THE EFFECTS OF FOREIGN TRADE ON ECONOMIC GROWTH IN COMESA COUNTRIES

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THE EFFECTS OF FOREIGN TRADE ON ECONOMIC GROWTH IN COMESA COUNTRIES

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APPROVAL

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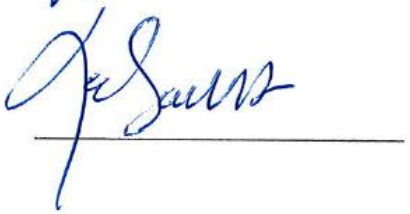

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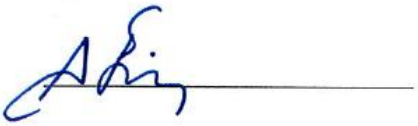

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ABSTRACT

THE EFFECTS OF FOREIGN TRADE ON ECONOMIC GROWTH IN COMESA COUNTRIES

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The study evaluates the relationship between foreign trade and economic growth and tests the null hypothesis of granger non-causality between the two variables using data for COMESA regional economic bloc. Annual panel data from 1980 to 2014 was analyzed using Quantile Regression method. The study also employed ARDL model to estimate the long run relationship between foreign trade and economic growth. The estimation results indicate that foreign trade is largely insignificant and only statistically significant with positive effects on economic growth up to the 10^{th} percentile for COMESA member states. On the other hand, economic growth is also largely insignificant with significant but negative effect on foreign trade between 65^{th} and 85^{th} percentile. Further, ARDL model shows that in the long run, foreign trade has a negative effect on growth while growth has a positive influence on trade.

Key words: Foreign trade, economic growth, quantile regression, ARDL, COMESA

ÖZET

COMESA ÜLKELERİNDE DIŞ TİCARETİN İKTİSADİ BÜYÜMEYE ETKİLERİ

Nzumbu, Christine N.
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Bu çalışma dış ticaret ve iktisadi büyüme arasındaki ilişkiyi değerlendirmekte olup bu çalışmada COMESA bölgesel ekonomik blokuna ait veriler kullanılarak bu iki değişken arasındaki granger nedensellik olmayan farksızlık hipotezi testi edilmiştir. Bu bağlamda, 1980 ve 2014 yılları arasındaki yıllık panel verileri Kantil Regresyon metodu kullanılarak incelenmiştir. Aynı zamanda, çalışmada ARDL modeli kullanılarak dış ticaret ve iktisadi büyüme arasındaki uzun vadeli ilişki değerlendirilmiştir. Bu değerlendirmenin sonucu bizlere dış ticaretin genel anlamda önemsiz olduğunu ve COMESA üye devletlerinde yalnızca istatiksel olarak önemli olup onuncu persantile kadar pozitif bir etkiye sahip olduğunu göstermektedir. Öte yandan, iktisadi büyüme ise belli ölçüde öneme sahip olsa da genel anlamda önemsiz bulunup altmış beşinci ve seksen beşinci persantile arasında negatif bir etkiye sahip olduğu saptanmıştır. Bununla beraber ARDL modeli, uzun vadede, dış ticaretin büyüme üzerindeki etkisinin negatifken, büyümenin dış ticaret üzerindeki etkisinin pozitif olduğunu göstermektedir.

Anahtar Kelimeler: Dış Ticaret, İktisadi Büyüme, Kantil Regresyon, ARDL, COMESA

DEDICATION

To My Family

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CHAPTER 1

1. INTRODUCTION

1.1 Introduction

Does foreign trade affect economic growth? This is one of the leading discussions for several decades in both developed and developing nations. The main concern of this debate has always been the level of economic growth that can be attributed to foreign trade and whether trade and trade policies act as a facilitator of underlying factors affecting growth or plays a fundamental role in a country's economic growth. Omoju & Adesanya (2012) asserts that the classical and the neoclassical economists consider foreign trade so essential to a nation's development that they regarded it as an engine of economic growth. Trade which comprises of outflow (exports) and inflow (imports) of goods and services is believed to enhance production efficiency via resource allocation to countries that have a comparative advantage. It is worth noting that role of exports and imports to economic growth depends on the degree (amount) of international trade that varies from one country to another. According to Schneider (2004), exports enlarge markets for domestic production on one hand while imports on the other hand broadens varieties to domestic markets, and in turn bring about additional competition. Foreign trade also interacts with other macroeconomic variables such as; inflation, foreign direct investments (FDI), investment and exchange rate among others and the effects vary across studies and countries or regional blocs under study.

Kehinde, Jubril, Felix & Edun (2012) explain that even though foreign trade can easily promote growth via the supply side, exporters are usually faced with costs associated with the balance of payment and to some extent compelled to use expensive imports mainly machinery or semi processed goods which as a result affect their exports capacity. However, foreign trade can be considered as the main avenue through which countries exchange goods and services that are not locally produced or rather it supplements local production in order to meet the required demand. Without trade,

therefore countries could only consume whatever is locally produced and in some cases where countries have different natural endowment may present insurmountable challenges due to lack of access.

Despite various studies having demonstrated a positive relationship between foreign trade and economic growth, some economists/researchers have had a contrary opinion. For instance, Appleyard, Field & Cobb (2006); Omoju & Adesanya (2012) and Soi, Koskei, Buigut & Kibet (2013) among others, have had a different view as they believe that only developed countries benefit from foreign trade at the expense of developing economies. They claim that international inequality has widened as a result of foreign trade, a situation where "developed countries have become richer at the expense of less developed ones". Other researchers like Klege & Babyenda (2014) found that foreign trade has no effect on the economic growth while Kim (2011) established that foreign trade has strongly beneficial effects on growth and real income for the developed countries but significantly negative effects for the developing countries. These differences in findings and opinions may perhaps be attributed to sample selection, methodologies as well as analytical tools applied in different studies.

Other researchers like Brueckner & Lederman (2015) explain that higher real GDP growth can increase trade openness through supply and demand channels. Through the supply channel "higher GDP growth increases countries' exports of goods and services" while through the demand channel "higher GDP growth leads to an increase in the consumption of goods and services produced". Zeren & Ari (2013) asserts that economic growth leads to trade openness because "high productivity reduces the unit costs and as a result increases exports". In the event that domestic production increase beyond the domestic demand, it is expected that producers will seek to sell their goods in international markets.

Empirically, there is no consensus on the effect of foreign trade on a country's economic growth as different researchers have had different findings. Nevertheless, the importance of foreign trade cannot be ignored due to the numerous benefits it contributes towards a country's development. Further, there is no clear establishment on whether: foreign trade leads to economic growth or economic growth leads to foreign trade or foreign trade merely follows economic growth. Equally important is

the fact that various studies have so far been carried out for different parts of the world but there exists less literature on COMESA region hence this is the gap the study strives to fill. Considering the elimination of tariffs amongst most COMESA countries, this study would naturally isolate the impact that comes from these type of barriers. In this study, we first attempt to examine if there is any link between foreign trade and economic growth by applying quantile regression model for a panel of COMESA member states in the last four decades. We then find out the nature of the relationship and whether the relationship is quantitatively important. Using this methodological framework, we establish whether foreign trade affects economic growth and vice versa.

1.2 Statement of the Problem

Over the years, there has been a growing interest to both economists and policy makers on the role played by foreign trade on a country's economic growth. Theoretically, links between foreign trade and economic growth have been widely discussed for over the centuries but there exist lots of controversies concerning the real effects of trade on economic growth. According to Kehinde et-al. (2012), historical validation has revealed that internationally active countries tend to be more productive than countries which produce for the domestic market only. Foreign trade has always been a "catalyst of growth" for global economy but some economists are against this idea as they believe that only developed countries benefit from foreign trade at the expense of developing economies (Soi et al., 2013).

Most studies related to this subject have been carried out for developed economies and few in the developing and least developed economies especially the COMESA member states; the largest economic regional grouping in Africa. As a matter of fact, there is sizable empirical work that has investigated the contribution of foreign trade to economic growth but very little literature exist for Sub Saharan Africa especially the COMESA region. Further, differences in both empirical findings and opinions on the foreign trade and economic growth relationship necessitates further research. This is the motivation behind this research as we attempt to ascertain whether there is any relationship between foreign trade and economic growth in COMESA region. To achieve its objective, the study employs quantile regression and Autoregressive

Distributed Lag (ARDL) models to the panel data set from COMESA member states over the period 1980-2014.

1.3 Research Objective and Hypothesis

The overall objective of the study is to investigate the effects of foreign trade on economic growth in COMESA regional bloc, while the null hypothesis is that foreign trade has no significant effect on economic growth in COMESA region.

1.4 Justification of the Study

Although the available literature indicates that most studies related to this subject have been conducted for developed countries, there has been growing interests to study foreign trade and its real effects on the developing countries' economies in the recent past. Nevertheless, there exist little literature on Sub-Saharan Africa and especially COMESA region. The purpose of this study therefore, is to evaluate if there exists any relationship between economic growth, foreign trade and other macroeconomic variables in COMESA region using quantile regression and ARDL methods. Whereas the standard linear techniques summarize the average relationship between a set of regressors and the outcome variable, quantile regression gives a more complete picture of the relationship at different points as it splits data into quantiles. The study contributes towards the effects of foreign trade on economic growth debate based on COMESA region experience. Additionally, trade liberalization has been recognized as a means for supporting economic development and is one of the policy reforms recommended by the World Bank and many bilateral donors to African countries with the belief that improvements in trade facilitation increases trade which in turn stimulates economic growth. Therefore, this study would help understand whether trade is beneficial or not for African countries following the significant improvements in trade liberalization in the recent past.

1.5 Scope and Limitation

The scope of the study is confined to COMESA regional bloc covering the period from 1980 to 2014 which gives a total of 35 annual observations per country. The main limitation of the study is unavailability of a longer period balanced panel data for all the member states. Further, the lack of quarterly data for the sample under

consideration also compelled us to use annual data. The rest of the paper is structured as follows: chapter 2 discusses the related literature; chapter 3 describes data sources, model specification and regression methodology; chapter 4 discusses the empirical results while chapter 5 covers conclusion and recommendations.

CHAPTER 2

2. LITERATURE REVIEW

2.1 Brief on Common Market for Eastern and Southern Africa (COMESA)

COMESA was founded in 1993 (treaty ratified in 1994) to succeed the Preferential Trade Area (PTA) for Eastern and Southern Africa, which was established in 1981. COMESA, a 19 member bloc (see figure 1) is the largest regional economic grouping in Africa with an estimated total population of 460 million (2013) covering a total combined area of 12.6 million square kilometres and a GDP of approximately USD 639 billion (2013). Its' Member States include; Burundi, Comoros, Democratic Republic of Congo (DRC), Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe (see figure 1). The bloc's headquarters is based in Lusaka, Zambia.

The regional bloc's principal focus is to promote regional integration through promotion of investment, trade enhancement as well as sustainable utilization of natural resources for the mutual benefit of all the region's citizens. To achieve this goal, COMESA adopted five focal areas of integration which include: "trade in goods and services; monetary integration, including payments and settlement arrangements; investment promotion and facilitation; infrastructure development (air, road, rail, maritime and inland transport, ICT, energy); electronic commerce as well as peace and security". Since its' establishment, COMESA has made a number of achievements in different areas including trade liberalization and customs co-operation, a programme aimed at "eliminating tariff and non-tariff barriers and the introducing a unified computerized customs network across the region". Besides, a COMESA Customs Union was launched in 2009 and negotiations for the formation of a Monetary Union by 2018 are underway. With reference to trade, COMESA's trade with the rest of the world has immensely grown over the years to reach US$284 billion in 2013 as it can be seen from figure 2.

