SBC) and Hannan-Quinn (H-Q) criterion. The estimates of our regressions will be discussed in full details in Chapter V.

The basic form of an ARDL regression model is: .

$$\mathbf{y_t = \beta_0 + \beta_1 y_{t-1} + ...+ \beta_k y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + ... + \alpha_q x_{t-q} + \varepsilon_t ,}$$

where ε_t is a random "disturbance" term, which we assumed was "well-behaved" in the usual sense. In particular, it was serially independent.

The ARDL / Bounds Testing methodology of Pesaran and Shin (1999) and Pesaran *et al*. (2001) has a number of features that many researchers feel give it some advantages over conventional cointegration testing. For instance:

- It can be used with a mixture of I(0) and I(1) data.
- It involves just a single-equation set-up, making it simple to implement and interpret.
- Different variables can be assigned different lag-lengths as they enter the model.

4.2 Autoregressive Distributive Lag (ARDL) Approach to Co-Integration

Here are the basic steps that we followed:

1. Made sure than none of the variables were I(2), as such data would invalidate the methodology.
2. Formulated an "unrestricted" error-correction model (ECM).
3. Determined the appropriate lag structure for the model in step 2.
4. Made sure that the errors of this model were serially independent (no serial correlation).
5. Made sure that the model was "dynamically stable".

6. Performed a "Bounds Test" to see if there was evidence of a long-run relationship between the variables (test for cointagression).
7. Since the outcome at step 6 was positive, we estimated a long-run "levels model", as well as a separate "restricted" ECM.
8. Used the results of the models estimated in step 7 to measure the long-run equilibrating relationship between the variables.

The important results of these stapes are displayed in chapter 5 below where we discuss the results.

4. 3 Models

This study tested two hypotheses as mentioned in the introductory chapter.

To test for the **first hypothesis on the elasticity analysis** we used a Partial Neo-Classical Aggregate Production function. In the original (full) **Neoclassical Aggregate Production Function** Model **capital**, **labor**, **government expenditure**, and the **level of technology** are inputs and GDP is the output. As Shuanglin. (2000) explained, this original model can be altered for it to be adapted to the study of the trade-growth relationship. In the process foreign trade became a proxy for the level of technology and when the data on labor are not available, population data can be used as a proxy for labor. That is:

$$Y = \beta_0 + \beta_1 TT + \beta_2 I + \beta_3 P + \beta_4 G + \mu$$

Where Y is the GDP, TT is Total Trade, I is the investment, G is government expenditure, and P the population.

In our analysis we use Partial Neo-Classical Aggregate Production Function Model because since we were using quarterly data these were not available for all the variables included in the full version of the model. Investment and government expenditure data were not available for Rwanda.

In fact, for our study, all the independent variables in the original model except the variable (s) related to Trade and GDP, all the others are control variables.

To solve the problem of the missing variables, in our partial version of the model we included (1) inflation rate variable as a proxy for macroeconomic stability of the economy **(**inflation also shows how changes in the overall price level (i.e. inflation) affect the economic growth. The effect of inflation on growth is another hotly contested topic in economics. On one hand, inflation can be good for growth when the excess of aggregate demand over aggregate supply is driven by factors such as high export levels or strong investment. On the other hand, inflation can be detrimental if it is the result of the money supply increasing faster than the economic growth**).** And (2)

exchange rate as a proxy for the volatility of Rwanda's national currency with respect to other currencies in international trade relations.

For that matter our Partial Neo-Classical Aggregate Production Function Model looks as follows:

$$\boldsymbol{Y = \beta_0 + \beta_1 TT + \beta_2 P + \beta_3 Infl. + \beta_4 Xchange + \mu}$$

Where Y is the GDP, TT is Total Trade, P is the population, Infl is the inflation rate, Xchange is the exchange rate. But in essence our variables of interest are the GDP and the variable (s) related to Trade, all other variables in this model are just controls for the model to run in E-Views.

For these regressions we derived the ordinary least squares (*OLS*) estimators using *moving average models* to correct for autocorrelation in our data (see Chapter V below).

For more details about the origins of this Partial Neo-Classical Aggregate Production Function Model, please see the papers by Lin, Shuanglin. 2000. "Foreign Trade and China's Economic Development: A Time-Series Analysis" and Omoju, Oluwasola and Adesanya, Olumide. 2012. "Does Trade Promote Growth in Developing Countries? Empirical Evidence from Nigeria". They used the same variables except the inflation variable. These papers were discussed in chapter II: Literature Review.

