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Exploring the Relationship between Trade Liberalization and Ethiopian Economic Growth

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**Erasmus Mundus Joint Master Degree
in Economics of Globalisation
and European Integration**

**Exploring the Relationship between Trade Liberalization and Ethiopian
Economic Growth**

Master dissertation

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Declaration

I, the undersigned, declare that this thesis is original work and has not been submitted in any other program or university, and that all sorts of materials used for the dissertation have been duly acknowledged.

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Acronyms

ADF:	Augmented Dickey Fuller
CPI:	Consumer price Index
ECM:	Error Correction Model
FDI:	Foreign Direct Investment
RGDP:	Real Gross Domestic Product
GMM:	Generalized Method of Moments
GTP:	Growth and Transformation Plane
IMF:	International Monetary Fund
MOT:	Ministry of Trade
NBE:	National Bank of Ethiopia
OLS:	Ordinary List Square
SAP:	Structural adjustment program
REER:	Real Effective Exchange Rate
SSA:	Sub Saharan African
TO:	Trade Openness
USD:	US Dollar
VEC:	Vector Error Correction
VECM:	Vector Error Correction Model
WB:	World Bank
WTO:	World Trade Organization

Abstract

Theoretical and empirical economic literature has shown the economic growth of countries is related to both liberalization and international trade integration. The main purpose of this study is to apply this knowledge to the Ethiopian case and estimate the impact of trade liberalization on Ethiopian economic growth. The study has employed an Error Correction Model (ECM) for the time series data ranging from 1980 to 2016 to examine the economic effect of trade liberalization on the Ethiopian economy.

The empirical results show that there are both short run and long run relationships between liberalization and economic growth. More specifically, trade openness has had a positive and significant impact on economic growth of Ethiopia. Therefore, the government of Ethiopian should have to design a more opened trade policies so as to reap the benefits associated with integrating ones economy with the world economy.

Key word Cointegration, Economic Growth, ECM, Trade Liberalization

1. Introduction

1.1. Background of the Study

In history, trade was considered as an essential and motor of economic growth Echekoba F (2015) and Edwards & Henry (1991) for nations which are at different levels of growth. Trade does transform growth from one economy to other economy and contribute to better resource allocations. In the previous many years, there has been a tremendous economic growth in some countries and a fluctuating economy in others and as a result there exists less evidence of convergences. International trade plays a crucial role in the sense that there exist both dynamic and static gains from trade though trade theories do not say anything about the fairness of those gains from trade.

World trade policies are getting deregulated from time to time after the Second World War starting from 1947 when 23 nations have signed the General Agreement on Tariffs and Trades (GATT). The fundamental objective was lowering tariffs significantly and other restrictions. Complement to this GATT has replaced by World Trade Organization after the eighth ministerial conference held in Uruguay round. Between the foundation of GATT and WTO which was stayed for 50 years, there have been eight different ministerial conferences which all rounds are aimed at avoiding tariff and non-tariff barriers. This was basically considered as a huge step forward towards trade liberalization. Moreover, the world leading financial institutions IMF and World Bank are also the main actors of trade liberalization in the sense that developing countries are supposed to adapt structural adjustment programs in which deregulation of trade policies and other domestic policies were the core principals to get loan.

In the WTO website it is articulated that "...The rules and regulations of trade among any member nation are undertaken at the world trade organization with the main objective of insuring smooth, foreseeable and free trade flows. Most of the negotiations and trade related treaties signed at this organization approved and authorised by the parliaments of the member states in the WTO".¹

¹ https://www.wto.org/english/thewto_e/thewto_e.htm

Tariff levels in advanced industrialised countries have come down dramatically. Tariff levels in developing countries have also been reduced, although they still does not eliminated totally. Non-tariff barriers to trade, such as quotas, licenses and technical specifications, are also being gradually decreased, but rather more slowly than tariffs. From a policy perspective, the continuing efforts to liberalize international trade on a multilateral basis first under GATT and now World Trade Organization headship have supported well market access and rates of growth of international current account dealings much above universal economic growth. From an empirical point of view, however, the trade-growth connection is still in discussion, both from a methodological approach and concerning the scope and significance of the estimated effects. (IMF, 2007).

The removal of trade barriers which makes transaction of goods and services free of any extra charge that produced in one nation and consumed or used as an intermediate goods in other third nations including dismantling of tariff (such as duties, surcharges, and export subsidies) as well as nontariff barriers (such as licensing regulations, quotas, and arbitrary standards).²

Most developing countries made a trade reform with the main objective of improving the living standard of its own nations and increasing the well-functioning of market that would attract foreign direct investment which indirectly used to get factor allocations and capital accumulation to hit economic growth.

Ethiopia as part of sub Saharan African country also implemented the structural trade policy adjustment and reform implementations derived from the two most donor such as International Monetary fund and the World Bank after the economic crises of the developing nations in the 1970's and 1980's with the central objective of trade liberalization globally through structural adjustment program boldly recommended by the two organizations (World Bank and IMF) to open foreign trade competition and decrease barriers of trade as a long term strategy of economic growth and development.

As it is briefly explained under the study of Ferede and Seyoum (2004), Poverty reduction, macroeconomic stability, rapid and sustainable economic growth was the main objectives of the Ethiopian government to implement variety policy reforms and liberalization of trade. Throughout this processes in Ethiopia, tariff have been cut, licencing bureaucracy was adjusted by using online registration system, relaxation of quota constraint, minimizing the

² <http://www.businessdictionary.com/definition/trade-liberalization.html>

control over foreign exchange and makes free the interest rate control and privatization began with private banking authorization.