Figure 1 COMESA Members States

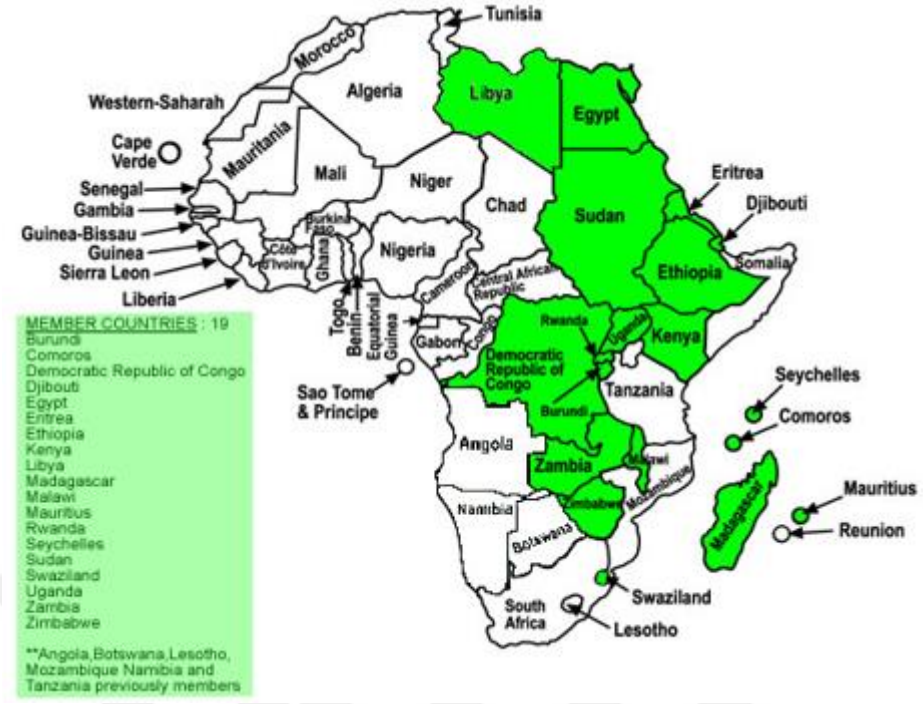
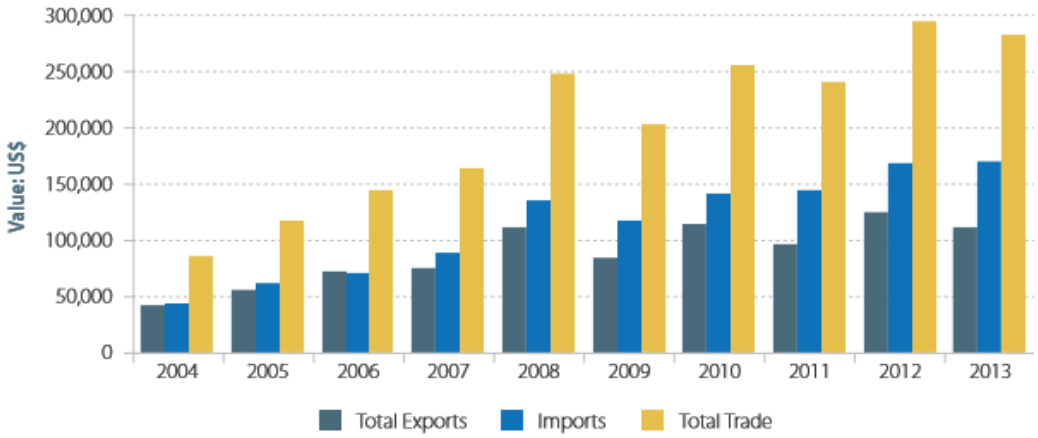


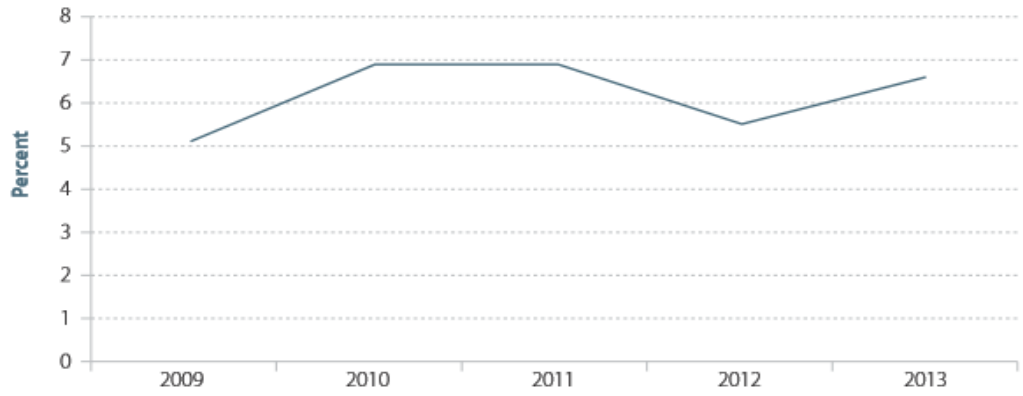
Figure 2 COMESA's Global Trade (nominal): 2004–2013



Source: COMSTAT and UN COMTRADE Databases

Through increased integration, COMESA region has achieved a relatively stable growth over the years. For instance, in 2013, the region attained an average GDP growth rate of 6.6 % against Africa's average growth of 4.7% for the same year as illustrated in the figure 3.

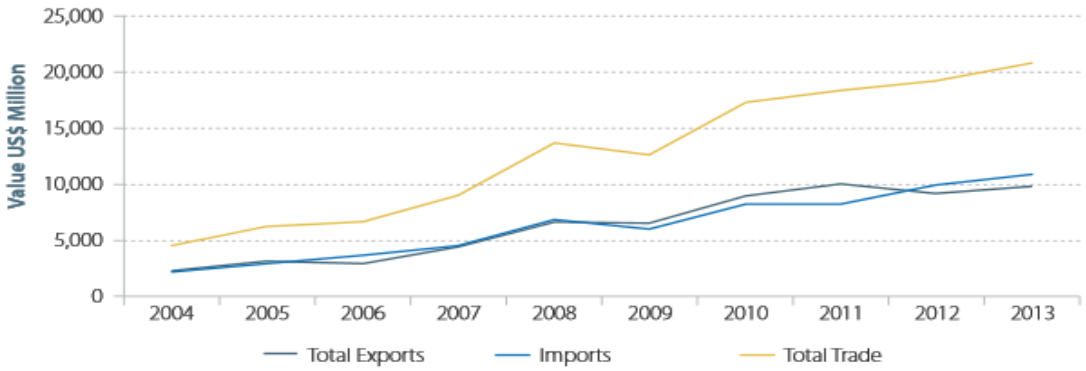
Figure 3 COMESA's Average Real GDP Growth: 2009–2013



Source: IMF Regional Economic Outlook Sub-Saharan Africa

Additionally, the elimination of tariffs among most COMESA countries has partially resulted in the growth of intra-COMESA trade from US$ 3.2 billion in 2000 when the Free Trade Area (FTA) was launched to a tune of US$ 22 billion in 2014 (see figure 4). So far, the FTA covers 15 Member States of COMESA whereby all goods that originate within the region are granted duty and quota-free market access to all other COMESA FTA member states. It is worth noting that COMESA member states have a 'managed' floating exchange rate.

Figure 4 Intra-COMESA Trade (nominal): 2004-2013



Source: COMSTAT Database

2.2 Theoretical Framework

The effects of foreign trade on economic growth were first defined in economic literature in 18th century when Adam Smith, a classical economist introduced the theory of "absolute" advantage. Smith demonstrated that "with free trade, each nation could specialize in the production of those commodities in which it could produce absolutely more efficient than other nations and import those commodities it could not produce efficiently". He believed that through division of labor, nations could produce more and the society as a whole will be better off by trading on the principles of absolute advantage. Having demonstrated that foreign trade is beneficial for all nations involved in trade, Adam Smith conceded that nations do not necessarily benefit in equal parts because exports of one nation is another nation's imports. The benefits of foreign trade notwithstanding, the critics of this theory were of the opinion that Smith overlooked the issue of how foreign trade could be still beneficial in the event that a country has an absolute advantage in the production of all commodities.

Later on, David Ricardo, also a classical economist, extended the Adam Smith's theory to incorporate the theory of "comparative" advantage (also regarded as the classical theory of international trade) in order to show that his theory is the basis for trade between nations and why trade is mutually beneficial to countries. Within the context of his theory, Ricardo demonstrated that openness abroad gives a country the opportunity to reorient or redirect its' scarce resources to more efficient sectors. He argued that under free trade, 'a country will produce and export more of a good for which it has a comparative advantage and import goods which it has a comparative disadvantage'. However, the theory is limited by the fact that it assumes that both labour and technology are fixed. In spite of its shortcomings, Ricardo's model was the first to link specialization with opportunity cost, which happens to be the basis of modern trade theory hence it cannot just be discarded. The relationship between trade and economic growth in the literature has also been highlighted by other models like the Heckscher-Ohlin model which advocates that, a country exports goods that use its' abundant factors more intensively. Moreover, Rodriguez & Rodrik (2001) argue that according to endogenous growth models, foreign trade's effect on economic growth depends on whether the country's comparative advantage force drives the resources in

the direction of activities that generate long-run growth or divert them from such activities.

Although foreign trade-growth theories mostly presume a unidirectional relationship between the two variables, with indication that increase in trade leads to a higher output, this study endeavours to evaluate whether there is any bidirectional link between the growth and foreign trade using data for COMESA member states.

2.3 Literature Review

Over the last four decades, there have been comprehensive empirical studies that have attempted to provide substantial amount of statistical evidence on the relationship between foreign trade and economic growth. Lee (1995) asserts that "a detailed and historical validation has proved that foreign trade affects economic growth positively by stimulating capital accumulation, industrialization, technological progress and institutional development." Specifically, the increase of imports of intermediate products and capital goods which are not locally produced may induce the manufacturing sector to higher productivity. Maizels (1963) used rank correlation analysis to investigate the impact of foreign trade on economic growth among seven developed economies, and showed a positive relationship between economic growth and foreign trade. According to the 2012 African Development Report, foreign trade is an influential tool through which gains from globalization are redistributed within and between countries.

Brueckner & Lederman (2015) used an instrumental variables (IV) approach to estimate the relationship between trade openness and economic growth in Sub-Saharan Africa for the period between 1981 and 2009. They observed that whereas economic growth has a negative significant contemporaneous effect on trade openness, trade openness has a positive significant effect on economic growth. In another study, Jouini (2015) employed Pooled Mean Group (PMG) estimation technique to explore the empirical evidence of the links between economic growth and openness to international trade in six Gulf Cooperation Council (GCC) countries over the annual sample period 1980–2010. The findings of the study showed that economic growth is directly and robustly linked to trade openness for the GCC countries both in the short

run and the long run. However, Klege & Babyenda (2014) found that foreign trade has no effect on the economic growth in the East Africa Community (EAC), but FDI, gross capital formation and total labour force participation have a positive influence, while inflation is insignificant. Zeren & Ari (2013) applied Granger non-causality test in heterogeneous panel model to examine the linkages between the openness ratio and economic growth for the G7 countries over the period between 1970 and 2011. Their study findings indicate positive bidirectional causal links between trade openness and economic growth. These findings, according to Zeren & Ari (2013) concur with what is advocated by the theories of endogenous growth that as openness increases, growth increases in the G7 countries; equally true is that, increase in growth increases openness.

Kim (2011) studied trade, growth and income relationships and investigated whether the trade's contribution to the standard of living and long-run economic growth varies according to the level of economic development. The study used instrument variable (IV) method and the results showed that greater trade openness has strong beneficial effects on growth and real income for the developed countries but significantly negative effects for the developing countries. He explains that, "due to technological or financial constraints, less developed countries may not have a sufficiently high level of social capability to successfully implement technologies developed in more advanced economies" which may result to differential effects of trade on long-run economic performance . He justifies that the findings of his study is an indication that "the beneficial effects of trade liberalization increase as economies develop which indeed confirms the debate about adoptive capacity of a country in determining knowledge accumulation and technology implementation". According to Krugman (1981), "much of the world trade is between countries with similar factor endowment and that trade between these countries is largely intra-industry in nature, (consists of two-way trade in similar products)". Additionally, Helpman (1988) noted that, "foreign trade brings welfare and efficiency gains" to all countries irrespective of their natural resource endowments, technological abilities, initial conditions, and level of development.