Next, to test the second hypothesis on sensitivity analysis (see chapter 1 above), we used a more rigorous technique, the **Autoregressive Distributed Lag Approach**, which was described at the beginning of this chapter.

4.4 Data and Variables

This next section provides descriptions of the datasets and variables that were used to conduct this study. We will also cover the coding of variables and provide descriptive statistics for them. Descriptive statistics give a first view of the dataset: the mean is a measure of central tendency, while the variance and range measure the dispersion of the data.

4.4.1 Rwanda time series data

No single dataset contained all the variables required for this study; thus, the data was assembled from various sources.

Log(GDP) is the logarithm of the Gross Domestic Product (GDP) series (2006-2014) Quarterly data provided by the National Institute of Statistics Rwanda. GDP has 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1)

D(GDPGR) is the first difference of GDPGR (GDP Growth rate) series calculated by the author from the GDP dataset provided by the National

Institute of Statistics Rwanda. The data is also Quarterly from 2007 Quarter 2 to 2014 Quarter 1 therefore it has 28 Quarterly observations.

In E-Views, the D(GDPGR) is generated as follows:

genr dgdpgr = gdpgr – gdpgr(-1)

Log(TOTAL TRADE) or log(TT) is the logarithm of total trade values. Total trade was created by adding the values of imports from and exports to EAC. The series are also quarterly with 32 observations. They were provided by the Ministry of EAC Rwanda.

Log(Imports) or log(M) is the logarithm of Imports values. The data was provided by the Ministry of EAC Rwanda. It has also 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1).

Log(Exports) or log(X) is the logarithm of Exports values. The data was provided by the Ministry of EAC Rwanda. It has 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1)

TTgr is the total trade growth rate series, expressed in percentage, which was calculated using the Exports levels (2006-2014) Quarterly data expressed in millions of US dollars, provided by the Ministry of EAC Rwanda. It has 28 Quarterly observations from 2007 Quarter 2 to 2014 Quarter 1.

Xgr are the Exports growth rate series, expressed in percentage, which was calculated using the Exports levels (2006-2014) Quarterly data expressed in millions of US dollars, provided by the Ministry of EAC Rwanda. The data also is Quarterly from 2007 Quarter 2 to 2014 Quarter 1 therefore 28 Quarterly observations.

Mgr are the Imports growth rate series, expressed in percentage, which was calculated using the Exports levels (2006-2014) Quarterly data expressed in millions of US dollars, provided by the Ministry of EAC Rwanda. It has 28 Quarterly observations from 2007 Quarter 2 to 2014 Quarter 1.

Log(TTlag1) is the logarithm of the lagged variable of total trade, lagged once. In E-Views it was created as follows:

genr ttlag1= tt(-1)

Log(Mlag1) is the logarithm of the lagged variable of imports, lagged once.

Log(Xlag1) is the logarithm of the lagged variable of Exports, lagged once.

Log(Infl.) is the logarithm of the quarterly inflation rate (2006-2014), expressed in percentage, which was calculated using the Arithmetic mean from the monthly inflation rates figures provided by the National Institute of

Statistics in Rwanda. It has 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1)

Log(Population) is the logarithm of the quarterly population figures (2006-2014), which was calculated using the Geometric mean from the annual population figures downloaded from international organizations websites such as the World Bank's websites and Index Mundi website. It must be understood that all the quarter 4 figures except 2014 Q4 are the only actual figures, all the others are estimates. This variable has also 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1)

Log(Exchange Rates) is the logarithm of the Exchange rate figures (2006-2014). These where provided by the National Institute of Statistics in Rwanda. It has 32 Quarterly observations (2006 Quarter 2 to 2014 Quarter 1).

Table 1. Descriptive statistics for Rwanda time series

VARIABLE	Mean	Std. Dev	Min.	Max.	N
GDP	1,383,770,069.33	394,906,727.96	662,632,183.21	1,980,611,566.19	32
Total Trade	125,522,342.45	50,559,540.12	41,884,662.16	239,589,998.11	32
Imports	89,074,520.25	23,293,800.38	33,748,343.00	121,532,423.89	32
Exports	34,023,579.78	33,789,369.62	6,089,139.57	118,742,895.93	32
Population	10,244,098.81	672,599.87	9,261,070.21	11,437,573.77	32
Exchange rate	584.95	37.81	543.46	671.72	32
Inflation	0.08	0.04	0.02	0.18	32
GDP Growth	0.14	0.09	0.003	0.32	28
Total Trade growth	0.25	0.38	(0.38)	1.08	28
Export growth	0.66	1.18	(0.83)	4.03	28
Imports growth	0.14	0.26	(0.26)	0.74	28

CHAPTER V: DATA ANALYSIS, RESULTS AND DISCUSSION

This chapter discusses the main findings of this study. It is designed in a way it clearly illustrates the results of testing the two hypotheses mentioned in chapter I and at the same time answers the main questions of this study.

