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EXPORT-LED GROWTH HYPOTHESIS: PANEL COINTEGRATION EVIDENCE

FROM EAST AFRICA

BY

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2007/HD02/9128U

A THESIS SUBMITTED TO THE DIRECTORATE OF RESEARCH AND GRADUATE

TRAINING IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN

AGRICULTURAL AND APPLIED ECONOMICS OF

MAKERERE UNIVERSITY

March, 2014

DECLARATION

I, Opoka James hereby declare that the work embodied in this thesis is my own and has never been submitted for any award in any other University. Where other sources of information have been used, they have been rightly acknowledged.

Signature ----------------------------------

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Date ---

APPROVAL

This thesis has been submitted with our approval as the University Supervisors.

Signed

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Dr. Bagamba Fredrick   Date

Signed

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Dr. Enid Katungi   Date

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DEDICATION

This research is dedicated to my father Mr. Opika Opoka H.S., my brother Mr. Onen Charles Mike, my sister Ms. Akullo Carolyne Mattrinah, my cousin Oballim Gerard, my wife Aloyo Innocent Jessie, and my daughters Agenorwot Danielle and Lamara Gabriella.

ACKNOWLEDGEMENT

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ABSTRACT

Economic growth continues to drive policy discussions across Africa and most developing countries. Different approaches have been employed including those that follow the market-led and export-led growth theories. Expansion of export base is expected to have significant impact on economic growth (Feder, 1983; Krueger, 1990). The study therefore examined the export-led growth (ELG) hypothesis for five East African countries of Uganda, Kenya, Rwanda, Tanzania and Burundi using panel co-integration and multivariate Granger causality tests. Also examined in the study was the impact of terms of trade volatility on exports and output. The results showed strong support for both long and short-run relationship between exports and outputs for all the East African countries. Feedback effects between exports and GDP are reported for Tanzania and Burundi while Uganda, Kenya and Rwanda reports unidirectional causality from exports to output. Overall the study supports Export-led growth hypothesis for all the five countries in the study. Using the Dynamic Ordinary Least Square (DOLS), the study shows that Terms of Trade Volatility has a Negative and Significant Effect on Exports in the long-run. It has also been shown using Vector Error Correction Model that Terms of Trade Volatility has a Negative and Significant Effect on both output and Exports in the short-run. These results supported the export-led growth hypothesis for the panel and for all individual countries in East Africa. Thus, to stimulate economic growth, policies that promote expansion of exports need to be emphasized; coupled with supportive fiscal and monetary policies

LIST OF ACRONYMS

AERC   African Economic Research Consortium

ASEAN   Association of East Asian Nations

BIMP-EAGA   Brunei-Indonesia-Malaysia-Philippines East-Asian Growth Area

DG   Directorate General

EAC   East African Community

ELGH   Export Led Growth Hypothesis

IFS   International Financial Statistics

IPS   Im-Pesaran-Shin

LLC   Levin-Lin-Chu

STATA   Statistical Package for Professionals

TOT   Terms of Trade

UNCTAD   United Nations Conference on Trade and Development

UNCTAT   United Nations Commodity Trade and Tariff

UNIDO   United Nations Industrial Development Organization

USD   United States Dollar

CHAPTER ONE

INTRODUCTION

1.1   Background

Economic growth and poverty reduction continues to dominate policy discussions across Africa and most developing countries. To achieve sustainable economic growth, African countries implemented significant trade liberalization policies starting in 1980s. Deregulation policies included reducing tariffs, removing price controls and restructuring state owned marketing boards with the hope of exposing countries to market-led economic growth (Katengeza *et al*. 2011). However, empirical studies indicated mixed results where increased imports and improved market coordination were reported, but there has been sluggish growth in exports especially at the beginning of trade liberalization (Ackah and Morrissey, 2005) and limited production across economic sectors especially in agriculture (Katengeza *et al*. 2011). In many countries trade deficit has increased. Therefore the challenge facing Sub-Saharan Africa (SSA) and the rest of Africa has been how to broaden and increase exports.

The five East African countries in this study are member states of the East African Community (EAC). The EAC aims at widening and deepening co-operation among the partner states and other regional economic communities in, among others, political, economic and social fields for their mutual benefit.

The challenges facing trade in East Africa include, most prominently, inadequate physical infrastructure; the need for reconciliation and harmonization of tariffs and border practices;

persistent interference with ground transport; institutional weaknesses (ranging from state bodies charged with negotiating trade agreements to customs, health, and standards agencies); and weak trade facilitation practices at land borders and ports. Solutions to these challenges, however, remain slow in bearing fruit. In addition to the daunting expense of improving roads, building bridges, developing rail transport, supplying ports, and strengthening storage facilities— especially for perishable agricultural products—those who wish to see East African regional and international trade flourish face a tangle of stakeholder ambivalence, resistance, and conflicts of interest (USAID, 2009).

1.2   Exports and GDP of East Africa

Table 1 below indicates that Kenya has the highest level of GDP in East Africa followed by Tanzania, Uganda, Rwanda and Burundi in a descending order. However, Tanzania's population is highest in the region followed by Kenya, Uganda, Rwanda and eventually Burundi in a descending order.

Table 1: GDP and Population of East African Countries for 2010

Countries	Gross Domestic Product (GDP) (in millions of US$), 2010	Population (1000 inhabitants), 2010
Kenya	32,152	40,513
Uganda	18,372	33,425
Rwanda	5,645	10,624
Tanzania	24,000	44,841
Burundi	1,400	8,383

Source: UNCTAD, 2012

Table 2 shows that Kenya has the highest exports to GDP ratio of 15.8%, followed by Tanzania with 10.7%, then Uganda with 10.4%, Rwanda with 7.3% and lastly Burundi with 5.1%.

Table 2: Percentage of East African Countries' Exports to the GDP per Country

Countries	Export: GDP ratio, 2010 (Percentage)
Kenya	15.8
Uganda	10.4
Rwanda	7.3
Tanzania	10.7
Burundi	5.1

Source: DG Trade Statistics (2012)

Table 3 shows GDP per capita of the five East African countries with Kenya having the highest GDP per capita of 760 USD, followed by Rwanda with 548 USD, Tanzania with 527 USD, Uganda with 503 USD and finally Burundi having the lowest GDP per capita of 189 USD.

Table 3: GDP per capita of East African Countries in 2010, current USD

Country	GDP per capita, current USD
Burundi	189
Kenya	769
Rwanda	548
Tanzania	527
Uganda	503

Source: World Bank (2010)

Table 4 shows that Burundi has the highest population engaged in Agriculture with 94%, Rwanda (90%), Uganda (82%), Tanzania (80%) and Kenya with the lowest population in

Agriculture with 75%. It also follows that percentage of GDP drawn from agriculture is highest in Rwanda with 35%, Burundi (33%), Uganda (29%), Tanzania (27%) and Kenya with 23.8%. East African countries remain heavily dependent on agriculture, portrayed by the structure of GDP where for the period 2003-2005 the average contribution of agriculture for Kenya was 24%, Tanzania 48% and Uganda 37.6% (East African Community-EAC, 2006).

Table 4: Principal Export of East Africa and percentage of population that works in Agriculture

Country	Principal Exports	Percentage of population that works in Agriculture	Percentage of GDP that is drawn from Agriculture
Kenya	Coffee, Tea, flowers and other horticulture vegetables, Clothing	75%	23.8%
Uganda	Coffee, fish and fish products, tea, precious metals, horticulture	82%	29%
Rwanda	Coffee, tea, insecticide (made from chrysanthemums), bananas, beans, livestock	90%	35%
Tanzania	Gold, fish, ores, coffee, tea, tobacco, cotton	80%	27%
Burundi	Coffee, tea, cotton	94%	33%

Source: USAID (2009)

From table 4 it is very clear that all the East African countries do export coffee and tea without exception. Ricardo's theory of comparative advantage explains that countries should specialize

in the production of commodities that are most efficient at producing in relation to other countries, and trade those commodities with the rest of the world.