Adak (2010) observed a consistent, significant and positive influence of foreign trade on economic growth for Turkey. He also asserts that foreign trade is one of the key

factors that determine Turkey's economic growth. Further, Singh (2011) used various methods (GMM – 'Generalized Methods of Moments', DOLS – 'Dynamic OLS', FMOLS – 'Fully Modified OLS' & NLLS – 'Non Linear Least Squares') to investigate the effects of international trade on output and tested the null of Granger non-causality between trade and economic growth in Australia. The study found consistent positive and significant long-run effects of exports and investment on output but predominantly negative effects of imports on output. Dufrénot, Mignon & Tsangarides (2009) applied quantile regression techniques to investigate "how the impact of trade openness on the growth rate of per capita income varies with the conditional distribution of growth". The results of their findings suggest a heterogeneous trade-growth relationship for both the short-run and long run with the effect of trade openness on growth being higher in countries with low growth rates and lower for countries with high growth rates.

Lin (2000) investigated the relationship between trade and economic growth based on China's national data for the period 1952-1997, and revealed that the growth rate of export, growth rate of import, growth rate of the volume of trade and labour force growth were positively related to economic growth. In a similar manner, Olaifa, Subair & Biala (2013) used the ordinary least squares (OLS) to estimate the influence of trade liberalization on economic growth in Nigeria between 1970 and 2012 with a view to examining whether there exists any long term relationship between the two variables. The basic findings of the study shows that trade liberalization supports long run economic growth. However, exports coefficient was reported to be negatively related to economic growth. Using panel data sets for COMESA region, Tumwebaze and Ijjo (2015) applied instrumental variables GMM regression in the framework of a cross-country growth model to investigate the relationship between regional economic integration and economic growth for the period between 1980 and 2010. The results of their basic findings indicated that openness to international trade, physical capital, world GDP growth are significant and positively related to economic growth.

Frankel & Romer (1999) used IV estimates and OLS to examine trade and income correlation in 1985 among 63 countries with geographical characteristics (notably its distance from potential trading partners), and concluded that geographical characteristics affect trade though they are uncorrelated with other determinants of income. Their study however observed that 'trade has a quantitatively large, robust,

and positive effect on income'. Accordingly, trade raises income by spurring the accumulation of physical and human capital as well as increasing output for given levels of capital. In the same manner, Singh (2015) examined the effects of international trade and investment on output and tested the null hypothesis of Granger non-causality among trade, investment and economic growth in Canada. His study employed similar methodologies used in his 2011 Australia paper, and demonstrated a consistent support for the significant and positive long-run effects of exports and investment on output but negative effects of imports on output. The study underlined the importance of accelerating investment (and exports) to offset the imports effects and escalate the altitudes of output and economic growth.

Using data for New Zealand during the period 1954-2007, Singh (2015) further studied the effects of international trade and investment on output and tested the Granger-causal nexus among trade, investment and economic growth. The findings were similar to the ones for Canada that exports and investment have a positive and significant long-run effect on output. His study further established that imports positively affect output and are statistically significant across most estimators. Mogoe & Mongale (2014) employed the Cointegrated Vector Autoregression (CVAR) model to examine the impact of international trade on economic growth in South Africa between 1990 and 2013. The results indicate that exports, exchange rate and inflation rate are positively related to GDP while imports have a negative effect on GDP.

Kehinde, et al. (2012) empirically observed that import, openness, and inflation rates are negatively associated with real GDP, while exchange rate, exports and FDI have a positive relationship. They interpreted the results as a demonstration that "increase participation in global trade helps Nigeria to reap static and dynamic benefits of international trade despite non conformity of the coefficient of openness. Both foreign trade volume and trade structure towards high technology exports result in positive effect on Nigeria economy". Ndulu & Njuguna (1998) showed that trade matters to economic growth, with the real exchange rate having a strong indirect effect on growth via exports and imports. The study found that, although investments affect economic growth directly they are also affected by trade policies. Ndulu & Njuguna (1998) further noted that, trade openness has a positive correlation with growth in Southern Africa.

From the above reviewed literature, it can be concluded that despite the existence of large amount of literature on foreign trade-economic growth relationship, the answer to the question on the effect of foreign trade on economic growth still remains unclear as different empirical results reflect a mixed picture.

CHAPTER 3

3. RESEARCH METHODOLOGY

3.1 Methodology

For purposes of this research, we derive the econometric model from the AK growth model (a special case of the fundamental Cobb-Douglas function of production) whereby output as the endogenous variable depends on gross investment plus other control variables as used in related literature (mainly foreign trade, government expenditure, exchange rate, FDI, geographical region, labor, and inflation among others).

Consider discrete time Cobb–Douglas production function represented by

$$Y(t) = A(t)\left(K(t)^{\alpha} L(t)^{1-\alpha}\right) \tag{1}$$

where $\alpha \in [0,1]$, Y(t) is output, L(t) labor, A(t) technology (labor augmenting & exogenous) and K(t) capital stock.

Under constant returns to capital assumption, $\alpha = 1$ the model transforms to AK model $Y = AK$ (Romer, 2006). This assumption replaces the diminishing returns to capital which makes investment an important factor for long-run growth and is considered strong due to the widely agreed view that capital accounts for about a third of output. Equally important is the fact that capital K in a broad sense includes physical and human capital, hence making the assumption valid. The AK model predicts a positive relationship between accumulated capital and economic growth in the long run. Capital stock is augmented with gross investment $K_t = I_t + (1-\delta)K_{t-1}$, with an assumption that, increased investments leads to higher output levels. Our model therefore follows Singh (2011; 2015) and uses investment or gross capital formation then augments it with foreign trade, FDI, government consumption/expenditure, exchange rate and inflation. We equally use output growth as proxy for output, given our panel approach. The a priori expectations are such that investments, foreign trade, government spending and FDI have a positive relationship with growth while exchange rate and inflation are negatively related to economic growth.

We then modify the AK model to have our econometric model as shown in equation 2 below.

$$Y(t) = A(t)K(t)*V(t) \quad (2)$$

where V(t) represents control variables mostly used in the related literature.

Taking logarithms of the modified AK model (equation 2), and replacing V(t) with various variables under consideration in the study yields;

$$\ln g^{gdp} = f(\ln INV, \ln FT, \ln REX, \ln G, \ln FDI, \ln INF)$$

$$\ln g_{it}^{gdp} = \alpha_0 + \alpha_1 \ln INV_{it} + \alpha_2 \ln FT_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln FDI_{it} + \alpha_6 \ln INF_{it} + \mu_{it} \quad (3)$$

where g denotes GDP growth rate, FT is imports plus exports to GDP ratio, REX is real exchange rate per unit of US dollar, G is government expenditure to GDP ratio, INV is gross capital formation to GDP ratio and INF is annual CPI inflation; α_0 is the growth rate intercept, a_1 - a_6 are regression coefficients of the respective independent variables while μ_t is the error term.

Similarly, we extend our analysis to a model with foreign trade as the dependent variable. The expectation is that economic growth, investments, government spending and FDI have a positive relationship with foreign trade while exchange rate and inflation are negatively related to foreign trade.

$$\ln FT = f(\ln INV, \ln g^{gdp}, \ln FDI, \ln REX, \ln G, \ln INF)$$

$$\ln FT_{it} = \alpha_0 + \alpha_1 \ln g_{it}^{gdp} + \alpha_2 \ln INV_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln FDI_{it} + \alpha_6 \ln INF_{it} + \mu_{it} \quad (4)$$

Following Singh (2015), we further extend our analysis by separating imports and exports. These two variables are the most important components of foreign trade and analyzing them separately will give us a clearer view of how they affect growth. The *a priori* expectation is that investments and exports positively affect growth while imports negatively influence economic growth.

$$\ln g^{gdp} = f(\ln INV, \ln X, \ln M)$$

$$\ln g_{it}^{gdp} = \alpha_0 + \alpha_1 \ln INV_{it} + \alpha_2 \ln X_{it} + \ln M_{it} + \mu_{it} \quad (5)$$

where X indicates exports while M is imports with both variables expressed as ratios of GDP.

We estimate the relationship between foreign trade, GDP and other selected macroeconomic variables using Quantile Regression (QREG) technique. The study further employs Autoregressive Distributed Lag (ARDL) Model to check the robustness of our results and estimate the long run relationship among the variables under study.

3.1.1 Quantile Regression

Quantile regression, a method originally proposed by Koenker & Basset (1978) has recently gained popularity especially due to the following attractive properties; its regression estimators are less sensitive to outliers, unlike OLS estimators. Quantile regression can be applied in investigating the response of the dependent variable to the explanatory variables at different points along the distribution. Therefore, it generates better estimates compared to the other linear estimation techniques (OLS, IV and GMM among others) (Koenker, 1994). Unlike other estimation techniques (OLS, IV and GMM) which estimate conditional mean of the conditional distribution of the dependent variable (mean is highly affected by extreme values – and the results can be misleading), quantile regression allows the estimation of responses to be measured at different points along the conditional distribution. This has made the method applicable even during "abnormal" periods to make key policy decisions. Symmetric test resembling Wald test that couldn't be constructed under OLS is available in QREG and examines the symmetry of the data directly by comparing each quantile value with the corresponding upper-tail quantile value. Employing quantile regression therefore, allows for a wider measurement of output growth response to the INV, FT, FDI, REX, G and INF in the economy.

We estimate equation (1) via quantile regression;-

$$q_\theta(g_{it} \mid X) = \alpha_{\theta 0} + \alpha_{\theta 1} \ln FT_{it} + \alpha_{\theta 2} \ln FDI_{it} + \alpha_{\theta 3} \ln REX_{it} + \alpha_{\theta 4} \ln G_{it} + \alpha_{\theta 5} \ln INV_{it} + \alpha_{\theta 6} \ln INF_{it} + \varepsilon_{it} \quad (6)$$

where $X = (FT_{it}, FDI_{it}, REX_{it}, G_{it}, INV_{it}, INF_{it})$, parameters $\hat{\alpha}_{\theta i}$ are solutions to the above regression equation and are interpreted in a similar way as OLS regression coefficients, with θ representing the percentiles.

The regressions with $\theta = 0.05,\ 0.1,\ 0.15,\ 0.2,\ ....\ 0.8,\ 0.85, 0.9\ \&\ 0.95$ (20 percentiles in total) of the panel data were estimated and graphed. For statistically robust inference results, we apply "heteroscedastic bootstrap" method to calculate the standard errors of the quantile regression estimates as used by Chevapatrakul & Paez-Farrell (2014). The figures are estimated using 90 per cent confidence interval. We then performed quantile symmetric tests using the bottom and the top quantiles of the 90-percent confidence interval regression to establish any statistically significant differences. Symmetric test is similar to Wald test and has a "null of symmetry" with alternative as asymmetrical.