The first part of this chapter focuses on the results of testing the first hypothesis related to elasticity. After analyzing how GDP is elastic vis-a-vis Trade with the EAC the researcher goes further (deeper) to examine how the elasticity is distributed when it comes to GDP vis-a-vis imports; and to GDP vis-a-vis Exports.

The second part focuses on the results of testing the hypothesis related to sensitivity. Also after exploring whether Rwanda's exposure to EAC Trade has been a significant contributor to its Economic Growth or not, the sensitivity is then looked into taking into account total trade breakdown, that is the sensitivity of Rwanda's Economic Growth vis-a-vis Exports or imports alone.

Then the last part discussed the limitations of the study.

5.1 ELASTICITY ANALYSIS

This first part tests the following hypothesis:

1. Following the Trade ties in East African Community (EAC), we expect that Rwanda's GDP will be at least inelastic vis-à-vis Trade with EAC Partner States.

   $H_0 : \beta_1 = \beta_2 = \beta_n = 0 \longrightarrow$ Perfect Inelasticity

   $H_1 : \beta_1, \beta_2, \beta_n <> 0 \longrightarrow$ Inelastic and above

We start by looking at the benchmark equation reported as *Model (1)* in Table 2 below. *Ceteris paribus*, a 1% increase in total trade with EAC is associated with a 0.22 % increase in Rwanda's GDP. This result is significant at 1% level.

Therefore, we reject the null hypothesis that Rwanda's GDP is Perfectly Inelastic vis-à-vis Trade with the EAC and we accept the alternative hypothesis that there is at least inelasticity.

The results of model (1) alone show that when Rwanda's Total Trade with the EAC increase by 1%, Rwanda's GDP increases by 0.22%. Although this is modest, "it is promising since inelasticity is different from zero elasticity. In fact, Inelasticity is the first level of elasticity".

By inelasticity we mean that when total trade with EAC increase by 1, Rwanda's GDP does not increase also by 1 too but rather only by 0.22 which is of course less than 1. So the elasticity is less than 1 but greater than 0.

Since our variables of interest in all the 3 models in Table 2 are the variables related to trade with EAC only (variables in bleu), we do not spend time in interpreting all the other variables in the model since they were used just as control variables.

As it can be seen from Table 2, the R^2 is 0.94, the F-statistics is 91.2*** and the Durbin-Watson is 1.26.

The F-statistic which measures the overall significance of the regression model shows that the model is significant. The Durbin-Watson statistic shows that the possibility of a serial correlation in the equation is low. This is because the value is greater than one therefore close to 2 than it is close to 0.

MODEL 2 AND 3 FOR <u>DISAGGREGATION</u> OF MODEL 1 AND FOR <u>DEEPER INVESTIGATIONS</u>:

Model 2 shows that, *Ceteris Paribus*, a 1% increase in Rwanda's imports from EAC is associated with a 0.07% increase in Rwanda's GDP. This result is significant at 5% level. Therefore Rwanda's GDP is also inelastic towards imports from EAC.

Model 3 shows that exports from EAC do not significantly affect Rwanda's GDP since they are not significant even at 10% level.

The disaggregation seems to indicate that Imports from EAC are more influential than Exports when it comes to their specific effects on Rwanda's GDP. This may be because, as shown in chapter III above, Rwanda's trade balance vis-à-vis EAC has been negative ever since…, therefore a Trade deficit.

In fact, Rwanda's economy is heavily dependent on imports from EAC than it does with respect to its exports to EAC. In terms of proportions for the period from 2006 quarter 1 to 2014 quarter 1, Rwanda's Exports to EAC were 27% of Rwanda's total trade with EAC. While imports from EAC were of course 73% of Rwanda's total trade with EAC. So this may make it easier to understand why imports were found significant while exports were not.

Nevertheless, overall the strength of Imports together with Exports (total trade) is more robust as illustrated by Model (1) since Total Trade with EAC is statistically significant at 1% level in other words at 99% of confidence interval or again confidence coefficient.

This suggest more pro-EAC Trade policies by the Government of Rwanda since as Total Trade with EAC goes up the elasticity will also increase which will have a positive impact on Rwanda GDP and therefore on Rwanda's overall Economy.