Export promotion has also suffered from currency overvaluation which was evident in most African countries prior to trade liberalization. The liberalization of exchange rates was therefore a crucial policy measure as the overvalued local currencies acted as a disincentive for exports. Indeed, as a significant proportion of the cost of production is paid in domestic currency, an overvalued exchange rate results in a reduction of incentives and of exporters' ability to compete in foreign markets. This obstructs the flow of foreign exchange receipts and damages a country's ability to purchase the imports needed for economic activity. In addition, an overvalued local currency means that import-competing industries are faced with increased pressure from imports, resulting in increased calls for protection against overvalued currencies from industrial and agricultural lobbies. It is therefore clear that trade liberalization through removal of import restrictions would only be effective with a competitive exchange rate (UNCTAD, 2008).

Thus, since mid-1970s there has been considerable shift towards export promotion strategy in most developing countries including Sub Saharan African region (SSA). It is assumed under this approach that export expansion leads to better resource allocation, create economies of scale and production efficiency through technological development, capital formation and employment generation (Shirazi and Manap, 2005). Most governments accepted export-led growth (ELG) strategies and sustained external competitiveness of their economies through exchange rate policy and export subsidies (UNCTAD, 2008).

Taban and Aktar (2008) noted that in developing countries, exports can lead to economic growth because; exports use more advanced technologies and better capacity utilization due to the larger

market and they are the source of foreign exchange that is very scarce in most developing countries in the world. With this foreign exchange the countries can import better quality inputs and more capital. However, there is still debate over suitability of an outward looking trade policy for promoting economic growth and development (Todaro and Smith, 2003).

The proponents of Export-Led Growth argue that there has been success in East Asian Tigers as a result of outward-oriented policies and free market while in Latin America economies that followed inward-oriented policies under the import substitution strategy showed poor economic achievements. The export-led growth hypothesis has been widely accepted by academics (Feder 1982; Krueger 1990) and has evolved into a "new conventional wisdom" (Tyler 1981; Balassa 1985). In addition, the theory has also shaped the development of a number of countries as well as the policies of the World Bank (World Bank 1987). Thus, stimulation of export-led orientation through implementation of adjustment and stabilization programmes in many countries was viewed as one way of correcting economic imbalances. It was thought that promoting exports would enable developing countries to correct imbalances in the external sector and assist them in their full recovery (Shirazi and Manap, 2005).

Nevertheless, the results from empirical studies on the relationship between exports and economic growth have been inconsistent for both developed and developing countries. This therefore continues attracting research attention to examine export-led growth hypothesis in different countries and regions including East Africa. Empirical studies have also noted that economic growth can be heavily influenced by countries' terms of trade (the price of exports relative to the price of imports) and exchange rate regimes which also greatly affect export

growth. Fatima (2010) reported that worsening of terms of trade has a negative impact on economic growth, as it ultimately reduces gross domestic product.

Most developing economies typically face large swings in export price and this increases volatility in the growth of output (GDP) (Broda and Tille, 2003). In such a case, exchange rate regime plays key role in the developing country's ability to absorb fluctuations in their terms of trade; albeit with perfect circular flow of income and expenditure. Economic theory suggests that in a country with a flexible exchange rate, fluctuations in the terms of trade will be offset by movements in the exchange rate, eliminating much of the impact on economic activity. On the other hand, a country with a fixed exchange rate will experience substantial swings in output (Broda and Tille, 2003).

1.3   Problem Statement

It has been observed that flexible exchange rate regime protects the economy from external pressures by allowing nominal exchange rate to fluctuate in accordance with market forces and this is critical for economies as exports will tend to increase. Increased exports in turn will stimulate economic growth (Sozovska, 2004).

In addition, most experts agree that promoting exports is beneficial for both developed and developing countries. The reasons being that export promotion generate a greater capacity utilization; take advantage of economies of scale; bring about technological progress; create employment and increase labour productivity; improve allocation of scarce resources throughout the economy; relax the current account pressures for foreign capital goods by increasing the country's external earnings and attracting foreign investment; and increase the total factor productivity and consequently the well-being of the country (World Bank, 1993). In realization

of this, there has been considerable shift over the years towards promotion of export-led growth in many countries (Shirazi and Manap, 2005).

The question this study puts forward is that; has export-led growth theories been making impact on economic growth in Eastern Africa? In other words has export promotion strategies led to increased output in the region? Empirical evidence also suggests that achievement of stable and sustainable export-led growth requires stability in the country' terms of trade. For instance, Fatima (2010) reported that worsening terms of trade has a negative impact on economic growth as it ultimately reduced gross domestic product. Bleaney and Greenaway (2000) also reported that an improvement in terms of trade and elimination in real exchange rate overvaluation enhances growth and investment increase. The question raised by this study therefore is, how has terms of trade volatility impacted levels of exports and output in East Africa? Export-led growth hypothesis is thus, a broad spectrum that requires substantial analysis to examine.

The study can therefore be of substantial impact to literature and the policy makers of East African governments as they continue to strive to achieve sustainable economic growth by employing various strategies.

1.4   Objectives of the Study

1.4.1   General Objective

To examine export-led growth hypothesis in East Africa using panel co-integration analysis from 1970 to 2008.

1.4.2   Specific Objective

1. To examine the relationship among the major economic variables (that is, Exports and GDP) in the five East Africa countries

2. To determine the impact of Export Growth on GDP for the five East African Countries.

3. To determine the Impact of terms of trade volatility on Exports and GDP in East Africa.

1.5   Hypothesis

1. Export is significantly different from GDP in the five East African countries

2. Export growth has had no impact on GDP in the five East African countries

3. Terms of trade volatility has no effect on Exports and GDP in East Africa

1.5   Scope of study

This study uses secondary panel data for Uganda, Tanzania, Kenya, Rwanda, and Burundi to examine export-led growth hypothesis using panel co-integration theories. The period of the study stretches from 1970 to 2008.

CHAPTER TWO

LITERATURE REVIEW

2.1   Introduction

Empirical studies have given divergent views on Export-led growth hypothesis for both developed and developing countries. By employing various methodologies in the studies of export-led growth nexus, there are still contradicting views on this subject matter.

2.1.1   Evidence of Export-led Growth hypothesis around the world

The export-led growth hypothesis still attracts attention from so many quarters as recent evidence fails to unequivocally support a robust exports–economic growth nexus. In South America for instance Maneschiold (2008), found co-integration between exports and economic growth in Argentina and Mexico. The export-led growth hypothesis in the countries was further supported by causal relationship in either bi-directional or unidirectional from export to GDP. However, Maneschiold failed to support the theory in Brazil. In Chile, Toda and Yamamoto (1995) procedure for testing for Granger non-causality in Vector Autoregressive models that involve variables that are integrated of an arbitrary order and that are possibly co-integrated using annual time series data was applied. The study examined impact of manufactured and primary exports on the economic growth and noted a significant but differentiated impact of manufactured and primary exports on the economic growth.

Applying the standard Granger causality tests for 37 developing countries to analyze the relationship between export growth and economic growth using time-series data, Jung and Marshall (1985) found evidence for export-led growth hypothesis in only four countries.

Similarly, Darrat (1986, 1987) rejects export-led economic growth causality for three out of four countries. Nonetheless, Chow (1987) in a sample of eight newly industrialized countries (NICs) found strong bidirectional causality between export growth and industrial development in seven. The sentiments were shared by Bahmani-Oskooee and Alse (1993) who used error correction modeling (ECM) approach and found strong support for export-led growth hypothesis for all nine developing countries included in the sample. Likewise, Dutt and Ghosh (1996) found support for the export-led growth hypothesis in half of their sampled countries and Xu (1996) also supported the theory in 17 out of 32 developing countries studied.

Shirazi and Manap (2005) found strong support for a long-run relationship among exports, imports, and real output for all of the five countries studied except Sri Lanka. There were feedback effects between exports and GDP for Bangladesh and Nepal, unidirectional causality from exports to output in Pakistan but no causality was reported for Sri Lanka and India. Feedback effects were also reported between imports and output in Pakistan, Bangladesh, and Nepal, as well as unidirectional causality from imports to output growth for Sri Lanka. Similarly, results by Ekanayake (1999) in eight Asian developing countries showed existence of bi-directional causality between export growth and economic growth in India, Indonesia, Korea, Pakistan, Philippines, Sri Lanka and Thailand. There was also evidence for export-led growth in Malaysia. Short-run Granger causality running from economic growth to export growth were reported in all cases except Sri Lanka but there was no strong evidence for short-run causality running from export growth to economic growth.