3.1.2 Auto-Regressive Distributive Lag Model (ARDL)

We further employ the ARDL to check the robustness of our basic findings as well as estimate the long-run relationship among the variables under investigation. ARDL is characterized by its' flexible application when the variables are either "mutually co-integrated" or are of different integration order, that is, $I(1)$ or $I(0)$. This implies that the model "yields consistent estimations of the long-run coefficients that are asymptotically normal irrespective of whether the underlying regressors are I(1) or I(0)". The method may however, not be appropriate when variables are integrated at order two ($I(2)$) or higher (Pesaran, M. & Pesaran, 2009). "ARDL takes sufficient numbers of lags to capture the data generating process in a general-to-specific modeling framework" (Banerjee, Dolado, Galbraith & Hendry, 1993). The ARDL estimating equation taking the form of equation 1;

$$\Delta g_{it}^{gdp} = \alpha_0 + \alpha_1 INV_{it} + \alpha_2 FT_{it} + \alpha_3 REX_{it} + \alpha_4 G_{it} + \alpha_5 FDI_{it} + \alpha_6 INF_{it} + \sum_{j=1}^{n} \varphi_{1,j} \Delta INV_{it-j} + \sum_{j=1}^{n} \varphi_{2,j} \Delta FT_{it-j}$$
$$+ \sum_{j=1}^{n} \varphi_{3,j} \Delta REX_{it-j} + \sum_{j=1}^{n} \varphi_{4,j} \Delta G_{it-j} + \sum_{j=1}^{n} \varphi_{5,j} \Delta FDI_{it-j} + \sum_{j=1}^{n} \varphi_{6,j} \Delta INF_{it-j} + \varepsilon_t \quad (7)$$

3.2 Data

In this study, we employ panel estimation models in our endeavour to investigate whether there exists any foreign trade-economic growth relationship for COMESA countries. According to Hsiao (2014), panel data: "increases degrees of freedom and reduces problems of multicollinearity; constructs more realistic behavioural models and discriminates between competing economic hypotheses; eliminates or reduces estimation bias; obtains more precise estimates of micro relations and generates more accurate micro predictions; provides information on appropriate level of aggregation as well as simplifies cross sections or time series inferential procedures". Our study employs quantile regression on the annual panel data sets for the period between 1980 and 2014 collected from secondary sources. The data sets are obtained from the World Bank Development Indicator database (http://data.worldbank.org). We used annual data sets due to unavailability of a longer quarterly data for COMESA countries

For furtherance of the study, the following variables were used; GDP growth rate (g), foreign trade (FT, exports plus imports as ratio of GDP, also referred to as openness), gross investment (INV, also referred to as capital formation), government expenditure (G). Foreign Direct Investment (FDI), the real exchange rate per unit of US Dollar (REX, deflated by ratio of USA CPI and each country CPI), and inflation (INF, CPI inflation). The additional variables in the model were included based on the fact that FT alone may not be strong enough to stimulate economic growth. All variables except GDP growth rate, Exchange rate and Inflation, are expressed as ratios to GDP. Although COMESA is comprised of 19 member states, only 12 countries (listed below) were incorporated in the sample due to lack of data. Nevertheless, these countries account for over 80 percent of the total combined GDP for COMESA region. We equally note that Sudan and South Sudan was one country until 2011 following the latter's independence from the former. This means that the data used until 2011 was combined while after 2011 is for Sudan (North Sudan) only.

1. Burundi
2. Congo (DRC)
3. Egypt
4. Kenya
5. Madagascar
6. Malawi
7. Mauritius
8. Rwanda
9. Seychelles
10. Sudan
11. Swaziland
12. Uganda

Figure 4 below shows how the data for the foreign trade and economic growth looks like for the sample period and the subsequent countries enlisted.

Figure 5 Average Trade Openness Ratio and Real Growth Rate (1980-2014)

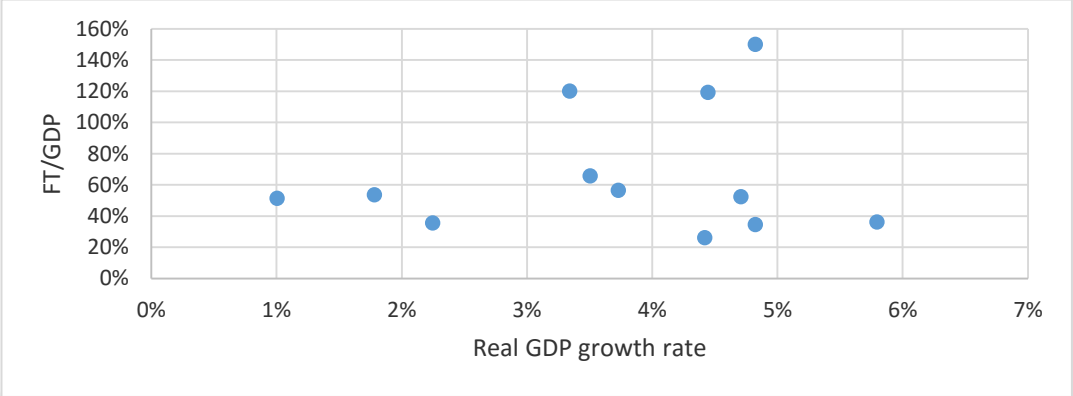


Table 1 Average Foreign Trade and Growth Rates Values

	DR Congo	Madagascar	Burundi	Seychelles	Malawi	Kenya
g	1.00%	1.78%	2.25%	3.34%	3.50%	3.73%
FT	51.45%	53.79%	35.71%	120.09%	65.79%	56.69%

	Sudan	Mauritius	Egypt	Swaziland	Rwanda	Uganda
g	4.42%	4.45%	4.71%	4.82%	4.82%	5.79%
FT	26.18%	119.42%	52.56%	150.05%	34.59%	36.22%

From table 1 above, it can be observed that smaller countries in terms of GDP like Seychelles, Mauritius & Swaziland, have on average had high foreign trade (above 100% of GDP) and above 3% averaged growth rate over the period under consideration. While larger countries (in terms of GDP) such as Egypt, Kenya and Sudan have a lower foreign trade ratio (below 60%). Overall, the data does not have any common trend as countries with higher foreign trade do not necessarily have higher growth.

CHAPTER 4

4. ESTIMATION RESULTS

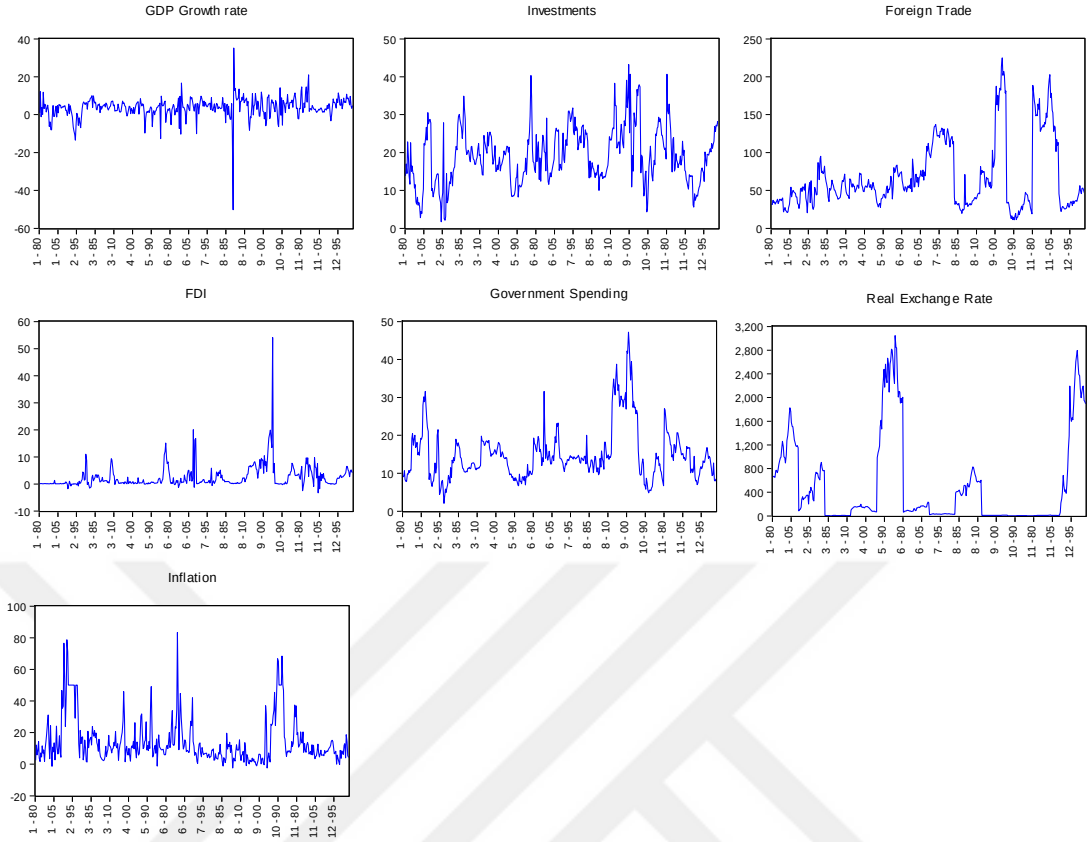
4.1 Descriptive Data

The main characteristics of the variables are depicted on table 2 while the graphs of the data sets are as illustrated in figure 6 (the graphs are for each individual country but stacked together with one (1) representing first country (Burundi) and 12 representing Uganda as the last country). The descriptive data (see table 2) reveals that all variables are not normally distributed (based on the Jarque-bera normality test at 5%). Further, some member countries like Rwanda have experienced serious economic turbulence especially around the 1994 genocide period; with a negative growth rate of 50 percent followed by positive 35 percent. Other countries like DRC also faced high inflation rates as it can be seen in figure 5 on inflation. It can also be observed that some countries in the sample have had negative FDI flows. As explained by the United Nations Conference on Trade and Development (UNCTAD), FDI flows with a negative sign implies that "at least one of the three FDI's components (equity capital, reinvested earnings or intra-company loans) is negative and not offset by positive amounts of the remaining components". These are cases of reverse investment or disinvestment and could be true for countries like Swaziland which experienced decline in FDI in 1990's due to political unrest.

Table 2 Descriptive Statistics

	FDI	FT	G	Growth	INF	INV	REX
Mean	2.443	66.879	14.978	3.718	96.173	19.152	512.86
Median	0.890	53.014	13.805	4.141	9.727	18.543	132.22
Maximum	54.063	225.02	47.192	35.224	23773	43.250	3047.6
Minimum	-3.285	11.087	2.0576	-50.25	-2.406	1.746	0.830
Std. Dev.	4.286	44.318	7.0375	5.437	1184.8	7.404	758.51
Jarque-Bera	47891	162.84	364.24	11458	2537954	7.645	229.9
Probability	0.000	0.000	0.000	0.000	0.000	0.022	0.000
Observations	420	420	420	420	420	420	420

Figure 6 Variables Multiple Graphs



4.2 Unit Roots Test

Due to increased sample size, testing for unit root using panel data is believed to be better compared to the low power of univariate tests like the Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) (Levin, Lin & Chu, 2002). As shown in table 3 below, four mostly used unit root tests were applied using Eviews 9.5 to investigate the order of integration of the panel data sets. The LLC null assumes 'common unit root processes' while the other three tests (IPS, ADF^{fcs} & PP^{fcs}) null assume 'individual unit root processes'. Results indicate that, all logged variables (Investments/GDP, GDP growth rate, foreign trade/GDP, FDI/GDP, Exchange rate, government expenditure/GDP, investments/GDP and inflation) are stationary at level, (I(0)). This means that we reject the null hypothesis of unit root at 1 percent significance level and as a result, we estimate our regressions with variables at level (that is without taking first differences).

Table 3 Panel Unit Root Tests Results with Automatic SIC Lag Selection

	LLC	IPS	ADF^{fcs}	PP^{fcs}	Comment
Investments	-2.678***	-2.755***	49.99***	50.18***	Stationary
GDP growth	-12.603***	-12.939***	188.9***	186.3***	Stationary
Foreign Trade	-1.380*	-2.219**	42.66**	38.55**	Stationary
FDI	-2.262**	-3.266***	79.99***	115.3***	Stationary
Exchange rate	-4.463***	-3.225***	57.95***	47.11***	Stationary
Government GE	-3.253***	-3.566***	51.85***	54.62***	Stationary
Inflation	-9.138***	-9.01***	125.6***	120.8***	Stationary

Notes: *(**)*** denotes significance at 10%(5%)1% respectively; FCS- Fisher Chi-square
LLC - Levin, Lin & Chu test, IPS - Im, Pesaran & Shin test, SIC – Schwarz Information Criteria
Used Eviews 9.5; The null (for all) is that series have a unit root

4.3 Regression Equations

We estimate the relationship between growth rate, foreign trade and other macroeconomic variables using Quantile Regression (QREG) technique. To check the robustness of our basic findings and evaluate the long run relationship, we use Autoregressive Distributed Lag (ARDL) Model. Before we carry out the estimation, we first understand what causes what i.e. whether growth causes foreign trade and vice versa via panel granger causality test. We applied two approaches to test the granger causality in the panel data sets. The first approach, stacked test, assumes that all coefficients are the same across all the cross-sections. The data sets were stacked and then the Granger Causality test was performed in the standard way, without letting data from one cross-section enter the lagged values of data from the next cross-section. In the second approach, we simply run standard Granger Causality regressions for each cross-section individually and the average test statistics (Dumitrescu & Hurlin, 2012).