Table 2. LEAST SQUARES ESTIMATES USING RWANDA TIME SERIES DATA

MOVING AVERAGE METHOD

***Dependent Variable:* Log(GDP)**

REGRESSORS	***Model (1)***	***Model (2)***	***Model (3)***
Log(TOTAL TRADE)	**0.22*** (3.60)**		
Log(Imports)		**0.07** (2.29)**	
Log(Exports)			**0.04 (1.30)**
Log(TTlag1)	0.18*** (2.68)		
Log(Mlag1)		0.17*** (5.50)	
Log(Xlag1)			0.0.5 (1.35)
Log(Exchange Rates)	1.63** (2.17)	- 2.05*** (-5.88)	2.65*** (2.87)
Log(Inflation)	- 0.005 (-0.94)	- 0.005 (-0.73)	- 0.003 (-0.05)
Log(Population)		5.46** (12.54)	
R sq.	0.94	0.99	0.91
F-Stat.	91.2***	972.48***	59.06***
Durbin-Watson	1.26	2.06	1.28
N	32	32	32

***$p < 0.01$; **$p < 0.05$; * $p < 0.1$ t-Stat. in parentheses

5.2 SENSITIVITY ANALYSIS

This second part tests the following hypothesis:

2. There is a Positive relationship between Rwanda's GDP Growth and the Growth rate of Total Trade with EAC Partner States. Therefore, Rwanda's exposure to EAC Trade has been a significant contributor to its Economic Growth.

   H_0 **:** $\beta_1 = \beta_2 = \beta_n = 0$

   H_1 **:** $\beta_1, \beta_2, \beta_n \neq 0$

5.2.1 AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODELS

5.2.1.1 GDP Growth vis-à-vis Growth of Total Trade with EAC

Table 3. TESTING FOR COINTAGRATION**: i.e., Whether Total Trade Growth and GDP Growth have association-ship or not.**

WALD TEST:

Test Statistic	Value	df	Probability
F-statistic	***5.177881***	(2, 25)	0.0131
Chi-square	10.35576	2	0.0056

Null Hypothesis: C(2)=C(3)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.349760	0.113139
C(3)	0.048645	0.022645

Restrictions are linear in coefficients.

After running the test as the results above show, we compare the F-Statistics

(in bold) with the critical value of bound test which was developed by M.H. Pesaran. The lower and upper bounds for the F-Statistic at the 10%, 5%, and 1% significance levels are [4.04, 4.78], [4.94, 5.73], and [6.84, 7.84] respectively. Therefore our F-Statistic is significant at 10% level since it is ***5.177881*** greater than 4.78 (the upper bound).

This means that we can reject the null hypothesis that there is no cointagression between Total Trade Growth and GDP Growth. Therefore, there is cointagration between these two variables. That is, the two variables move together in the long run.

Then, next we run our ARDL regressions

Table 4. ARDL Model (1)

Dependent Variable: D(GDPGR)
Method: Least Squares
Sample (adjusted): 2007Q2 2014Q1
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007954	0.008673	-0.917050	0.3675
ECT(-1)	**-0.350149**	0.112653	**-3.108198**	0.0045

R-squared	0.270910	Mean dependent var	-0.008846
Adjusted R-squared	0.242868	S.D. dependent var	0.052717
S.E. of regression	0.045871	Akaike info criterion	-3.257235
Sum squared resid	0.054707	Schwarz criterion	-3.162078
Log likelihood	47.60130	Hannan-Quinn criter.	-3.228145
F-statistic	9.660893	Durbin-Watson stat	1.340369
Prob(F-statistic)	0.004519		

What matters most in the table above is the information in bold. The table above is a final outcome of a long series of regressions as it is the way ARDL models are conducted.

The final result is shown by the ECT (Error Correction Term) coefficient and its t-Statistic.

What ECT shows in the model above is that the model is significant at 10% level according to the M.H. Pesaran[8] critical values (the t-Statistic at *10%*, 5%, and 1% significance levels *are [-2.57, -2.91]*, [-2.86, -3.22], and [-3.43, -3.82] respectively), according to M.H. Pesaran, ECT must be negative and significant for ARDL Model to be considered significant. When this happens then we can say that Growth of Total Trade variable affects positively GDP Growth variable.

The ECT coefficient (-0.35) is a long run coefficient and is called the speed of adjustment towards the long run equilibrium. Therefore in this model the speed of adjustment toward the long run equilibrium is around 35%.

The t-statistics of (-3.10) is greater (in absolute values) than (-2.91) the Pesaran critical value at 10% level (the upper bound). With this we can easily reject the null hypothesis and accept the alternative hypothesis.