Dritsakis *et al.* (2006) examined empirically the causal relationship among exports, gross capital formation, foreign direct investments and economic growth using a multivariate autoregressive

VAR model for Greece over the period 1960-2002. The results of cointegration test suggested that there was only one cointegrated vector between the examined variables, while Granger causality tests showed that there was a unidirectional causal relationship between exports and gross fixed capital formation and also there was a unidirectional causal relationship between foreign direct investments and economic growth.

Estimating export-augmented production function for 14 Asian developing countries including Pakistan, Rana (1985) found evidence supporting the argument that exports contribute positively to economic growth. Again, Kemal *et al*. (2002) found strong support for long-run causality from export to GDP for Pakistan and India, and bidirectional causality for Bangladesh, Nepal, and Sri Lanka. Kemal *et al*. (2002) also found short-run causality from exports to GDP for Bangladesh and Sri Lanka, and reverse short-run causation from GDP to exports for India and Nepal. On the other hand, Anwar and Sampath (2000) examining export-led growth hypothesis for 97 countries including Pakistan, India, and Sri Lanka for period 1960–92, found unidirectional causality in Pakistan and Sri Lanka but no causality for India. Likewise, Ahmed *et al*. (2000) rejected the export-led growth hypothesis for all but one (Bangladesh) of the countries studied using a trivariate causality framework.

Using panel co-integration techniques for three BIMP-EAGA (Brunei-Indonesia-Malaysia-Philippines East-Asian Growth Area) countries (that is, Indonesia, Malaysia, and the Philippines), Hanim (2009) failed to reject the null hypothesis of no co-integrating relationship between export and development for Indonesia, Malaysia, and the Philippines. Thus, there was no evidence supporting export-led growth hypothesis implying that exports could not be seen as the "engine" of growth in the BIMP-EAGA countries. Malaysia, Indonesia and Philippines are

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dynamic developing countries which experienced rapid economic development. However, the story may be different for the case of developing countries in Sub-Saharan countries.

Nonetheless, Al-Yousif (1997), using a multivariate model for Malaysia, supported the export-led growth hypothesis as a short-run phenomenon while El-Sakka and Al-Mutairi (2000) found mixed results regarding the direction of causality in 16 Arab countries. Ghartey (1993), using a vector autoregressive (VAR) model for Taiwan, the United States, and Japan, found export-led growth in Taiwan, economic growth Granger causes export growth in the United States, and a feedback causal relationship existing in Japan. Against this, Kwan, Cotsomitis, and Kwok (1996) found mixed results for Taiwan, while Boltho (1996) found that domestic forces rather than foreign demand propelled longer-run growth in Japan. Ahmed and Harnhirun (1996) rejected the export-led growth hypothesis for five ASEAN (Association of East Asia Nations) economies, while Gupta (1985) found bidirectional association between exports and economic growth for Israel and the Republic of Korea.

Nandi and Biswas (1991), Bhat (1995), and Ghatak and Wheatley (1997) found evidence of an export-led economic growth nexus for India, while Xu (1996) rejected the export-led growth hypothesis for India. Shirazi and Manap (2005) strongly supported a long-run relationship among import, export and output growth in Pakistan. Their study found feedback effect between import and output growth, and unidirectional causality from export to output growth but no significant causality between import and export growth. Using simultaneous equation model Khan and Saqib (1993) also found a strong relationship between export performance and economic growth in Pakistan. Meanwhile Mutairi (1993) found no such support for the period

1959–91, while Khan *et al*. (1995) found strong evidence of bidirectional causality between export growth and economic growth for Pakistan.

Choong *et al*. (2005) using the recent technique – the bounds testing approach to test the validity of the export-led growth hypothesis in Malaysian economy provided further evidence to support export-led growth hypothesis. According to Choong *et al*. (2005) both exports and labour force had stimulated positive adjustment to economic growth, whereas imports, exchange rate and East Asian financial crisis influenced growth negatively. Co-integrated relationship between exports and economic growth was detected in both the long and short runs. Further analysis showed that exports Granger-cause economic growth. Nevertheless, further examination of the export-led growth (ELG) hypothesis in Costa Rica, Medina-Smith (2001), while confirming the validity of the theory, empirical results showed that physical investment and population mainly drove Costa Rica's overall economic performance from 1950 onwards. These results clearly supported the neoclassical theory of production and, to a lesser extent, the so-called new-fashioned economic wisdom. Serious doubt was reported with regard to promoting exports as a comprehensive development strategy. Thus, Medina-Smith (2001) concludes that ELG hypothesis is probably beneficial only for a limited number of developing countries, and only to a certain extent.

In conclusion, empirical evidence is not conclusive with regard to validity of export-led growth hypothesis. While some studies report that exports drive economic growth others found that exports are a function of level of economic growth. Furthermore, Shirazi and Manap (2005) observed that some empirical studies found that the effect of exports on economic growth depends on the level of development of the country concerned and the composition of exports themselves while some maintain that a long and complex process of structural change and

economic development precedes both export expansion and economic growth. Thus, studies in the subject are still vital.

2.1.2 Terms of Trade Volatility and Exports and GDP

Empirical evidence in economic literature has stressed the importance of trade as a main driver of economic growth and development (UNIDO, 2010). Arguments have been put forward, that the relationship between trade and development is complex. It is not guaranteed that trade will automatically lead to economic growth for developing countries. In order to increase the likelihood of this happening, there is need to harmonise different economic policies to align countries to better position of achieving significant growth in output. To this regard, countries ought to review their trade and industrial policies as well as policies that will stimulate exports so as to realise each country potential growth. Razmi and Blecker (2004) observed that developing countries compete in the world market for exports and this calls for better exchange rate policies to take into account the nuances of international competition.

Of particular importance are also terms of trade which play a significant role in export promotion and economic growth as a whole. An unfavourable term of trade for example leads to sluggish growth in goods a country exports and minimizes investments which in turn affects growth in output (Fatima, 2010). According to Bleaney and Greenaway (2004), an improvement in terms of trade leads to improvement in growth and investment. However, volatility in a developing country's terms of trade can seriously disrupt output growth (Broda and Tille, 2003). Nevertheless, flexibility in exchange rate minimises contraction in output. Bleaney and Greenaway (2004) also suggest the same, arguing that elimination of exchange rate overvaluation and maintenance of its competitiveness enhances investment and help exporters

overcome the costs of exchange rate variability and this encourages growth of exports. An insight into exchange rate regimes and its impact on exports is therefore of significant importance.

2.1.3   Real exchange rate volatility and Exports

Vergil (2002) notes that long-run relationship between Turkey's real exports and its exchange rate volatility is negative and statistically significant for Germany, France and the United States. In addition, the exchange rate volatility has a negative short-run effect on real exports to Germany. But for the rest of the countries in the study, the short-run impact of the exchange rate volatility is statistically insignificant. Adubi and Okunmadewa (1999) are able to establish that exchange rate volatility has a negative effect on agricultural exports, while price volatility has a positive effect. Thus, the more volatile the exchange rate, the lower the incomes of farmers, which subsequently also leads to a decline in output production and a reduction in export trade.

A study by Kiptui (2008) corroborates with previous findings by concluding that exchange rate volatility has significant negative short and long-run effects on Kenya's real exports of tea and horticulture. The elasticity with respect to the exchange rate risk variable is found to be -0.02 for tea and -0.33 for horticulture. Arize et al. (2005) study eight Latin American countries showed that increases in the volatility of the real effective exchange rate, exert a significant negative effect upon export demand in both the short-run and the long-run in each of these countries.

CHAPTER THREE

METHODOLOGY

3.1   Data and Data Sources

The study used panel time series data for four variables which included; Gross domestic product GDP, Exports (X), terms of trade (TOT) and real exchange rate (RER). The Time series data were obtained from World Bank database, IMF's *International Financial Statistics* Year book and the United Nations Statistics Division Database (UNSDD). The study period covered 1970 to 2008. The countries in the study included Uganda, Tanzania, Kenya, Burundi and Rwanda. Data for Exports and GDP were captured in United States dollar (US $) and were obtained from the United Nations Statistics Database. Data for nominal exchange rate (in US $) were obtained from the IFS Year book in the case of Uganda, Kenya, Tanzania and Rwanda. Data on nominal exchange rate for Burundi was missing and therefore not captured. Terms of trade were computed from data obtained from the UNSDD year book. Real exchange rate was computed from data obtained from IFS. Finally, real exchange rate volatility was measured as the variance of the RER around its predicted trend and terms of trade volatility was measured as the standard deviation of the TOT at the time t. To analyze the panel datasets STATA and Eviews were used. However, data for Burundi was obtained for only two variables that is; GDP and exports.