Table 4 Panel Granger Causality Test

Stacked Test – Common Coefficients

Null Hypothesis	F-Statistic	Prob.
1. Economic Growth does not Granger Cause Foreign Trade	7.59921	0.0061
2. Foreign Trade does not Granger Cause Economic Growth	3.93265	0.0480

Pairwise Dumitrescu Hurlin Panel Causality Tests - Individual coefficients

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
1. Economic Growth does not homogeneously cause Foreign Trade	2.30289	2.68239	0.0073
2. Foreign Trade does not homogeneously cause Economic Growth	2.47501	3.05655	0.0022

Notes: lags employed = 1 in both approaches

The results (see table 4) from common coefficients approach indicate probabilities of 0.006 and 0.048 for the first and second hypotheses respectively. While from individual coefficients approach, the results indicate probabilities of 0.007 and 0.002 for the first and second hypotheses respectively. Evidently, we reject both null hypotheses at 5% significance level and conclude that growth causes foreign trade on one hand and foreign trade causes growth on the other hand i.e. there is bidirectional granger causality. Consequently, regression equations with growth rate as the dependent variable and foreign trade as the dependent variable were respectively used. The study employs two regression techniques (QREG and ARDL) previously described to estimate each of the following seven equations/models.

Model 1: $\ln g_{it}^{gdp} = \alpha_0 + \alpha_1 \ln INV_{it} + \alpha_2 \ln FT_{it} + \mu_{it}$

Model 2: $\ln g_{it}^{gdp} = \alpha_0 + \alpha_1 \ln INV_{it} + \alpha_2 \ln FT_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln INF_{it} + \mu_{it}$

Model 3: $\ln g_{it}^{gdp} = \alpha_0 + \alpha_1 \ln INV_{it} + \alpha_2 \ln FT_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln FDI_{it} + \alpha_6 \ln INF_{it} + \mu_{it}$

Model 4: $\ln FT_{it} = \alpha_0 + \alpha_1 \ln g_{it}^{gdp} + \alpha_2 \ln INV_{it} + \mu_{it}$

Model 5: $\ln FT_{it} = \alpha_0 + \alpha_1 \ln g_{it}^{gdp} + \alpha_2 \ln INV_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln INF_{it} + \mu_{it}$

Model 6: $\ln FT_{it} = \alpha_0 + \alpha_1 \ln g_{it}^{gdp} + \alpha_2 \ln INV_{it} + \alpha_3 \ln REX_{it} + \alpha_4 \ln G_{it} + \alpha_5 \ln FDI_{it} + \alpha_6 \ln INF_{it} + \mu_{it}$

Models 1, 2 and 3 have growth rate as the dependent variable while models 4, 5 &6 have foreign trade as the dependent variable. Model 1 applies the core AK model (growth rate and investment) with foreign trade as the only additional variable. Model 2 uses all variables but excludes FDI from the equation based on the assumption that it may be highly correlated with investments while model 3 includes all the variables under investigation.

Further, we run the cross-section correlations test for variables in the six (6) models as shown in table 5. The results indicate that for the regression equations with growth rate as dependent variable, we cannot reject the null of 'no cross-section correlations'. Therefore, we conclude that this particular data has no cross section dependency. However, the results with foreign trade as the dependent variable show that there is cross-section dependency among the variables hence we strongly reject the null hypothesis at 1% significance level.

Table 5 Cross-Section Correlation (Dependence) Test

Test	Regressions with g as dependent variable			Regressions with FT as dependent variable		
	M1	M2	M3	M4	M5	M6
Breusch-Pagan LM	81.677 (0.092)	75.927 (0.189)	77.805 (0.152)	173.187 (0.000)	203.608 (0.000)	158.05 (0.000)
Pesaran scaled LM	1.365 (0.172)	0.864 (0.387)	1.027 (0.304)	9.329 (0.000)	11.977 (0.000)	8.012 (0.000)

Notes: Null hypothesis: No cross-section dependence (correlation) in residuals, the p-values are in brackets
M stands for model, e.g. M1 is model 1

4.4 Panel Regression

4.4.1 Results with the GDP Growth Rate as the Dependent Variable

In this section, we analyze resultant regression equations with the GDP growth rate as the dependent variable for $\theta = 0.05,\ 0.1,\ 0.15,\ 0.2,\ \ldots.\ 0.8,\ 0.85, 0.9\ \&\ 0.95$ which gives a total of 20 percentiles.

Results for model 1 from table 6 below, which is basically the AK model with foreign trade as the only additional variable indicate that investments are largely significant while foreign trade is significant up to 65th percentile. Investments positively influence growth across all percentiles. Foreign trade on the other hand, has negative significant influence on growth up to 65th percentile but on high percentiles (90th and above), the effects becomes positive though insignificant.

In model 2 (see table 6) which includes government spending, real exchange rate and inflation in addition to foreign trade to the AK model; investments coefficient is significant and positively related to growth across all the 20 percentiles. Foreign trade is only statistically significant with a positive effect on growth up to 10th percentile, while the rest of the percentiles depicts insignificant mixed effects on growth, i.e. both negative and positive effects. Government spending and inflation coefficients are largely significant but mainly affect growth negatively in COMESA region. As far as exchange rate is concerned, the results show a significant positive relationship as from 65th percentile.

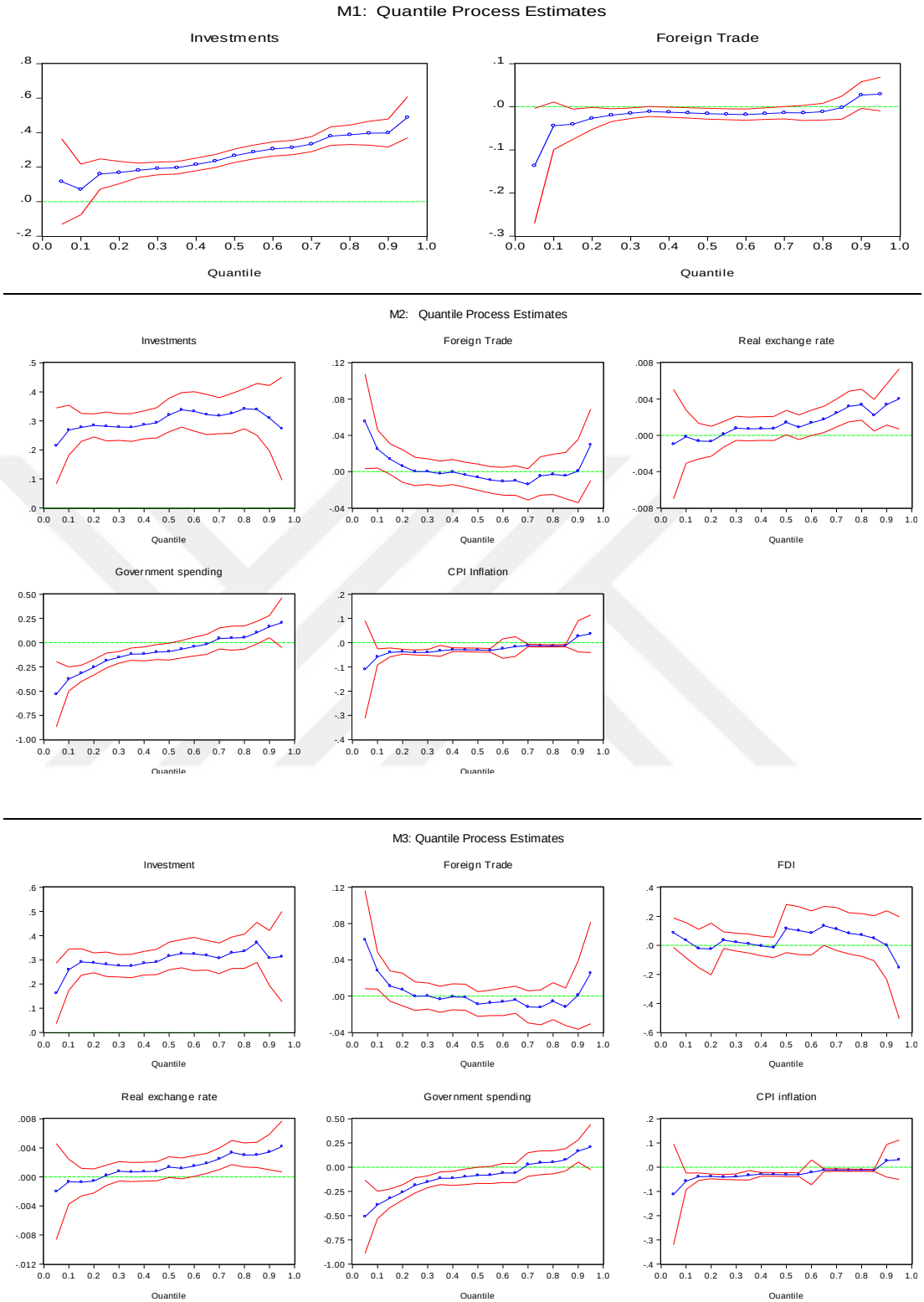
Model 3 in table 6 below includes all the variables under investigation (that is model 2 plus FDI). Similar to model 1 and model 2, investments are statistically significant

with a positive influence on growth while foreign trade coefficient has a statistically significant positive effect on growth up to 10^{th} percentile. In this model, FDI is statistically insignificant across all the 20 percentiles whereas exchange rate exchange rate displays a significant positive relationship with growth as from 60^{th} percentile. Government expenditure on the other hand shows a significant negative effect on growth up to the 50^{th} percentile with the other percentiles depicting the coefficient's insignificant mixed effects on growth. Lastly, inflation rate is largely significant with a negative influence on economic growth.