---

[8] **Professor M. Hashem Pesaran: Emeritus Professor of Economics, University of Cambridge, John Elliot Distinguished Chair in Economics, University of Southern California, Director, Center for Applied Financial Economics, USC.**

Therefore, if the Growth rate of Total Trade with the EAC was to increase by 1 (one), Rwanda's GDP Growth would increases by 0.35 in the long run.

These results lead us to conclude that in general Rwanda's exposure to EAC Trade has been a significant contributor to its Economic Growth.

N.B: We cannot use the words "very significant contributor" because the results are only significant at 10% level of significance that means with 10% chance of errors and not at 1% chance of errors.

TESTING FOR STATISTICAL VALIDITY OF THE RESULTS

BREUSCH-GODFREY SERIAL CORRELATION LM TEST:

F-statistic	***2.284675***	***Prob. F(2,24)***	***0.1235***
Obs*R-squared	4.478288	Prob. Chi-Square(2)	0.1065

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 2007Q2 2014Q1
Included observations: 28
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000513	0.008278	0.061947	0.9511
ECT(-1)	-0.163890	0.134610	-1.217519	0.2352
RESID(-1)	0.395621	0.214720	1.842496	0.0778
RESID(-2)	0.191265	0.216948	0.881617	0.3867

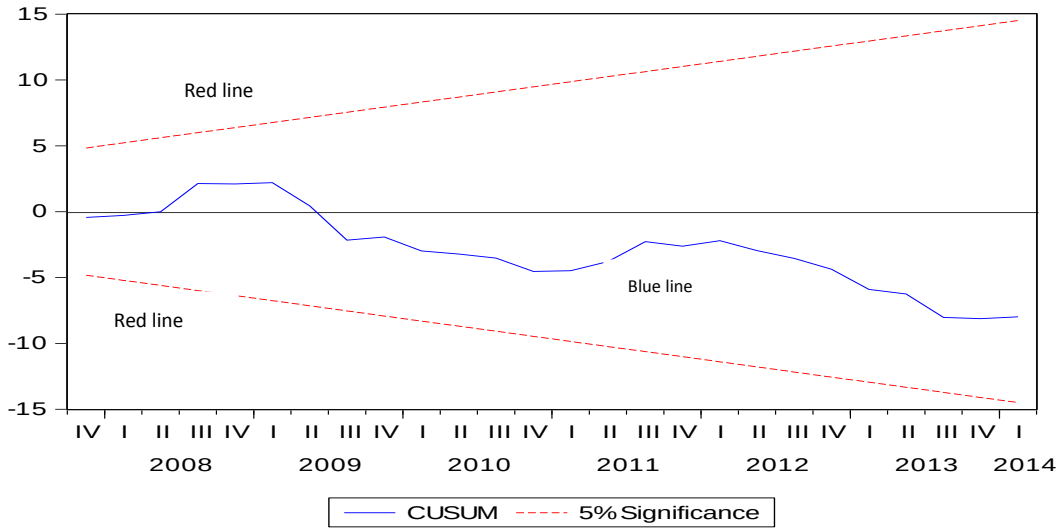
R-squared	0.159939	Mean dependent var	-1.92E-18
Adjusted R-squared	0.054931	S.D. dependent var	0.045013
S.E. of regression	0.043759	Akaike info criterion	-3.288659
Sum squared resid	0.045957	Schwarz criterion	-3.098344
Log likelihood	50.04122	Hannan-Quinn criter.	-3.230478
F-statistic	1.523116	Durbin-Watson stat	2.057129
Prob(F-statistic)	0.234026		

Null Hypothesis: There is no serial correlation.

Since F-statistic is not significant (0.1235) we cannot reject the null hypothesis that there is no serial correlation. This means of course that there is no serial correlation.

TESTING WHETHER THE MODEL IS STABLE OR NOT

CUSUM Test



Since the blue line lies between the two red lines it means that our model is stable. So we can easily accept the results of our model (1).

MODEL 2 AND 3 FOR DISAGGREGATION OF MODEL (1) AND FOR DEEPER INVESTIGATIONS:

5.2.1.2 GDP Growth vis-à-vis Growth of Imports from EAC

TESTING FOR COINTAGRATION: Whether Growth of Imports and GDP Growth have association-ship or not.

WALD TEST:

Test Statistic	Value	df	Probability
F-statistic	**5.063649**	(2, 25)	0.0142
Chi-square	10.12730	2	0.0063

Null Hypothesis: C(2)=C(3)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.388724	0.123191
C(3)	0.071502	0.033998

Restrictions are linear in coefficients.