3.2   Data Analysis and Empirical Modelling

STATA and Eviews were used as statistical packages for analyzing data. Due to data inadequacy, Burundi was excluded from the third objective of the study. This study has used GDP as a proxy for Economic growth.

3.2.1 The relationship among the major economic variables (that is, Exports and GDP)

This study used descriptive statistics whereby trends of major economic variables in the analysis that is exports and GDP were examined by transforming exports and GDP into logs and then obtaining their means and standard deviations. In addition the study also employed time series line graphs to observe the gap between Exports and GDP for Uganda, Kenya, Rwanda, Tanzania and Burundi. Data was transformed into natural log since there was interest in measuring the rate of change which was captured by the coefficients of the regressors (Aliyu, S.U.R., 2008).

3.2.2 The Impact of Exports on GDP

The first step to analyze time series data is to investigate time series properties of the variables in the time series was to determine their stationarity. Several panel unit root tests currently exist. The power of these tests is substantially greater than the tests for time series in that the failure to reject a unit root test occurs much less frequently. In this study, the panel unit root test was used as proposed by Levin *et al.* (2002) [Levin-Lin-Chu test – (LLC test)], which allows for heterogeneity of the intercepts across members of the panel, and by Im *et al.* (2003) [Im-Pesaran –Shin test (IPS test)], which allows for heterogeneity in intercepts as well as in the slope coefficients; both of these tests are constructed by averaging individual Augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) t-statistics across cross-section units.

The LLC test is of the null hypothesis that each individual time series in the panel is integrated against the alternative hypothesis that all individual time series are stationary. The test is based on the following pooled ADF equation:

$$\Delta Y_{it} = \alpha_i + \delta t + \gamma_i\, y_{it-1} + \sum_{l=1}^{p_i} \phi_{il}\Delta y_{it-l} + \varepsilon_{it} \tag{1}$$

Where a common $\delta = \rho - 1$ is assumed, ΔY_{it} is the difference dependent variable, y_{it-1} represents the exogenous variable(s) in the model at level and Δy_{it-l} the exogenous variable(s) in the model after differencing. The model includes fixed effects or individual trends (t), and ρ_i is the required country specific degree of lag augmentation to make the residuals white nose that is determined by the conventional step-down procedure. The null hypothesis H_0: $\delta = 0$ under the assumption that $\delta_i = \delta$ for all i is tested against the alternative hypothesis, H_1: $\delta < \delta_i$ for all i. The test is based on a technique that removes autocorrelation as well as deterministic components.

The panel specification for the IPS test takes the form:

$$\Delta y_{it} = X_{it}'\alpha + \delta y_{it-1} + \sum_{L=1}^{p_i} \beta_{ij}\Delta y_{it-L} + \varepsilon_{it} \tag{2}$$

Where $X_{it,}$ are exogenous variables in the model that also includes the time dummies used to account for cross-sectional correlation that could result from common shocks affecting all countries in the study. The null hypothesis is H_0 is $\delta = 0$ for all i (i.e., all series have a unit root) and is tested against the alternative H_1: $\delta_i < 0$ for $i = 1, 2, \ldots, N$ and $\delta_i = 0$, for $i = N_1 + 1, N_2 + 2$ ... N. On the assumption that the N cross-section units independently distributed, the t-statistic can be computed as an average of the individual ADF t-statistics such that:

$$\bar{t}_{NT}(p_i) = \frac{\sum_{i=1}^{N} t_{iTi}(p_i)}{N} \tag{3}$$

Where $\bar{t}_{NT}(p_i)$ is the t-statistic for testing $\delta_i = 0$ in each individual ADF regression. In a further step, the above t-bar statistic is standardized so that it converges to a standard normal distribution as N increases. A key strength of the IPS test is that δ_i is allowed to differ across countries and only a fraction of panel members is required to be stationary under the alternative hypothesis.

The next step was to test whether GDP and exports are co-integrated. The available techniques for panel co-integration tests are in essence an application of the Engel and Granger (1987) co-integration analysis. As in the analysis of single time series, these approaches test the residuals from the estimation for stationarity. Kao *et al.* (1999) and Pedroni (1995) provide different statistics for this purpose, both of which assume homogenous slope coefficients across countries.

Kao *et al.* (1999) tests the residuals $\hat{e}_{it}$ of the OLS panel estimation by applying DF- and ADF-type tests:

$$\hat{e}_{it} = \hat{e}_{it}\rho_{it-1} + \upsilon_{it} \tag{4}$$

and

$$\hat{e}_{it} = \hat{e}_{it}\rho_{it-1} + \sum_{j=1}^{p}\phi_j\Delta\hat{e}_{it\text{-}j} + \upsilon_{it}. \tag{5}$$

The null hypothesis of no co-integration, H_0 is $\rho = 1$, tested against the alternative hypothesis of stationary residuals, H_1: $\rho < 1$. The OLS estimate of ρ can be written as:

$$\hat{\rho} = \frac{\sum\limits_{i=1}^{N}\sum\limits_{t=2}^{T} \hat{e}_{it}\,\hat{e}_{it-1}}{\sum\limits_{i=1}^{N}\sum\limits_{t=2}^{T} \hat{e}_{it-1}^{2}} \tag{6}$$

To test for long and short-run co-integration relationship the study applies Westerlund's (2006) panel Z-LMC test to test the null hypothesis of panel co-integration between GDP and exports. The estimated equation is:

$$\text{AdjGDP}_{it} = \eta_i + \delta t_i + \beta X_{it} + \varepsilon_{it}, i = 1,...N, t = 1,...,T \tag{7}$$

$$\Delta\text{AdjGDP}_{it} = \eta_i + \delta\Delta t_i + \beta\Delta X_{it} + \varepsilon_{it}, i = 1,...N, t = 1,...,T \tag{8}$$

Where; Δ = difference of a variable, AdjGDP refers to adjusted gross domestic product, η_i is the intercept, t is time trend, δ is the coefficient of the time trend, $X_{it.}$ i is countries 1 to 5 and subscript t refers to time period from 1970 to 2008. Adjusted GDP is used to correct for effects of price changes.

The co-integration of the series by either Engle-Granger approach or Johansen-Juselius approach or both implies existence of an error correction model (ECM) (Rahman and Mustafa, 1997:84) including an error correction term (ECT) obtained from relevant co-integration regressions. ECT is then used for correcting disequilibrium and testing for long-run and short-run causality among co-integrated variables. The error correction models are suitable for this study as compared to the GARCH models because of its suitability in working with finite number of samples (Arize *et al*, 2005). The error correction models are defined as in equations (9) and (10).

$$\Delta Y_{\mathrm{t}} = \alpha_1 + \sum_{i=1}^{m} \beta_{1i} \Delta Y_{t-i} + \sum_{i=1}^{n} \lambda_{1i} \Delta X_{t-1} + \sum_{i=1}^{r} \delta_{1i} ECT_{t-1} + e_t \tag{9}$$

$$\Delta X_{\mathrm{t}} = \alpha_2 + \sum_{i=1}^{m} \beta_{2i} \Delta X_{t-i} + \sum_{i=1}^{n} \lambda_{2i} \Delta Y_{t-1} + \sum_{i=1}^{r} \delta_{2i} ECT_{t-1} + e_t \tag{10}$$

Where; Δ refers the differenced stationary form of the variables. The sources of causality could be exposed through the statistical significance of: a) a joint test applied to the sum of the lags of each explanatory variable in turn by an F or Wald χ^2 test; b) the lagged ECTs by a t-test which is the weak exogeneity test, which is considered by Asafu-Adjaye (2000) as short-run causality since the dependent variable responds only to short term shocks to the stochastic environment c) a joint test applied to the sum of each explanatory variable and the lagged ECTs by an F or Wald χ^2 test which is a strong exogeneity test, which gives us the long-run causality. Masih and Masih (2000) for instance, the null hypothesis that "Y does not granger cause X" is rejected if the lagged values of ΔY are jointly significant from zero in equation (9). The same hypothesis is also rejected if the lagged value of ECT_{t-1} is significant or lagged values of ΔY and the lagged value of ECT_{t-1} are jointly significantly different from the zero. If the estimated values of lag variables in equation (9) are statistically significant, then we can conclude that Y Granger causes X in the short run. In addition, if the coefficient of the ECT_{t-1} term is significant, then we can say that Y Granger causes X in the long-run.