Table 6 QREG Regression Results: GDP Growth Rate as Dependent Variable

θ	Model 1		Model 2					Model 3					
	INV	FT	INV	FT	REX	GOV	INF	INV	FT	FDI	REX	GOV	INF
0.05	0.117	-0.137*	0.214***	0.055*	-0.001	-0.532***	-0.110	0.162**	0.062*	0.087	-0.002	-0.512**	-0.112
	(0.77)	(-1.69)	(2.69)	(1.75)	(-0.26)	(-2.61)	(-0.90)	(2.12)	(1.89)	(1.41)	(-0.51)	(-2.23)	(-0.89)
0.10	0.071	-0.044	0.268***	0.025*	0.000	-0.374***	-0.058***	0.259***	0.028**	0.035	-0.001	-0.389***	-0.058***
	(0.80)	(-1.31)	(5.10)	(1.96)	(-0.09)	(-4.95)	(-2.89)	(5.00)	(2.27)	(0.47)	(-0.35)	(-4.54)	(-2.79)
0.15	0.160***	-0.040*	0.277***	0.014	-0.001	-0.316***	-0.040***	0.291***	0.011	-0.022	-0.001	-0.320***	-0.040***
	(3.00)	(-1.91)	(9.49)	(1.35)	(-0.53)	(-6.22)	(-3.64)	(8.84)	(1.09)	(-0.27)	(-0.64)	(-5.55)	(-4.17)
0.20	0.169***	-0.027*	0.284***	0.006	-0.001	-0.253***	-0.038***	0.288***	0.007	-0.025	-0.001	-0.259***	-0.038***
	(4.30)	(-1.75)	(11.77)	(0.56)	(-0.66)	(-5.25)	(-6.24)	(11.49)	(0.66)	(-0.23)	(-0.56)	(-5.44)	(-6.24)
0.25	0.182***	-0.019**	0.281***	0.000	0.000	-0.184***	-0.041***	0.282***	0.000	0.036	0.000	-0.187***	-0.040***
	(7.20)	(-2.16)	(9.30)	(0.02)	(0.14)	(-3.93)	(-6.41)	(9.21)	(-0.01)	(1.03)	(0.25)	(-3.94)	(-6.48)
0.30	0.192***	-0.015**	0.279***	0.000	0.001	-0.151***	-0.040***	0.276***	0.000	0.022	0.001	-0.151***	-0.040***
	(8.55)	(-2.02)	(10.03)	(0.00)	(0.96)	(-4.15)	(-5.45)	(9.82)	(0.02)	(0.59)	(0.95)	(-4.09)	(-5.24)
0.35	0.197***	-0.011	0.277***	-0.002	0.001	-0.118***	-0.034**	0.275***	-0.003	0.012	0.001	-0.114***	-0.033***
	(8.89)	(-1.55)	(9.51)	(-0.26)	(0.88)	(-3.03)	(-2.44)	(9.38)	(-0.39)	(0.29)	(0.85)	(-2.87)	(-2.79)
0.40	0.216***	-0.013*	0.286***	0.000	0.001	-0.116**	-0.029***	0.286***	-0.001	-0.004	0.001	-0.115***	-0.029***
	(9.63)	(-1.76)	(9.78)	(-0.06)	(0.94)	(-2.65)	(-6.38)	(9.68)	(-0.08)	(-0.10)	(0.90)	(-2.59)	(-6.40)
0.45	0.236***	-0.014*	0.293***	-0.004	0.001	-0.097**	-0.030***	0.291***	-0.001	-0.014	0.001	-0.099**	-0.030***
	(10.23)	(-1.95)	(9.28)	(-0.42)	(0.94)	(-2.04)	(-6.35)	(9.20)	(-0.14)	(-0.34)	(0.96)	(-2.06)	(-6.31)
0.50	0.266***	-0.016**	0.320***	-0.006	0.001*	-0.092*	-0.030***	0.316***	-0.009	0.116	0.001	-0.084*	-0.031***
	(11.23)	(-2.15)	(9.10)	(-0.70)	(1.73)	(-1.73)	(-6.30)	(9.11)	(-1.05)	(1.15)	(1.57)	(-1.65)	(-6.45)
0.55	0.288***	-0.017**	0.338***	-0.009	0.001	-0.067	-0.032***	0.326***	-0.007	0.102	0.001	-0.080	-0.031***
	(11.75)	(-2.24)	(9.34)	(-1.03)	(1.09)	(-1.23)	(-6.54)	(9.17)	(-0.86)	(1.01)	(1.35)	(-1.49)	(-6.50)
0.60	0.305***	-0.018**	0.332***	-0.011	0.001	-0.041	-0.024	0.324***	-0.006	0.085	0.001*	-0.060	-0.021
	(12.26)	(-2.29)	(8.05)	(-1.15)	(1.61)	(-0.69)	(-0.99)	(7.76)	(-0.68)	(0.92)	(1.72)	(-0.99)	(-0.69)
0.65	0.314***	-0.016*	0.322***	-0.010	0.002*	-0.016	-0.016	0.319***	-0.004	0.135	0.002**	-0.060	-0.012***
	(12.43)	(-1.95)	(7.65)	(-1.00)	(1.99)	(-0.25)	(-0.64)	(8.57)	(-0.45)	(1.64)	(2.24)	(-0.99)	(-3.53)
0.70	0.333***	-0.014	0.318***	-0.014	0.002**	0.044	-0.012***	0.307***	-0.012	0.112	0.002***	0.028	-0.012***
	(12.64)	(-1.61)	(8.40)	(-1.34)	(2.62)	(0.66)	(-3.69)	(7.98)	(-1.10)	(1.25)	(2.77)	(0.38)	(-3.65)
0.75	0.380***	-0.014	0.325***	-0.005	0.003***	0.047	-0.013***	0.329***	-0.012	0.082	0.003***	0.046	-0.012***
	(11.69)	(-1.32)	(7.78)	(-0.37)	(3.11)	(0.62)	(-4.09)	(8.31)	(-1.06)	(0.96)	(3.32)	(0.61)	(-4.11)
0.80	0.388***	-0.011	0.341***	-0.003	0.003***	0.053	-0.013***	0.336***	-0.006	0.071	0.003***	0.051	-0.013***
	(11.22)	(-0.96)	(8.15)	(-0.22)	(3.25)	(0.72)	(-4.65)	(7.80)	(-0.45)	(0.80)	(2.98)	(0.70)	(-4.66)
0.85	0.397***	-0.002	0.339***	-0.004	0.002**	0.104	-0.012***	0.372***	-0.012	0.049	0.003***	0.077	-0.013***
	(9.40)	(-0.11)	(6.25)	(-0.29)	(2.09)	(1.48)	(-4.56)	(7.35)	(-0.94)	(0.52)	(2.87)	(1.09)	(-5.19)
0.90	0.398***	0.027	0.309***	0.001	0.003**	0.166**	0.027	0.307***	0.001	0.001	0.003**	0.166**	0.027
	(8.07)	(1.44)	(4.50)	(0.03)	(2.47)	(2.40)	(0.68)	(4.44)	(0.05)	(0.01)	(2.31)	(2.42)	(0.66)
0.95	0.489***	0.029	0.273**	0.030	0.004**	0.207	0.037	0.313***	0.025	-0.154	0.004*	0.208	0.031
	(6.76)	(1.24)	(2.53)	(1.23)	(1.98)	(1.32)	(0.78)	(2.76)	(0.75)	(-0.72)	(1.96)	(1.46)	(0.62)
Symmetry	0.42	0.91	0.49	0.07	0.85	0.84	0.50	0.48	0.07	0.34	0.98	0.65	0.50

Figure 7 Quantile Regressions Estimates for Models 1, 2 & 3



The estimation results for the quantile regression models 1, 2 & 3 are as illustrated in figure 7. Results for model 1 reveal that foreign trade is generally negatively associated with growth though the influence appears minimal while investments above 10^{th} percentile affect growth positively. Model 2 show that foreign trade has a positive significant effect up to 10^{th} percentile while the real exchange rate has a positive effect on growth after the 60^{th} percentile. Whereas investment is significant and positively influences growth across all the percentiles computed, inflation displays a general negative impact on growth. More importantly, low government spending (below median, 50^{th} percentile) has a negative effect while high government spending (between 80^{th} and 90^{th} percentile) has positive effects on growth. It can be concluded that high government spending stimulates growth while budget cuts lead to reduced growth.

Model 3, on the hand reveals that, the response of economic growth on all variables under investigation is fundamentally active except for FDI and foreign trade. Foreign trade is only statistically significant with positive effects on growth up to the 10^{th} percentile, while FDI is largely insignificant which may imply that the variable plays a minimal role towards economic growth in COMESA member states. The real exchange rate is only statistically significant with positive effect on growth after the 60^{th} percentile and insignificant otherwise. Inflation is largely statistically significant and negatively associated with growth. Capital formation (gross investments) is statistically significant with positive effects on growth across all percentiles which is an indication that the variable is key towards economic growth as advocated by the AK model. Finally, low government spending leads to a negative growth while high spending has a positive effect.

On the other hand, we evaluate the relationship using ARDL as shown in table 7 below. The basic results indicate that in the long run, all variables are largely statistically significant. Investments, FDI and government spending affect growth positively while foreign trade, the real exchange rate and inflation have a negative effect on growth. In model 1, foreign trade is insignificant to stimulate economic growth while a one percent increase in investments leads to a 0.1436 percent increase in growth. In model 2, results show that all variables (investments, foreign trade, exchange rate, government spending and inflation) are statistically significant. We further observe

that foreign trade, exchange rate and inflation have a negative relationship with economic growth while investments as well as government spending have a positive relationship with growth in the long-run. The ARDL adjustment (ECM (-1)) coefficient is negative and statistically significant as expected for all the three regression equations (Model 1, 2 & 3), implying that any disequilibrium in the last period is corrected in the current period.

Table 7 PMG/ARDL Regression Results: GDP Growth Rate as Dependent Variable

	M1	M2	M3
Investment	0.1436*** (3.94)	0.3184*** (8.12)	0.1358*** (3.54)
Foreign Trade	-0.0123 (-0.94)	-0.0459*** (-3.75)	-0.1136*** (-10.6)
FDI			0.8267*** (18.3)
Exchange rate		-0.0277*** (-6.60)	-0.0344*** (-7.81)
Government		0.2523*** (3.34)	0.2221*** (4.31)
Inflation		-0.0347*** (-9.54)	-0.0178 (-1.31)
ECT(-1)	-0.845*** (-5.50)	0.588*** (-2.94)	-0.7079*** (-4.27)
ARDL lags	4,4,4	4,4,4,4,4,4	4,4,4,4,4,4,4

Notes: *(**)*** denotes significance at 10%(5%)1% respectively; t-values are in parenthesis
The empty spaces indicate the variables excluded in the regression equation
ECT – Error correction term

4.4.2 Regression Results with Foreign Trade as the Dependent Variable

In this section, we similarly analyze the models for the 20 percentiles but with foreign trade as the dependent variable (Models 4, 5 & 6).

Results from model 4 (see table 8) indicate that, investments coefficient is statistically significant with a positive effect on foreign trade across all the 20 percentiles. Growth on the other hand is significant and negatively related to trade between 40^{th} and 90^{th} percentiles and insignificant otherwise.

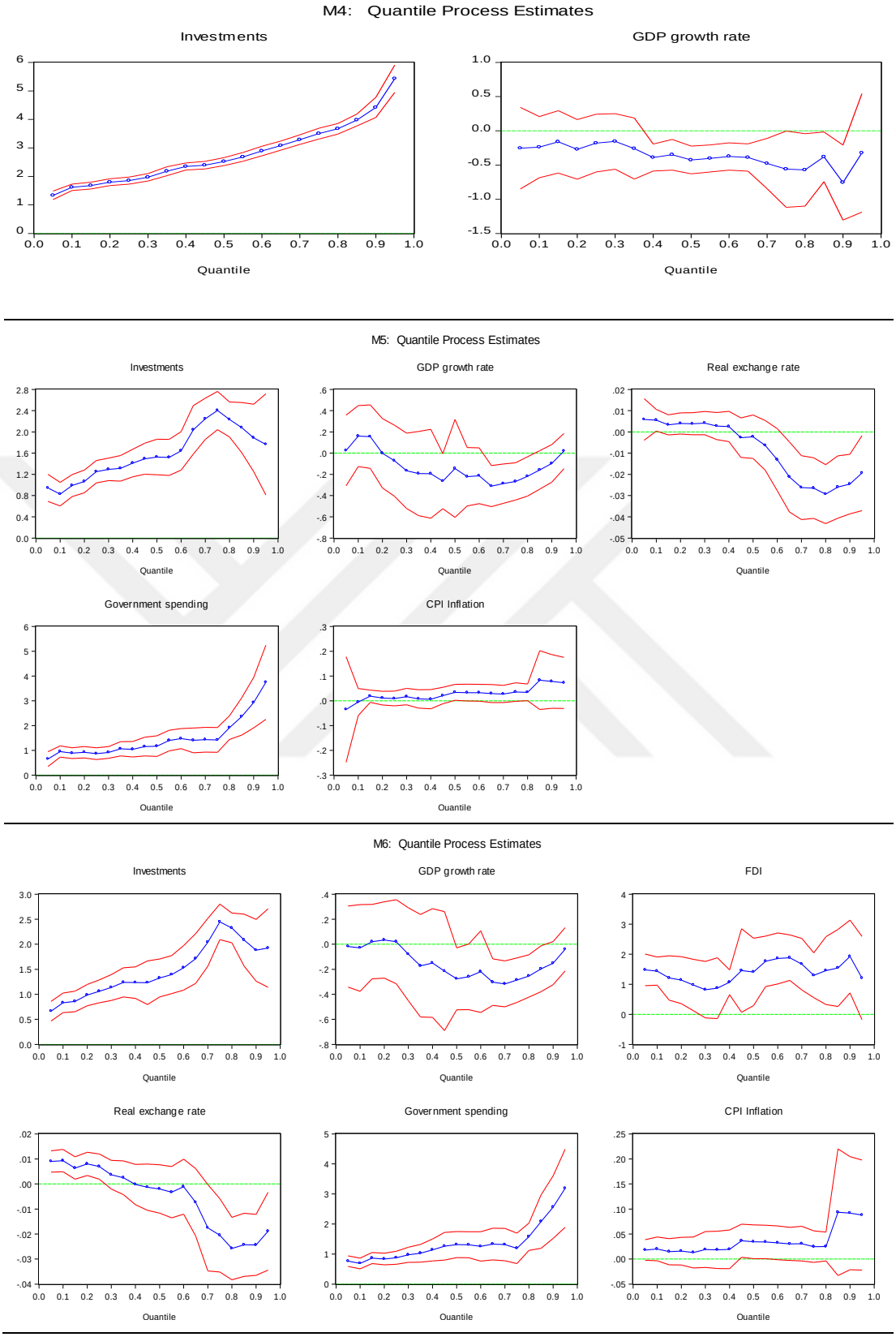
Model 5 in table 8 (which adds government spending, real exchange rate and inflation to model 4), reveals that investment remains fundamentally active with positive influence on trade across all percentiles though the coefficients have declined in magnitude. Growth is largely insignificant with pockets of significant but negative impact on trade while real exchange rate is mainly significant with negative effects on growth between 65^{th} and 95^{th} percentiles. Government spending is statistically significant and has positive influence on trade across all the 20 percentiles whereas inflation rate is largely insignificant in this model.