After running the test as the results above show, we compare again the F-statistics (in bold) with the critical value of bound test which was developed by M.H. Pesaran. The lower and upper bounds for the F-Statistic at the 10%, 5%, and 1% significance levels are [4.04, 4.78], [4.94, 5.73], and [6.84, 7.84] respectively. Therefore our F-Statistic is significant at 10% level since it is ***5.063649*** greater than 4.78 (the upper bound).

This means that we can reject the null hypothesis that there is no cointagression between Imports Growth and GDP Growth. Therefore, there

is cointagration between these two variables. That is, the two variables move together in the long run.

Next we run our ARDL regressions

Table 5. ARDL Model (2)

Dependent Variable: D(GDPGR)
Method: Least Squares
Sample (adjusted): 2007Q2 2014Q1
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.007384	0.008625	-0.856115	0.3998
ECT(-1)	**-0.386287**	0.121392	**-3.182156**	0.0038

R-squared	0.280299	Mean dependent var	-0.008846
Adjusted R-squared	0.252618	S.D. dependent var	0.052717
S.E. of regression	0.045574	Akaike info criterion	-3.270197
Sum squared resid	0.054002	Schwarz criterion	-3.175039
Log likelihood	47.78275	Hannan-Quinn criter.	-3.241106
F-statistic	10.12611	Durbin-Watson stat	1.425758
Prob(F-statistic)	0.003766		

The interpretation is the same as in model (1) above.

The ECT coefficient (-0.39) is a long run coefficient and is called the speed of adjustment towards the long run equilibrium. Therefore in this model the speed of adjustment toward the long run equilibrium is around 39%.

The t-statistics of (-3.18) is greater (in absolute value) than (-2.91) the Pesaran critical value at 10% level (the upper bound). With this we can easily reject the null hypothesis.

Therefore, when the Growth rate of Imports from EAC increases by 1 (one), Rwanda's GDP Growth increases by 0.39 in the long run.

TESTING FOR STATISTICAL VALIDITY OF THE RESULTS

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.367505	Prob. F(2,24)	**0.2739**
Obs*R-squared	2.864420	Prob. Chi-Square(2)	0.2388

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Sample: 2007Q2 2014Q1
Included observations: 28
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000484	0.008511	0.056854	0.9551
ECT(-1)	-0.120301	0.143403	-0.838899	0.4098
RESID(-1)	0.330559	0.217526	1.519631	0.1417
RESID(-2)	0.107212	0.215296	0.497974	0.6230

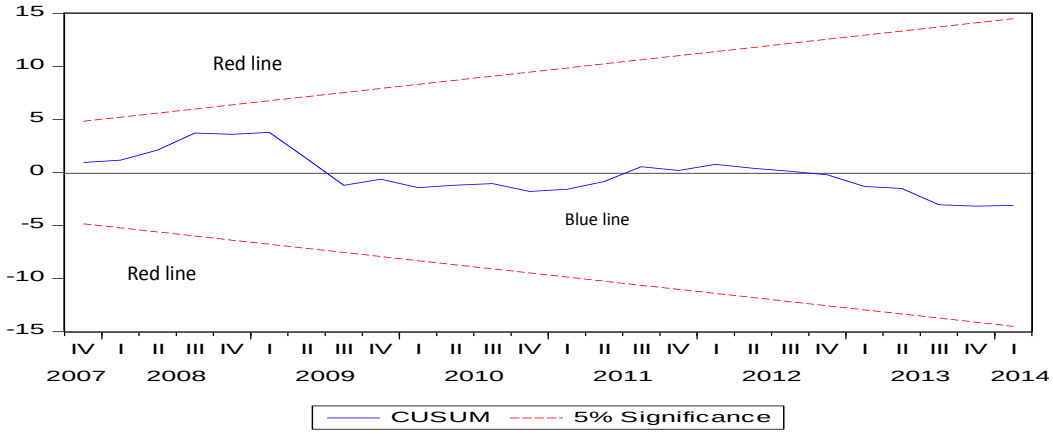
R-squared	0.102301	Mean dependent var	1.42E-18
Adjusted R-squared	-0.009912	S.D. dependent var	0.044722
S.E. of regression	0.044943	Akaike info criterion	-3.235260
Sum squared resid	0.048478	Schwarz criterion	-3.044945
Log likelihood	49.29364	Hannan-Quinn criter.	-3.177079
F-statistic	0.911670	Durbin-Watson stat	2.069512
Prob(F-statistic)	0.450063		

Null Hypothesis: There is no serial correlation.