3.2.3 Impact of Terms of Trade Volatility on Exports and GDP

The study analysed the long-term impact of terms of trade (TOT) on East African countries of Uganda, Kenya, Rwanda and Tanzania using the Dynamic Generalized Least Squares (DGLS) and the Dynamic Ordinary least Squares (DOLS). Several techniques were used to increase

robustness of acquired results (Komarek *et.al*., 2001). This study applied the Dynamic Generalized Least Squares (DGLS) methodology of Stock and Watson (1993) as described in Campbell and Perron (1991). This methodology corrects for (i) serial correlation where the sample residuals exhibit AR (1) using Generalized Least Square (GLS); and (ii) endogeneity of the regressors by including lags and leads of changes in the explanatory variables. Mark and Sul (1999) showed that there are sizeable gains from pooling the data. Kao and Chiang (1999) have compared different estimation techniques for panel data and have found that the DGLS easily outperforms both OLS and fully modified OLS (FMOLS). Also, while economic theory provides some guidance on long-run parameters, it is typically silent on short-run dynamics and the exact nature of the adjustment processes (see for example, Haque *et al*., 1999). To this end, the analysis is based on the panel dynamic generalized least square (DGLS) method to obtain the long- and short-run parameters of the model. The long-run DGLS procedure involves running the following function (Y_{it}) regression:

$$Y_{it} = \alpha_i + \lambda_{it} X_{it}^{'} + \sum_{k=1}^{p_i} \beta_{it} \Delta X_{it}, L_{t-i} + \sum_{k=1}^{p_i} \delta_{it} \Delta X_{it}, L_{t+i} + \varepsilon_{it} \tag{11}$$

Where Y_{it} is the dependent variable for country i at time t, $X_{it}^{'}$ the regressors of the model are in the level, L_{t-i} denoted the lag operator and L_{t+i} lead operator of the first differenced parameters, and ε_{it} is the error term to capture the unobserved effects and is assumed to have zero mean and constant variance. The lead and lags are included in the cointegration regressions in order to produce asymptotically unbiased estimators, and to avoid the likely problem of estimating nuisance parameters.

The long-run DOLS procedure involved running the model below following Kao and Chiang's (2001) dynamic OLS (DOLS).

$$Y_{it} = \alpha_i + X_{it}^{'}\beta + \sum_{j=p}^{q} c_{ij}\Delta X_{it+j} + \varsigma_{it} \tag{12}$$

Where $X_{it}^{'}$ the regressors of the model in levels, ΔX_{it+j} the regressors of the model with leads and lags at first difference, ς_{it} is the error term. The DOLS (p, q) where p and q denote the number of leads and lags respectively are estimated.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Trends of Major Economic Variables in the Analysis

4.1.1 Descriptive Characteristics of the Data

The data was first converted to natural log then summarized in Table 5. In real terms Kenya has a higher GDP (22.97) followed by Tanzania, Uganda, Rwanda and Burundi (20.63). Kenya also leads in exports (21.39 and is followed by Tanzania, Uganda, Rwanda and Burundi. Figure 1 reports logarithmic plot of the data and demonstrates that individually the real GDP and real exports of each country move in the same direction (co-move) for the period understudy implying that these variables may move together as stipulated by economic theory.

Table 5: Descriptive Statistics

Variable	Country	Mean	Std. Dev	Min	Max
GDP	Uganda	22.29	0.50	21.72	23.35
	Kenya	22.97	0.41	22.19	23.64
	Rwanda	21.51	0.35	20.92	22.23
	Tanzania	22.45	0.43	21.80	23.36
	Burundi	20.63	0.23	20.17	20.93
Exports	Uganda	19.93	0.70	18.62	21.30
	Kenya	21.39	0.40	20.83	22.18
	Rwanda	18.52	0.42	17.63	19.24
	Tanzania	20.30	0.72	19.17	21.69
	Burundi	18.24	0.22	17.83	18.75
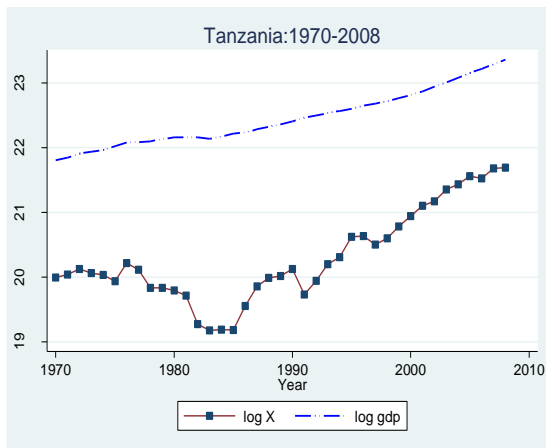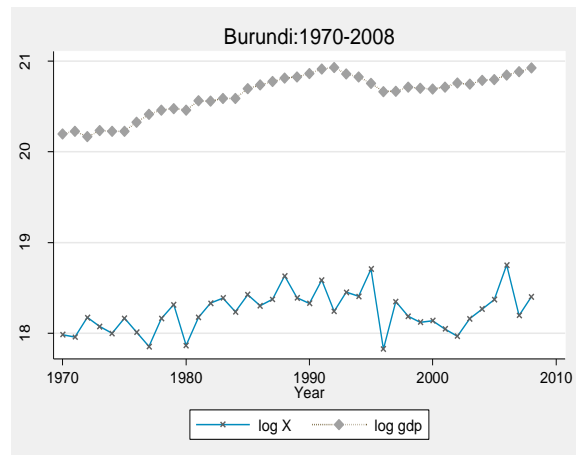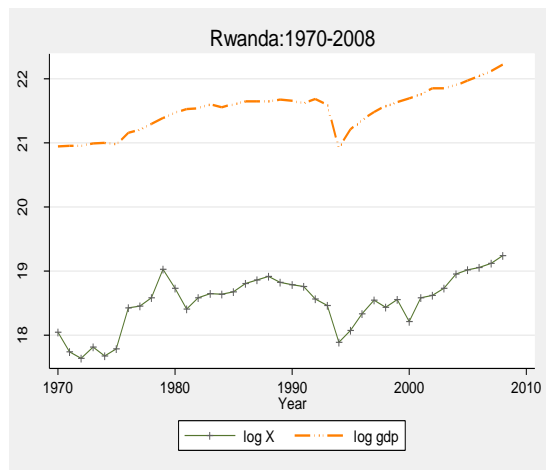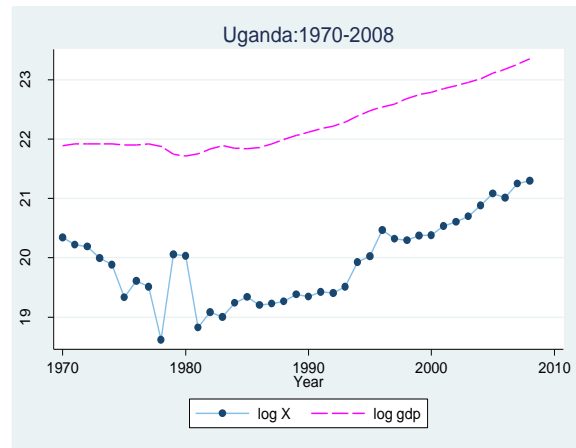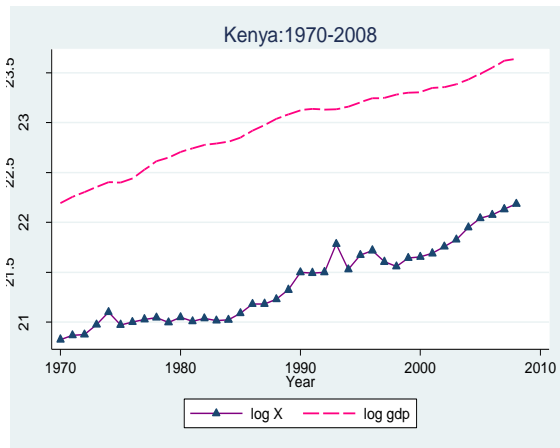
Figure 1: Logs of GDP and Exports in East Africa

Figure 1 show natural logs of GDP and Exports in East Africa and it also indicates that for all the East African countries in the study, the GDP line lies above the export line. This stems from economic theory which postulates that there are other components of GDP other than Exports. The other components of GDP include Government expenditure, Investment expenditure, household expenditure and Imports. Other factors that influence the size of income in East Africa besides exports are many, but vary from country to country— including macroeconomic policies, investment and trade, political and economic institutions, infrastructure and financial development, human capital, and income distribution (EAC, 2012).