Model 6 which adds FDI to model 5, shows that investments and government spending affect foreign trade positively across all the percentiles while FDI has significant positive influence on foreign trade between 5^{th}-25^{th}, 40^{th} -90^{th} percentiles and insignificant otherwise. Growth rate and real exchange rate coefficients are largely insignificant with pockets of significant negative and mixed (both positive & negative) relationship with trade respectively.

Table 8 QREG Regression Results: Foreign Trade as Dependent Variable

θ	Model 4		Model 5					Model 6					
	INV	g	INV	g	REX	GOV	INF	INV	g	FDI	REX	GOV	INF
0.05	1.337***	-0.254	0.945***	0.025	0.006	0.646***	-0.035	0.662***	-0.019	1.478***	0.009***	0.764***	0.018
	(14.8)	(-0.70)	(6.12)	(0.12)	(0.98)	(3.57)	(-0.27)	(5.52)	(-0.09)	(4.61)	(3.48)	(7.19)	(1.45)
0.10	1.619***	-0.239	0.827***	0.160	0.005*	0.950***	-0.005	0.830***	-0.030	1.438***	0.009***	0.686***	0.020
	(23.6)	(-0.88)	(6.15)	(0.92)	(1.76)	(6.88)	(-0.16)	(6.95)	(-0.14)	(5.04)	(3.45)	(6.37)	(1.41)
0.15	1.681***	-0.161	0.989***	0.156	0.003	0.883***	0.018	0.858***	0.021	1.209***	0.006**	0.865***	0.015
	(23.0)	(-0.58)	(7.82)	(0.86)	(1.16)	(6.66)	(1.20)	(6.85)	(0.11)	(2.70)	(2.34)	(7.70)	(0.93)
0.20	1.800***	-0.270	1.067***	-0.001	0.004	0.920***	0.011	0.984***	0.034	1.138**	0.008***	0.834***	0.016
	(25.1)	(-1.02)	(8.18)	(0.00)	(1.30)	(6.56)	(0.63)	(7.62)	(0.18)	(2.40)	(2.86)	(7.20)	(0.94)
0.25	1.854***	-0.180	1.250***	-0.071	0.004	0.864***	0.009	1.059***	0.020	0.977*	0.007**	0.874***	0.013
	(24.5)	(-0.70)	(9.78)	(-0.35)	(1.21)	(6.06)	(0.49)	(7.59)	(0.10)	(1.88)	(2.27)	(6.65)	(0.70)
0.30	1.972***	-0.155	1.294***	-0.167	0.004	0.910***	0.017	1.135***	-0.080	0.820	0.004	0.974***	0.019
	(24.8)	(-0.63)	(10.09)	(-0.77)	(1.25)	(6.27)	(0.83)	(7.23)	(-0.36)	(1.44)	(1.07)	(6.34)	(0.88)
0.35	2.184***	-0.259	1.313***	-0.192	0.003	1.058***	0.007	1.239***	-0.172	0.871	0.002	1.025***	0.018
	(23.2)	(-0.96)	(8.94)	(-0.80)	(0.70)	(6.08)	(0.33)	(6.99)	(-0.69)	(1.41)	(0.60)	(5.74)	(0.81)
0.40	2.350***	-0.390***	1.413***	-0.194	0.003	1.039***	0.006	1.234***	-0.150	1.067***	-0.000	1.137***	0.019
	(31.3)	(-3.24)	(8.94)	(-0.76)	(0.58)	(5.50)	(0.26)	(6.47)	(-0.57)	(4.27)	(-0.04)	(5.13)	(0.82)
0.45	2.393***	-0.350**	1.495***	-0.264*	-0.003	1.148***	0.021	1.232***	-0.215	1.459*	-0.001	1.259***	0.037*
	(29.6)	(-2.56)	(8.42)	(-1.67)	(-0.49)	(5.02)	(1.04)	(4.65)	(-0.75)	(1.73)	(-0.23	(4.51)	(1.83)
0.50	2.522***	-0.426***	1.526***	-0.144	-0.002	1.167***	0.034*	1.325***	-0.276*	1.411**	-0.002	1.314***	0.035*
	(29.5)	(-3.45)	(7.50)	(-0.51)	(-0.37)	(4.62)	(1.73)	(5.74)	(-1.84)	(2.07)	(-0.34)	(4.98)	(1.69)
0.55	2.686***	-0.403***	1.520***	-0.222	-0.006	1.392***	0.033	1.393***	-0.260	1.764***	-0.003	1.311***	0.034*
	(28.7)	(-3.35)	(7.35)	(-1.33)	(-0.90)	(5.47)	(1.60)	(6.05)	(-1.63)	(3.45)	(-0.52)	(4.98)	(1.69)
0.60	2.892***	-0.375***	1.642***	-0.214	-0.013	1.471***	0.032	1.530***	-0.219	1.860***	-0.001	1.253***	0.032
	(28.3)	(-3.09)	(7.45)	(-1.34)	(-1.47)	(5.97)	(1.57)	(5.66)	(-1.11)	(3.61)	(-0.16)	(4.20)	(1.59)
0.65	3.080***	-0.390***	2.037***	-0.311***	-0.021**	1.401***	0.029	1.713***	-0.303***	1.885***	-0.007	1.333***	0.030
	(31.6)	(-3.22)	(7.33)	(-2.64)	(-2.12)	(4.61)	(1.30)	(5.66)	(-2.68)	(4.08)	(-0.90)	(4.16)	(1.51)
0.70	3.291***	-0.478**	2.247***	-0.287**	-0.026***	1.429***	0.027	2.040***	-0.317***	1.671***	-0.018*	1.314***	0.031
	(32.5)	(-2.14)	(9.52)	(-2.55)	(-2.86)	(4.70)	(1.29)	(7.03)	(-2.84)	(3.20)	(-1.67)	(4.03)	(1.46)
0.75	3.503***	-0.560*	2.403***	-0.267**	-0.026***	1.419***	0.035	2.447***	-0.287***	1.300***	-0.021**	1.189***	0.025
	(30.2)	(-1.65)	(10.98)	(-2.51)	(-3.05)	(4.66)	(1.54)	(11.34)	(-2.65)	(2.87)	(-2.31)	(3.85)	(1.29)
0.80	3.673***	-0.571*	2.233***	-0.219*	-0.029***	1.915***	0.034	2.325***	-0.254**	1.457**	-0.026***	1.575***	0.025
	(32.7)	(-1.78)	(11.11)	(-1.95)	(-3.47)	(6.60)	(1.65)	(12.86)	(-2.47)	(2.12)	(-3.40)	(5.68)	(1.43)
0.85	3.978***	-0.380*	2.082***	-0.158	-0.026***	2.363***	0.083	2.084***	-0.196*	1.542**	-0.024***	2.083***	0.094
	(31.2)	(-1.72)	(7.27)	(-1.44)	(-2.92)	(5.17)	(1.15)	(6.60)	(-1.76)	(1.98)	(-3.17)	(3.85)	(1.22)
0.90	4.420***	-0.756**	1.888***	-0.097	-0.025***	2.924***	0.078	1.880***	-0.151	1.924***	-0.024***	2.563***	0.092
	(20.7)	(-2.27)	(4.89)	(-0.90)	(-2.89)	(4.72)	(1.18)	(5.02)	(-1.45)	(2.61)	(-3.28)	(4.04)	(1.34)
0.95	5.428***	-0.323	1.765***	0.019	-0.019*	3.743***	0.072	1.923***	-0.041	1.206	-0.019**	3.187***	0.088
	(18.6)	(-0.61)	(3.05)	(0.19)	(-1.81)	(4.12)	(1.15)	(4.04)	(-0.39)	(1.43)	(-2.00)	(4.04)	(1.31)
Symmetry	0.00	0.98	0.44	0.88	0.05	0.22	0.46	0.08	0.17	0.83	0.16	0.62	0.39

Figure 8 Quantile Regression Estimates for Models 4, 5 & 6



The illustrations for quantile regression results with foreign trade as the dependent variable are as shown in figure 8. The graphs for model 4 show that investments have

a positive and significant influence on foreign trade while growth rate has a negative influence on trade. From model 5, we can see that government spending and investments are positively related to foreign trade whereas growth rate and real exchange rate are negatively related to foreign trade, and inflation rate is insignificant.

In model 6 (figure 8), all variables except inflation are generally statistically significant. GDP growth rate is statistically significant with negative effects on foreign trade between 50^{th} and 90^{th} percentile and insignificant otherwise. Investment, FDI and government spending have a statistically significant positive influence on foreign trade. It is worth noting that the positive effect of investments and government spending on foreign trade is across all percentiles. The real exchange rate on the other hand, has a mixed influence, positive effects below 30^{th} percentile but negative influence on foreign trade after 70^{th} percentile; weak local currency (above 70^{th} percentile) leads to decreased foreign trade while strong local currency (below 30^{th} percentile) has positive effect on foreign trade. In this regression, inflation is largely insignificant.

Table 9 PMG/ARDL Regression Results: Foreign Trade as Dependent Variable

	M4	M5	M6
Investment	0.9265*** (5.63)	0.8551*** (4.59)	0.1463 (0.56)
g	1.1995*** (3.68)	1.5123*** (4.26)	2.3568*** (4.27)
FDI			1.7546*** (4.94)
Exchange rate		0.1689*** (5.52)	0.2560*** (6.50)
Government		0.700* (1.90)	0.9142** (2.37)
Inflation		-0.00061 (-0.021)	0.0495 (1.61)
ECT	-0.2045** (-4.459)	-0.1878*** (-3.219)	-0.1531*** (-2.64)
ARDL lags	1,1,1	1,2,2,2,2,2	3,3,3,3,3,3,3

Notes: *(**)*** denotes significance at 10%(5%)1% respectively; parenthesis denotes t-values
The empty spaces indicate the variables excluded from the regression equation
ECT is error correction term

In table 9, we analyze the models 4, 5, and 6 using the ARDL estimation technique. The results for model 4 reveal that both investments and growth rate positively affect foreign trade in the long run. From model 5, we see that all variables (investments, growth rate, real exchange rate, and government spending) except inflation are statistically significant with positive impact on foreign trade. Lastly, the ARDL regression results for model 6 reveal that all variables have positive effects on foreign trade even though investments and inflation effects are statistically insignificant. The ARDL adjustment (ECM (-1)) coefficient is negative and statistically significant as expected for all the three models implying that any disequilibrium in the last period is corrected in the current period.

4.4.4 Mean Value and Percentile Comparison

The variables under investigation are not normally distributed i.e. mean value is not located at median level, 0.5; FDI (68.6^{th} percentile), growth rate (45^{th} percentile), government spending (63.8^{th} percentile), Investments (51.9^{th} percentile), foreign trade (66.9^{th} percentile, real exchange rate (69^{th} percentile) and inflation is largely skewed towards the end tail at 96^{th} percentile due to hyperinflation in some countries under the sample. This therefore means majority of the commonly used regression techniques which describe relationships amongst variables based on pooled mean values may sometimes lead to misleading results or wrong conclusion. We therefore believe that, QREG regression gives better results compared to ARDL or any other model for COMESA region.