Since F-Statistic is not significant (0.2739) we cannot reject the null hypothesis that there is no serial correlation. This that there is no serial correlation.

TESTING WHETHER THE MODEL IS STABLE OR NOT

CUSUM Test



Since the blue line lies between the two red lines it means that our model is stable. So we can easily accept the results of our model (2).

5.2.1.3 GDP Growth vis-à-vis Growth of Exports from EAC

Table 6. ARDL Model (3)

Dependent Variable: D(GDPGR)
Method: Least Squares
Sample (adjusted): 2007Q2 2014Q1
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECT(-1)	-0.292016	0.112816	**-2.588432**	0.0153

R-squared	0.175418	Mean dependent var	-0.008846
Adjusted R-squared	0.175418	S.D. dependent var	0.052717
S.E. of regression	0.047870	Akaike info criterion	-3.205585
Sum squared resid	0.061872	Schwarz criterion	-3.158006
Log likelihood	45.87819	Hannan-Quinn criter.	-3.191039
Durbin-Watson stat	1.217612		

ARDL of Growth of Exports to EAC and Rwanda's GDP Growth seem to be inconclusive! This means that the results are not good.

The t-statistic of the ECT is (-2.588432) therefore between the lower and the upper bound of M.H. Pesaran bound test statistics at 10% level [-2.57, -2.91]. and less than -2.91.

The disaggregation also seems to indicate that Growth of Imports from EAC is more influential than Growth of Exports when it comes to their specific effects on Rwanda's GDP Growth.

However, overall the strength of Imports Growth rate together with Exports Growth rate (total trade Growth rate) is more robust as illustrated by Model (1) since Total Trade Growth is statistically significant.

- **Possible reasons for imports positive significance (according to economic theories)**

According to Lin, Shuanglin. 2000, foreign trade benefits a developing country through obtaining advanced technology and the flow of ideas embodied in the imported products. Foreign trade also increases efficiency of domestic firms, which are forced to improve production technologies to compete in the domestic and international markets. Foreign trade may also

be accompanied by foreign direct investment, which increases a developing country's capital stock and the level of technology.

Some studies built on the import-growth relationship have found positive impact of import on growth especially through the impact of technology imports in the production process of developing countries (Perreira, 1996).

Grossman and Helpman (1991) demonstrated the importance of imports of foreign technology in the growth process of a country. He explained that the importation of foreign equipments create a more efficient production system, increases productive capacity, global output, technological capacity development and economic growth.

5.3 Limitations of the Study

One of the greatest challenges associated with this study is the limited availability of Rwanda Quarterly time series data. While data for GDP and Trade were available from 2006 to 2014, other series such as their GDP growth rates were only available starting from 2007. For some datasets, such as Investment (whether public of Private) and Government Expenditure quarterly series were not available at all.

In addition, the small sample size hinders the perfection of this study. The dataset used included observation from 2006 to 2014. Even if the data were

available for every quarter in this period for all the variables, the total number of observations would total only to 33. Conclusions drawn from such a small sample may not always be picture-perfect.

Another type of limitation is that for the results on elasticity analysis, the F-statistics when using the Autoregressive Distributed lag (ARDL) models were below the lower bound developed by Pesaran *et al*. (2001), and by definition no cointegration was possible in ARDL model which led us to conclude that the variables were I(0), i.e stationary although the stationality-test was showing the opposite. This was a dilemma at the beginning, but remember that as noted earlier Professor Sarkar said that the shorter the length of the series the lower is the power of the standard tests and for that matter different tests of unit root often give different results.

CHAPTER VI: CONCLUSION

This study was set out to scrutinize the Trade-Growth relationship in the context of Rwanda's Trade with the EAC. In essence, it has identified how elastic Rwanda's Economy is vis-à-vis its Trade with the EAC. The study has also sought to know whether Rwanda's Trade with the EAC has been a significant contributor to its Economic Growth. As seen in chapter two, the literature on the Trade-Growth relationship is not yet a clear cut. It was therefore not obvious to accurately imagine how Rwanda's Economy behaves when it comes to its Trade with the EAC without a clear and profound analysis of the statistics involved. That is particularly why this study sought to answer the following questions:

a. How is the relationship between Rwanda's Total Trade with EAC Countries and Rwanda's Economy? (Direction: Positive or Negative).

b. How elastic is Rwanda's Economy (GDP) with respect to EAC Countries Trade Relations (Rwanda's Total Trade with EAC countries)?

c. Further, how Rwanda's Economic Growth (GDP Growth) does behave when it comes to its trade (Growth) with EAC? In other

words, how sensitive is Rwanda's GDP Growth with respect to EAC Countries Trade Relations (Growth of Rwanda's Total Trade with EAC countries)?