From figure 1 it can be noted that over the period of study the GDP of Kenya, Uganda and Tanzania have been growing steadily. However, the exports of Uganda and Tanzania plunged in the late 1970's while Kenya's exports remained stable. This can be explained by the collapse of the East African community in 1977 due to its lack of steering functions, the unequal distribution of benefits and the differences of opinion between leading players (Stefan and Moritz, 2011). For the case of Rwanda one very notable fall in both her GDP and exports was observed in the mid 1990's which was as a result of the political instability that was peaked with 1994 Rwanda genocide. Burundi has on the other hand experienced a volatile movement in her exports over the years. This can be explained by the fact that Burundi has for a very long time been experiencing both economic and political instability.

4.2   Impact of Exports on GDP

4.2.2   Integration Properties of the Data

As a first step for carrying out co-integration analyses the study carries out a univariate analysis to investigate stationarity properties for each of the series. The study uses a panel unit root test proposed by Levin et al. (2002) (LLC), which allows for heterogeneity of the intercepts across members of the panel, and by Im et al. (2003) (IPS), which allows for heterogeneity in intercepts as well as in the slope coefficients. Both of these tests are constructed by averaging individual augmented Dickey-Fuller (ADF) (Dickey and Fuller, 1979) t-statistics across cross-section units.

The results of the LLC and IPC test are reported in Table 6. For each of the series the study first considers the level form of the series. The results show that the null hypothesis of unit root for GDP, Exports and Terms of Trade (TOT) cannot be rejected, which means that the time series in levels are non-stationary. However, the null hypotheses of the unit root is rejected at 1 percent level for first differenced variables, indicating that the variables of each country are first differenced stationary or integrated of order one, $I(1)$. This implied that there existed a long run relationship among the variables above and this was confirmed by conducting a cointegration test. On the other hand terms of trade volatility and exchange rate volatility variable are $I(0)$.

Table 6: Panel Unit Root Test for Exports and GDP

Variable	Levin *et al.* (2002)		Im *et al.* (2003)		Order of Integration
	Levels	1st Difference	Levels	1st Difference	
GDP	1.342	-5.812	2.623(*0.996*)	-3.265	*I(1)*
	(*0.910*)	(*0.000*)		(*0.001*)	
Exports	0.669	-10.013	1.096	-12.075	*I(1)*
	(*0.748*)	(*0.000*)	(*0.864*)	(*0.000*)	
Terms of Trade volatility	-3.573	-	-5.610	-	*I(0)*
	(*0.000*)		(*0.000*)		
Terms of Trade	-0.810	-6.248	-0.426	-9.100	*I(1)*
	(0.209)	(*0.000*)	(0.335)	(*0.000*)	
Exchange Rate volatility	-4.024	-	-3.249	-	*I(0)*
	(*0.000*)		(*0.001*)		

Note: Figures in Parenthesis are P-values

4.2.2 Testing for Co-integration

The first step in testing the export-led growth hypothesis was testing for co-integration properties of the GDP and exports panel. According to Olumuyiwa and Thornton (2006) the available techniques for panel co-integration tests follows an application of the Engle and Granger (1987) co-integration analysis. These approaches test the residuals from the estimation for stationarity just as in the analysis of single time series. Kao *et al* (1999) and Pedroni (1995) provide different statistics for this purpose, both of which assume homogenous slope coefficients across countries. The outcomes for this test are shown in Table 7 and report for two methods of analysis namely; The Newey-West automatic bandwidth selection and Quadratic Spectral kernel and the Newey-West automatic bandwidth selection and Bartlett kernel. The results indicate that the null of no co-integration between GDP and exports can be rejected at 1 percent significance level for Pedroni (1995) and at 5 percent significance level for Kao *et al* (1999). Consequently, the

economic growth and exports for the five East African countries are co-integrated and there exists a meaningful long-run relationship between GDP and exports.

Table 7: Panel Co-integration Test for Exports and GDP

Method	Statistics	Pedroni (1995)				Kao *et al* (1999)
		Panel v	Panel rho	Panel PP	Panel ADF	ADF
Quadratic Spectral kernel	t-statistic	5.510	-3.365	-3.577	-0.078	-1.974
	P-value	0.000	0.000	0.000	0.469	0.024
Bartlett kernel	t-statistic	5.697	-3.015	-3.403	-0.078	-1.842
	P-value	0.000	0.001	0.000	0.469	0.033

4.2.3   Testing for long-run and Short-run Co-integration Relationship

Applying the Westerlund's (2006) panel Z-LMC test for panel co-integration this study gets results for both long and short-run equations. The results for the long-run equation for export-led growth hypothesis are presented in Table 8. The results indicate that when economic growth (i.e. adjusted GDP) is the dependent variable, the t-statistics are significant for the panel and all countries i.e. Uganda, Kenya, Tanzania, Rwanda and Burundi. The null hypothesis of no-causality is therefore convincingly rejected for the full panel and all individual countries implying existence of a long-run relationship between GDP and exports. The rejection of null hypothesis implies that exports cause GDP. These findings supported the export-led growth hypothesis for the panel and for all individual countries in East Africa. Thus, to stimulate economic growth, policies that promote expansion of exports need to be emphasized.   Such policies would include supportive fiscal and monetary policies.

On the other hand when export is the dependent variable the t-statistic is significant for the panel, Tanzania and Burundi but no significance is reported for Uganda, Kenya and Rwanda. This indicates that economic growth also stimulates exports for the entire panel and in Tanzania and Burundi. Thus a two way relationship exists. However, unidirectional causality is observed for Uganda, Kenya and Rwanda where only exports enhance economic growth but not the opposite. For Tanzania and Burundi policies that stimulate economic growth will also promote exports but the governments of Uganda, Kenya and Rwanda should aim at policies that promote exports in order to achieve sustainable economic growth. Nonetheless, East Africa as a region, promotion of policies that are oriented toward stimulating exports will support economic growth and vice versa.

In terms of the long-run elasticities the expectation under the export-led growth hypothesis is that the estimated elasticities are to be positive. As expected the signs are positive and significant except for Burundi which is negative and significant. This indicates that exports contribute positively to economic growth for the East Africa region. Kenya has the highest export elasticity of output (0.226), followed by Rwanda (0.212), Uganda (0.208), Tanzania (0.148) and Burundi (-0.054). It shows that except for Burundi, exports are playing a significant role in the economic growth of these countries. For the full panel the elasticity is reported as 0.08 and this implies that a 1 percent increase in exports increases GDP by 0.08 percent. For individual countries a 1 percent increase in exports increases the GDP with a magnitude of 0.23 percent for Kenya, 0.21 for Uganda, 0.15 percent for Tanzania and 0.21 percent for Rwanda.

Nevertheless, there appear to be a decrease in GDP by 0.05 percent for Burundi with a 1 percent increase in exports. This is unexpected observation under the export-led growth hypothesis but not unusual as Sanjuàn-Lòpez and Dawson (2010) also reported negative but significant coefficients for Algeria, Mexico, South Africa and Trinidad and Tobago. Thus, in Burundi expansion in exports may have no significant impact on economic growth. Burundi has for so many years been in conflict and this may have limited national production.