4.5 Individual Country Regression

In this section, we carry out these regressions for each individual country (for M3 and M6). Results (see table 12) show that, in most COMESA Member States foreign trade has no significant effect on growth rate and similarly, the growth rate has no significant influence on foreign trade. This confirms the assertions made by Hsiao (2014), that panel data "increases degrees of freedom and reduces problems of multicollinearity; constructs more realistic behavioural models and discriminates between competing economic hypotheses; eliminates or reduces estimation bias; obtains more precise estimates of micro relations and generates more accurate micro predictions; provides

information on appropriate level of aggregation as well as simplifies cross sections or time series inferential procedures".

Table 10 Regression Results for Individual Countries Relationship

Country	Variables	QREG (median)		PMG/ARDL	
		M3	M6	M3	M6
Burundi	FT	-0.175 (-0.72)		-0.95*** (-4.6)	
	g		-0.262 (-0.85)		-0.259 (-1.16)
	FDI	0.298 (0.08)	0.157 (0.04)	1.735 (1.10)	-9.139 (-1.60)
	RER	0.065 (1.19)	-0.006 (-0.11)	0.038 (1.32)	0.026 (0.57)
	G	-0.292 (-0.93)	0.226 (0.76)	-0.134 (-0.86)	0.133 (0.50)
	Inv	0.481** (2.24)	0.654*** (3.0)	1.073*** (6.7)	0.623*** (3.6)
	Inf	-0.149 (-0.94)	-0.243 (-1.33)	-0.138* (-1.76)	-0.463* (2.04)
Congo DR	FT	0.0306 (0.35)		-0.367 (-0.86)	
	g		1.005* (1.92)		0.187 (0.03)
	FDI	0.227 (0.86)	1.166* (1.96)	-1.602 (-0.90)	19.124 (0.57)
	RER	0.006 (0.41)	0.085** (2.11)	0.127 (1.05)	-0.330 (-0.43)
	G	-0.288 (-0.48)	0.421 (0.91)	-0.487 (-0.63)	2.803 (0.45)
	Inv	0.581 (1.25)	0.509 (1.02)	0.497 (1.34)	9.296 (0.6)
	Inf	-0.023 (-0.80)	0.007 (0.74)	-0.028* (-1.73)	-0.039 (-0.15)
Egypt	FT	0.156 (0.87)		0.249*** (4.2)	
	g		0.532 (0.71)		2.076*** (3.1)
	FDI	0.146 (0.54)	0.734 (1.47)	0.095 (1.11)	0.341 (0.83)
	RER	0.002 (0.03)	0.178*** (4.1)	-0.028* (-1.92)	0.170*** (6.6)
	G	0.059 (0.20)	0.254 (0.44)	-0.217** (-2.1)	0.686* (1.96)
	Inv	0.253* (1.73)	0.603 (1.26)	0.40*** (4.50)	-0.608 (-1.43)
	Inf	-0.142 (-0.83)	0.698** (2.52)	-0.41*** (-5.6)	1.311*** (5.5)
Kenya	FT	0.048 (0.27)		0.052 (0.53)	
	g		0.683 (1.42)		-0.718 (-0.93)
	FDI	1.384 (1.53)	-0.926 (-0.48)	-2.552* (-1.99)	1.236 (0.82)
	RER	-0.004 (-0.23)	0.026 (0.61)	-0.013 (-1.12)	-0.008 (-0.21)
	G	-0.035 (-0.07)	0.054 (0.06)	-0.063 (-0.24)	0.106 (0.13)
	Inv	0.324 (1.43)	-0.362 (-0.73)	0.418*** (3.8)	0.023 (0.06)
	Inf	-0.214** (-2.1)	0.360 (1.56)	-0.086 (-1.52)	0.497*** (3.6)
Madagascar	FT	0.008 (0.08)		0.144* (2.1)	
	g		0.522* (1.88)		2.104 (1.2)
	FDI	-0.331 (-0.87)	0.703 (0.84)	0.191 (0.83)	1.011 (0.77)
	RER	0.034 (0.91)	0.249*** (3.56)	-0.104* (-1.92)	0.286 (1.33)
	G	0.359 (0.48)	3.382* (1.90)	-2.553* (-2.02)	1.233 (0.23)
	Inv	0.255 (1.24)	0.583 (1.11)	0.054 (0.37)	0.357 (0.40)
	Inf	-0.110 (-1.42)	0.274 (1.46)	-0.154* (-2.07)	0.031 (0.08)
Malawi	FT	0.069 (0.17)		-0.357 (-1.58)	
	g		-0.169 (-0.70)		0.092 (0.47)
	FDI	0.118 (0.27)	0.957 (1.79)	0.20 (0.87)	1.987*** (5.6)
	RER	-0.011 (-0.13)	0.121** (2.18)	0.084* (1.93)	0.075*** (3.0)
	G	-0.354 (-0.67)	0.539 (1.40)	0.156 (0.47)	-0.272 (-1.49)
	Inv	-0.024 (-0.06)	0.402 (1.23)	0.511** (2.11)	0.838*** (4.2)
	Inf	-0.057 (-0.28)	0.248** (2.69)	0.067 (0.70)	0.479*** (6.5)
Mauritius	FT	-0.102 (-0.82)		0.067 (1.27)	
	g		-0.609 (-1.15)		0.892 (1.44)
	FDI	0.022 (0.07)	0.351 (0.58)	-0.192 (-1.45)	0.345 (0.83)
	RER	0.063 (1.26)	0.142 (1.54)	0.014 (0.71)	0.159** (2.6)
	G	-1.59*** (-3.1)	-0.453 (-0.29	-1.326*** (-7)	0.321 (0.28)
	Inv	0.677** (2.66)	1.326*** (3.3)	0.323** (2.9)	1.250*** (3.5)
	Inf	-0.329 (-1.67)	-0.049 (-0.16)	-0.190** (-2.7)	-0.325 (-1.12)

Country	Variables	QREG (median)		PMG/ARDL	
		M3	M6	M3	M6
Rwanda	FT	-0.0009 (-0.001)		1.378 (1.50)	
	g		-0.075 (-0.24)		3.003 (0.59)
	FDI	-0.213 (-0.05)	0.877 (0.35)	-6.663 (-1.24)	8.657 (0.62)
	RER	0.075 (0.67)	0.051 (1.12)	0.005 (0.04)	-0.466 (-0.48)
	G	0.257 (0.33)	0.164 (0.37)	1.516 (1.17)	-2.302 (-0.69)
	Inv	-0.033 (-0.03)	0.711 (1.17)	0.416 (0.42)	-2.581 (-0.58)
	Inf	-0.104 (-0.46)	0.169 (0.78)	-0.056 (-0.13)	-1.012 (-0.72)
Seychelles	FT	0.039 (0.35)		-0.033 (-0.56)	
	g		-0.503341		-18.13 (-0.07)
	FDI	-0.001 (-0.03)	-0.208 (-0.49)	0.279 (1.03)	-1.617 (-0.04)
	RER	0.034 (0.16)	1.688 (-0.16)	0.083 (0.63)	-30.21 (-0.06)
	G	-0.508 (-1.03)	2.769*** (3.6)	-0.179 (-0.62)	55.14 (0.07)
	Inv	-0.285 (-0.96)	0.707 (0.73)	-0.432* (-1.9)	77.29 (0.07)
	Inf	-0.406 (-1.55)	-0.101 (-0.12)	-0.492** (-2.5)	69.60 (0.08)
Sudan	FT	0.036 (0.15)		-0.431* (-2.02)	
	g		-0.112 (-0.38)		2.465 (1.29)
	FDI	-0.571 (-0.61)	-0.983 (-0.74)	-0.559 (-0.74)	2.563 (0.62)
	RER	0.027 (0.73)	0.015 (0.42)	0.012 (0.60)	0.229 (1.07)
	G	0.404 (0.63)	1.167* (1.7)	0.933* (1.99)	0.70 (0.43)
	Inv	0.332 (0.81)	0.806* (2.02)	0.500* (2.01)	0.023 (0.02)
	Inf	0.005 (0.07)	-0.112 (-1.03)	-0.042 (-0.70)	0.132 (0.41)
Swaziland	FT	0.118 (1.32)		0.033 (0.10)	
	g		0.395 (0.56)		-1.961 (-0.90)
	FDI	0.202 (0.60)	0.080 (0.09)	-1.224 (-0.51)	7.864 (1.44)
	RER	-0.09** (-2.17)	0.231** (2.22)	-0.303 (-1.02)	1.163 (1.66)
	G	0.338 (0.72)	-0.468 (-0.36)	-0.635 (-0.43)	1.352 (0.39)
	Inv	-0.111 (-0.42)	1.557** (2.23)	-0.259 (-0.25)	3.515* (1.92)
	Inf	0.138 (0.59)	0.019 (0.03)	0.852 (0.79)	-2.595 (-1.50)
Uganda	FT	-0.060 (-0.16)		-0.263 (-1.1)	
	g		-0.206 (-0.76)		-0.41** (-2.6)
	FDI	0.813 (1.07)	1.577* (1.89)	1.729** (2.1)	2.621*** (5.7)
	RER	-0.005 (-0.18)	-0.066** (-2.5)	0.033 (1.32)	-0.028** (-2.1)
	G	0.278 (0.58)	0.361 (0.92)	-0.974* (-1.76)	0.267 (1.01)
	Inv	-0.035 (-0.06)	1.312*** (3.7)	-0.369 (-0.91)	0.699*** (3.7)
	Inf	0.282 (1.56)	0.245 (1.49)	-0.246 (-0.9)	0.531*** (4.0)

Notes: *(**)*** denotes significance at 10%(5%)1% respectively; parenthesis denotes t-values

5. CONCLUSION

The main focus of this research is to investigate the effects of foreign trade on economic growth in the COMESA regional bloc. The sizeable empirical work though mainly for developed economies, is full of controversies especially on methodologies and the estimation results. This compelled our interest to employ quantile regression and ARDL to analyze this important relationship between foreign trade and growth in COMESA member countries using annual data from 1980 to 2014.

Foreign trade appears beneficial to the economy only at low levels (below 15th percentile). Investments have a positive influence on growth across all percentiles. Inflation is negatively associated with growth while FDI is largely statistically insignificant. Government spending has a mixed response towards growth rate (low government spending has negative influence while high spending has positive influence), a clear indication that budget cuts hurt economy more in COMESA region. Lastly, real exchange rate is beneficial to the economy above 60th percentile (may be depreciated currency helps economy via imports substitution and increased exports). Africa being largely a net importer, investments maybe mainly focused on import substitution without generating enough for re-export. Low government spending (below median) is bad for the economy but high government spending (between 85th and 90th percentile) is good for the economy.

The study further established that FDI, government spending and investments have a positive influence on foreign trade while growth rate, real exchange rate and inflation have negative effects on trade. FDI and investment appear to be the two key variables that positively affect foreign trade in the COMESA region. Real exchange rate above 30th percentile leads to decreased foreign trade while the one below 30th percentile has no impact on foreign trade. Government spending has mixed influence on growth rate but it is positively associated with foreign trade. Similar to Brueckner & Lederman (2015), we establish that economic growth has a significant and negative effect on trade. Finally, foreign trade is largely insignificant for COMESA member states as it only has significant and positive effects on economic growth up to 10th percentile.

Using ARDL estimation technique, we establish that government spending, FDI and investments have a positive influence on growth rate while foreign trade, the real exchange rate and inflation have a negative effect. However, employing foreign trade as the dependent variable, we establish that growth rate, FDI, real exchange rate and government spending have positive significant effects to foreign trade while gross investments and inflation are not important variable to stimulate foreign trade.

In conclusion, we established that FDI, government spending and investments have a positive influence on foreign trade, inflation is insignificant, while growth rate and real exchange rate have mixed effects on foreign trade depending on the regression model used. We further note that, investments has a positive influence on growth, while all other variables (foreign trade, exchange rate, FDI, government spending and inflation) have mixed influence depending on the regression model used. The study recommends that COMESA member states ought to increase gross investments and government spending to foster high levels of economic growth as well as trade.

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