This chapter therefore seeks to synthesize all the main findings of the study and give conclusions and implications related to the subject understudy.

All of this is to help policymakers in devising the right policies with respect to Rwanda's Trade relations with EAC Partner States in order to ensure that Rwanda reaps the maximum benefit it can from the EAC.

6.1 Empirical Findings

The main empirical findings are chapter specific and were discussed within the respective empirical chapter: (Data Analysis, Results and Discussion, chapter V). This section synthesizes the empirical findings to answer the study questions:

a. How is the relationship between Rwanda's Trade with EAC Countries and Rwanda's Economy? (Direction: Positive or Negative).

All the regressions run in this study indicated that the relationship between Rwanda's Trade with EAC Countries and Rwanda's Economy is positive. Therefore, this means that when total trade with the EAC increases then Rwanda's economy, whether GDP or GDP Growth, both increase.

b. How elastic is Rwanda's Economy (GDP) with respect to EAC Countries Trade Relations (Rwanda's Trade with EAC countries)?

Rwanda's Economy (GDP) was found to be inelastic vis-à-vis Trade with EAC. This means that the elasticity is greater than zero but less than one. Therefore, when Trade with EAC increases then the GDP also increases but in smaller proportions. As already seen in chapter V, The increase is not at all negligible.

c. Further, how Rwanda's Economic Growth (GDP Growth) does behave when it comes to its Trade (Growth) with EAC? In other words, how sensitive is Rwanda's GDP Growth with respect to EAC Countries Trade Relations (Growth of Rwanda's Trade with EAC countries)?

The Growth of Rwanda's Economy (GDP Growth) is fairly sensitive vis-à-vis Trade (Growth) with EAC. This means that Rwanda's GDP Growth behaves in a positive way because the two variables move together. Therefore, Rwanda's GDP Growth variation goes in the same direction as variation in the growth of Rwanda's Trade with the EAC. But it must be clear that the relationship between the two variables is not yet a one to one, in this sense in the long run Rwanda's GDP Growth slowly adjust to the changes in Trade with EAC.

****What this indicates in general is that Rwanda's exposure to Trade with the EAC has been moderately a significant contributor to its Economic Growth.*

6.2 Theoretical Implication

In chapter two on literature review we noticed that a positive Trade-Growth relationship is still a very controversial subject since it has supporters who say that the relationship is there and positive and those who are sceptic about the relationship and say that a positive Trade-Growth relationship is nothing more than an illusion.

We recognize and respect the views of the scepticists, but this study of Rwanda time series data supports the view that there is indeed a positive Trade-Growth relationship at least in the case of Rwanda. It has to be emphasized that this relationship cannot **yet** be generalized for all the countries since it may only be country specific. Therefore time series give better response in this area than may do cross-sectional or panel data regressions.

6.3 Policy implications

Let's recall that the findings in chapter V showed that Exports to EAC do not affect significantly Rwanda's GDP or Rwanda's GDP Growth. Furthermore

let's also recall that chapter III illustrated that Rwanda's Trade Balance still negative up to today when it comes to Trade with the EAC.

These two facts alone are enough to question (but with good intentions) Rwanda's Trade policies with respect to EAC.

One of the problems may be that our import strategy together with our export strategy may not be correctly coordinated!

Still, in general, the findings suggest the need for trade policy reviews which will enable the improvement of the current Trade Balance status quo (i.e.: Trade deficit) and further the situation of the whole Economy.

6.4 Recommendation for further research

First, as discussed in the early chapters, the findings of this study raised very important questions, therefore, further researches are needed to find out why what was found is so:

a) First, why imports are so significant? What do we import and through which channels do they affect our economy?
b) What do we export and why don't they significantly affect our economy?
c) More researches are needed on our import and export strategies (particularly with regards to EAC), how are they coordinated and

how can they be better coordinated for both our imports and exports to and from EAC to significantly affect our economy.

Second, one of the remaining fundamental questions which may be a subject for further research also is to empirically investigate to what extent Rwanda citizens' economic welfare was improved by Rwanda's membership in the EAC.

6.5 Conclusion

In spite of all the limitations uncounted, the study has been able to successfully deliver on its objectives. Now we have reliable statistics showing the behavior of Rwanda's Economy vis-à-vis its Trade with the EAC.

Since Rwanda's Economy responds positively to Trade with the EAC, in a Trade perspective, it can be concluded that it is a right decision for Rwanda to fortify its membership in the East African Community.

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