Table 8: Panel Long-run Co-integration Test Results for Exports and GDP

Independent Variables	ADJUSTED GDP			EXPORTS		
	Coefficient	S. E	t-statistic	Coefficient	S. E	t-statistic
ADJUSTED GDP	-	-	-	0.530272	0.24037	2.20608
EXPORTS	0.077485	0.02338	3.31365	-	-	-
Uganda	0.207644	0.05802	3.57907	-0.274806	0.18417	-1.49213
Kenya	0.225639	0.07530	2.99649	-0.073994	0.23904	-0.30955
Tanzania	0.147593	0.04066	3.62954	-0.362716	0.12909	-2.80985
Rwanda	0.211776	0.06204	3.41376	-0.204685	0.19693	-1.03938
Burundi	-0.05419	0.02716	-1.99514	-0.158691	0.08622	-1.84053
Trend	0.004961	0.00127	3.91514	2.01E-05	0.00402	0.00499
Constant	2.845121	0.72292	3.93561	-3.206379	2.29486	-1.39720

Table 9 presents the short-run equation under the export-led growth hypothesis. The elasticities are positive as expected except for Burundi and indicate that a 1 percent increase in exports will yield 0.044 percent increase in GDP for the East Africa region. Rwanda had the largest short-run elasticity of 0.041 followed by Uganda (0.039), Tanzania (0.029), Kenya (0.010) and Burundi (-0.020). Thus, the export-led growth hypothesis is confirmed in both the short and long-runs.

Table 9: Panel Short-run Co-integration Test Results for Exports and GDP

Independent Variables	ADJUSTED GDP			EXPORTS		
	Coefficient	S.E	t-statistic	Coefficient	S.E	t-statistic
ADJUSTED GDP	-	-	-	0.162491	-0.23045	0.70510
EXPORTS	0.043888	0.02476	1.77255	-	-	-
Constant	0.012747	0.02421	0.52664	0.236434	-0.07283	3.24629
Uganda	0.038561	0.02963	1.30143	-0.08915	-0.290332	-3.25659
Kenya	0.010215	0.02374	0.43025	-0.07143	-0.10727	-1.50165
Rwanda	0.040774	0.03333	1.22344	-0.10028	-0.343607	-3.42645
Tanzania	0.028630	0.02780	1.02989	-0.08365	-0.222311	-2.65779
Burundi	-0.02026	0.02628	-0.77091	-0.07908	-0.138245	-1.74822

4.2.4 Granger Causality Tests

An ambiguity exists in economic theory on whether exports cause economic growth or are a result of growth. Granger causality tests of the variables will therefore help to establish the relationship between exports and economic growth in East Africa for the period between 1970 and 2008. The tests for granger causality are simple if the variables are co-integrated (Sims *et.al.*, 1990). However, co-integration results only reveals existence of long-run relationship but do not indicate the direction of causality. As such an application of granger causality tests helps to analyze the causality structure of the variables.

The results for granger causality tests are presented in Table 10 and shows both F-statistics and level of significance using the P-value. The P-values indicate that exports are significant (at 5 percent for 2 lags and at 1 percent for 5 lags) long term cause of GDP for the entire period of study. These results provide strong evidence supporting export-led growth hypothesis in the five East African countries. The short-term relationship reflected in the F-statistics also indicates that

exports significantly contribute to economic growth. Over all, the results for granger causality tests indicate that a two way relationship exist between exports and economic growth in both the short-run and long-run.

Table 10: Multivariate Panel Granger Causality Test for Exports and GDP

Null Hypothesis:	N	F-Statistic	Prob.
Exports do not Granger Cause GDP	185	3.389	0.036
GDP does not Granger Cause Exports		7.196	0.001

4.3   Impact of Terms of Trade Volatility on Exports and GDP

4.3.1   Long-term Impact of Terms of Trade Volatility on Exports

An analysis of the long-term impact of terms of trade (TOT) – (the price of its exports relative to the price of its imports) on East African countries of Uganda, Kenya, Rwanda and Tanzania using the Dynamic Generalized Least Squares (DGLS) and the Dynamic Ordinary least Squares (DOLS) indicate that terms of trade volatility has a negative and significant effect on exports in the long-run (Table 11). These sharp swings in the countries' terms of trade can seriously disrupt economic growth of a country especially in developing countries as observed by Broda and Tille (2003). Broda and Tille argue that more often than not developing economies face large swings in export price and that such fluctuations are unwelcome because they can contribute to increased volatility in the growth of output (GDP). Thus, the negative impact of terms trade volatility on exports in East African countries confirms the argument that large swings in export

price relative to import price has a significant negative impact on the level of exports and hence impedes output growth.

Developing countries suffer worsening terms of trade because of i) heavy dependency on agricultural commodity exports, that is, mostly unprocessed agricultural products (Blattman *et.al, 2007*). Broda and Tille (2003), Blattman *et.al.,* (2007) and Bleaney and Greenaway, (2000) observed that specialization in primary product exports reduces growth as a result of adverse trends in, and the high variance of, primary product prices. Prices of primary commodity exports are more volatile and fluctuate a lot unlike manufactured products and these seriously affect terms of trade (Blattman *et.al,* 2007); ii) high degree of openness to foreign trade. Baxter and Kouparitsas (2000) argued that the high degree of openness to foreign trade in developing countries implies that export volatility affect a large share of their economies; and iii) little or no leverage over exports. In most developing countries the prices of exports are dictated by the world markets unlike developed countries and oil exporters where export prices are determined and influenced by countries in question (Broda 2003). This exogenous nature of terms of trade shifts in developing countries makes terms of trade movements to account for roughly half of output volatility in these countries (Mendoza, 1995 and Kose, 2002).

Looking at the negative impact of terms trade volatility on economic growth of East African countries of Uganda, Kenya, Rwanda and Tanzania and other developing countries, there is need to stimulate growth by improving on terms of trade. One way is by shifting reliance from agricultural exports to exporting manufactured commodities. Value addition need to be enhanced so as to reduce price volatility of exports. Blattman *et.al,* (2007) observed that volatility in export price slows economic growth. In addition, flexible exchange rate regimes need to be emphasized.

Broda and Tille (2003) observed that countries with a flexible exchange rate regime experience much milder contraction in output than their counterparts with fixed exchange rate regimes amid terms of trade volatility.

Table 11: Long-Term Impact of Terms of Trade Volatility on Exports

Variable	Coefficient		Std. Error	t-Statistic	Prob.
Dynamic Generalised Least Squares (DGLS)					
Constant	-4.254		1.274	-3.339	0.001
Terms of Trade Volatility	-0.027		0.013	-2.160	**0.033**
Terms of Trade	0.266		0.070	3.819	**0.000**
Adjusted GDP	1.094		0.058	18.998	**0.000**
Lead Adjusted GDP	0.894		0.283	3.159	0.002
Lag Adjusted GDP	0.084		0.290	0.289	0.773
Lead Delta Terms of Trade	-0.437		0.115	-3.810	0.000
Lag Delta Terms of Trade	-0.097		0.108	-0.897	0.371
Weighted Statistics					
R-squared	0.954	Mean dependent var		21.443	
Adjusted R-squared	0.951	S.D. dependent var		4.984	
S.E. of regression	0.290	Sum squared resid		11.163	
F-statistic	276.368	Durbin-Watson stat		0.624	
Prob(F-statistic)	0.000				
Unweighted Statistics					
R-squared	0.941	Mean dependent var		20.019	
Sum squared residual	11.457	Durbin-Watson stat		0.539	
Variable		**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Dynamic Ordinary Least Squares (DOLS)					
Lag Real Exchange Rate volatility		-0.074	0.130	-0.566	**0.572**
Terms of Trade Volatility		-0.065	0.030	-2.194	**0.030**
Terms of Trade		0.490	0.173	2.840	**0.005**
Adjusted GDP		0.901	0.008	118.865	**0.000**
Lead delta Terms of Trade		-0.425	0.295	-1.440	0.152
Lag delta Terms of Trade		-0.169	0.267	-0.632	0.529
Lead delta Adjusted GDP		0.889	0.707	1.257	0.211
Lag delta Adjusted GDP		0.501	0.752	0.666	0.507
R-squared		0.688	Mean dependent var	20.019	
Adjusted R-squared		0.672	S.D. dependent var	1.168	
S.E. of regression		0.670	Akaike info criterion	2.090	
Sum squared resid		60.969	Schwarz criterion	2.255	
Log likelihood		-142.446	Hannan-Quinn criteria.	2.157	
Durbin-Watson stat		0.151			

4.3.2 Short-term Impact of Terms of Trade Volatility on GDP and Exports

Using vector error correction model the study tests the hypotheses that i) exports in East African countries of Uganda, Kenya, Rwanda and Tanzania are negatively and significantly influenced by; i) exchange rate volatility; ii) terms of trade volatility has a negative and significant impact on output and iii) terms of trade volatility has a negative and significant impact on exports in the short-run. The results (Table 12) show that real exchange rate volatility had no significant impact on exports. However, terms of trade volatility has a negative and significant effect on both adj-GDP (t=-3.5455) and Exports (t=-2.6846) in the short-run. This confirms that worsening of terms of trade has a negative impact on economic growth of East African countries as it ultimately reduces gross domestic product.

The results, however, indicate that there is an indirect negative impact of real exchange rate volatility on GDP and exports. Broda and Tille (2003) suggest that exchange rate regime plays a significant role in absorbing fluctuations in terms of trade. For instance in a country with a flexible exchange rate, fluctuations in the terms of trade will be offset by movements in the exchange rate, eliminating much of the impact on economic activity. By contrast, a country with a fixed exchange rate will experience substantial swings in output. Thus, flexing the exchange rate regime in East Africa will enable the countries to offset the negative impact of terms of trade on output growth.

Table 12: Short-Term Impact of Terms of Trade (TOT), TOT Volatility and Exchange Rate Volatility on Exports and GDP

Independent Variables	Exports			Adjusted GDP		
	Coefficient	STD Error	t-statistic	Coefficient	STD Error	t-statistic
CointEq1	-0.375238	0.06210	-6.04278	0.019337	0.02371	0.81539
D(LNX(-1))	**0.049884**	**0.08429**	**0.59180**	**0.068863**	**0.03219**	**2.13925**
D(LNX(-2))	**-0.019140**	**0.07992**	**-0.23950**	**0.062265**	**0.03052**	**2.04012**
D(LNX(-3))	0.262048	0.07569	3.46191	0.035334	0.02891	1.22232
D(LNADJGDP(-1))	-0.017988	0.23926	-0.07518	0.001140	0.09137	0.01247
D(LNADJGDP(-2))	0.041028	0.23235	0.17658	-0.145981	0.08873	-1.64517
D(LNADJGDP(-3))	-0.197606	0.22245	-0.88833	-0.015893	0.08495	-0.18708
LAGVOLRER_TRE	**-0.025755**	**0.04527**	**-0.56890**	**-0.014368**	**0.01729**	**-0.83103**
LNTOTVOL1	**-0.020304**	**0.00756**	**-2.68462**	**-0.010240**	**0.00289**	**-3.54550**
LNTOT	**0.229425**	**0.04948**	**4.63626**	**0.008200**	**0.01890**	**0.43389**
DKE	0.401273	0.07962	5.03981	-0.022278	0.03041	-0.73267
DUGA	0.161153	0.05147	3.13119	0.019029	0.01966	0.96812
DTZ	0.198017	0.05635	3.51435	-0.012688	0.02152	-0.58965
R-squared	0.372990			0.150180		
Adj. R-squared	0.313745			0.069882		

4.4   Granger Causality Tests

Granger causality tests for Terms of Trade (TOT) and Exports and Real Exchange Rate (RER) and Exports try to establish the relationship between these variables in East Africa for the period between 1970 and 2008. The results (Table 13) rejects the hypotheses that TOT does not granger cause Exports and RER does not granger cause exports but fails to reject hypotheses that Exports does not granger cause TOT and that Exports does not granger cause RER. This implies that there exists both long and short-term unidirectional causality between TOT and exports and between RER and Exports. Thus, there is strong evidence to suggest terms of trade have an impact on exports but not export impacting on terms of trade. The results also indicate that real exchange rate affects exports but, Export does not influence real exchange rate. According to Batten and Belongia (1984) a simple two-variable comparison will not correctly identify the relationship between exchange rate movement and exports because factors other than exchange rate fluctuation influence export flow. However, it should be noted that changes in commodity export prices generally have an important effect on real exchange rate behavior, but in the short run. It is possible, however, that the short-run increase in the rate of inflation exceeds what is required to bring about the equilibrium real appreciation generated by the export boom; in this case, the real exchange rate will appreciate in the short run by more than the amount real factor would indicate (Edwards, 1986).

Table 13: Multivariate Panel Granger Causality Test for Terms of Trade and Exports and Real Exchange Rate and Exports

Null Hypothesis:	N	F-Statistic	Prob.
Terms of trade does not Granger Cause Exports	152	5.959	0.016
Exports do not Granger Cause Terms of trade		0.225	0.636
Real exchange volatility does not Granger Cause Exports	152	9.699	0.002
Exports do not Granger Cause Real exchange rate volatility		1.020	0.314

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

5.1   Conclusions

The economic theory postulate that an increase in exports leads to an increase in real GDP through a multiplier effect. On the other hand, increase in real GDP could lead to realization of economies of scale that could boost exports. However, the export-led growth (ELG) hypothesis postulates that export growth is one of the key determinants of economic growth. Thus, since 1970s there have been shifts in emphasis from import substitution policies towards export promotion strategies in an effort to promote economic development.

The study rejected the null of no cointegration between GDP and exports implying that economic growth and exports are cointegrated. Both long run and short run relationships between Exports and GDP are strongly supported and hence agreeing with export-led growth hypothesis

The results also show significant effect of economic growth on exports for Tanzania and Burundi but GDP appears to have no significant impact on exports in Uganda, Kenya and Rwanda. The study also indicates a two way relationship between exports and economic growth in both the long and short-run for the region. Nevertheless, for individual countries, a feedback effect between exports and output growth is reported for Tanzania and Burundi, but the study shows a unidirectional causality from exports to output growth in case of Uganda, Kenya and Rwanda. Thus, the study supports the export-led growth hypothesis in all the five countries and also finds strong evidence that economic growth stimulates exports in Tanzania and Burundi but fails to find strong impact of economic growth in Uganda, Kenya and Rwanda

It has also been shown in the study that using Dynamic OLS that Terms of Trade Volatility has a Negative and Significant Effect on Exports in the long-run. The study has also shown using Vector Error Correction Model that Terms of Trade Volatility has a Negative and Significant Effect on both output and Exports in the short-run. This implies that the large swings in export price in East Africa can cause serious volatility in output growth and hence make export-led growth initiatives enormously difficult.

5.2   Recommendations and Policy Implications

Given the recent drive for economic integration for the East African Community, this study seeks to recommend all the member states to adopt policies that aim at boosting exports. For Tanzania and Burundi economic policies that enhance economic growth will likewise promote exports. The East African community member states should also work on having a flexible exchange rate regime to minimise output contraction amid terms of trade volatility. These recommendations actually work for agricultural sector because of the high exports concentration on agricultural commodities of the East African countries.

5.3   Further Research

Further research should take account of more variables in the analysis of export-led growth hypothesis for instance; degree of openness, rate of population growth, rate of domestic investment, gross fixed capital formation, imports, rate of inflation, aggregate level of labour and several others. This way it would become clear how the new variables included influence economic growth in addition to exports and thereafter inform policy accordingly.

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APPENDIX: Measuring volatility of Terms of trade and Exchange rate

Measuring volatility of Terms of trade and Exchange rate

Volatility can be measured is many ways. For simplicity, this study measured volatility using the following:-

(a) Terms of trade (TOT) volatility $= std\left[In\left(\dfrac{TOT_t}{TOT_{t-1}} \right) \right]$ where volatility of the terms of trade at

time t-1 is defined as the standard deviation of the terms of trade at the time t.

(b) Real Exchange Rate (RER) volatility $= \left[RER_t - R\hat{E}R_t \right]^2$ where $R\hat{E}R_t$ is the predicted trend of

the real exchange rate obtained from $R\hat{E}R_t = \alpha + \beta(timetrend) + \gamma(timetrend)^2 + \varepsilon_t$. This gives

volatility as the variance of the real exchange rate around its predicted trend.