1.2. Statement of the study

It is found to be undecided whether trade liberalization affects economic growth positively or negatively for the development of countries. The main purpose of trade liberalization since mid-1980 was to encourage economic growth by capturing the static and dynamic gains from trade through technological transfer and innovation, proper allocation of resources, creating more computation among nations, increasing inflow of investment and capital accumulation Babatunde (2009) Greenaway et al (2002) , Felix G.(2003), Lill and Ronald (2008), (Yimer, 2012) and Burhan A,(Suranovic, 2010) (Manni & Afzal, 2012) Grossman and Helpman (1980) and Mkubwa, Mtengwa, & Babiker, (2014), are among those who have argued about the greater opportunity to grasp and absorb technological advancement spawned from the developed nations which is the benefits from a positive relationship between trade liberalization and economic growth others as described on the works of Vasquez(2002) and Winters (2004) have concluded that trade liberalization and economic growth are inversely related in the case of developing countries specifically in Africa

The issue of opening an economic activity for the international market may trigger a trade performance better than those who are closed their economy due to the fact that opening the economy to the international market allows the country to attract foreign direct investment (FDI), market access for domestically produced goods, technological transfer from other nations through trade specially by importing machineries and skill demanding materials, it also creates employment opportunities (Parikh & Stirbu, 2004).

For the transformation of the growth strategy to developing nations such as Ethiopia where the economy is mainly dependant on primary agricultural products and the foreign currency earnings mostly from coffee and oilseed exports which are primary products export is often debatable. Previous studies that deal with the growth of the economy due to the fact that countries open and liberalized their economy have increased in the last couple of years. Substantial progress has been made in intensifying more reliable theory and knowledge of the effect of opening the economy apart from those institutional frameworks that support and encourage the working environment of the sector to compete in trade activity.

It is advocated by Krueger et al (2003) that poverty will be reduced to the minimum level whenever developing countries economy is more freed and integrated with the rest of the world. Popularizing view of the positive impact of trade openness to poverty, Segerstrom &

Wallack (2003) argued that over the period 1950-1998, countries that have liberalized their trade regimes have experienced, on average, increase on annual growth rates by 1.5% compared to pre-liberalized times. Furthermore, the works of Dowrick and Galley, (2004), showed that technological progress can be increased through liberalized trade which in turn results in higher productivity. The researchers additionally elucidated expanded output pushes towards economic growth by means of letting domestic producers to practice specialization and economies of scale based on the availability of resources eg, Ethiopia is endowed with the most organic and variety of coffee that has a unique aroma and other organic agricultural products such as oil seed which requires value addition practicing.

Formerly, few studies have been undertaken on the impact of trade liberalization in the case of Ethiopia. However those studies did not directly linked the impact of trade liberalization to the Ethiopian economic growth; they instead investigated the impact of trade liberalization on other variables other than economic growth. As a result, this study is motivated to explore the relationship between trade liberalization and economic growth. After identifying the impact of trade liberalization on the economic growth by including current data for selected variables, the study able to forward some possible recommendations for policy makers in the last section. Thus, in this paper, an updated review and synthesis of the empirical literature on exploring the relationship between trade liberalization and Economic growth of Ethiopia, between the periods 1977 and 2015 is presented.

1.3. Objective of the study

The general objective of the study is to explore the relationship between trade liberalization and Economic growth in the case of Ethiopia. The study has the following additional specific objectives.

- To investigate whether trade liberalization is an important policy instrument to promote economic growth in Ethiopia
- To suggest policy direction on the linkage between trade liberalization and economic

1.4. Research question

In order to successfully complete the objectives mentioned above, this study has attempted to address the succeeding twosome of questions

- Does trade openness have any influence for the Ethiopian economy?
- How trade liberalization and economic growth are linked in the case of Ethiopia?

1.5. Hypothesis

The economic impact of trade liberalization on economic growth has been an area for research in the last many years. Majority of the research have revealed a positive relationship between economic growth and trade liberalization. Mkubwa & Babiker (2014) Echeboba & Okonkwo (2015), (Babula, 2009), Babula & Lill Andersen (2009) have concluded that there exists a positive and significant relationship between liberalization and growth. There are still few researches that conclude a negative economic impact of liberalization where they justify it with the help of infant industries argument. That is, Most of manufacturing industries are small and medium enterprises that their financial and production capacity is limited. Therefore, in times of liberalization those enterprises will face strong competition from external companies, they will immediately liquidate or demolished. However, supporters of free trade come to criticise against the infant industry with a conclusion of those infant industries who are being protected by the government have not grown and they always want a long lasting protection from external competition. Provided this, the hypothesis of the study is that there is long-run relationship between economic growth and trade liberalization and that relationship is positive.

1.6. Research Methodology and data source

The study is based on secondary source of time series data covering from 1977 to 2016 collected from national bank of Ethiopia, Ministry of Finance and Economic Development, WB and others. The collected data is checked for the stationarity issues first and analysed using an econometric model such as vector error correction model (VECM). Therefore when the economy is more open the higher economic performance will be. The variables that are used in the study are trade openness as a proxy for trade liberalization, Active population from the age of 15 to 64 as a proxy of labour force, Real effective exchange rate used as an useful measurement of country's international price competitiveness, Expenditure on education as a proxy to human capital and real gross domestic product as a proxy of economic growth.

RGDP is considered to be the proxy for economic growth in many analyses and the case for this study is not different from the tradition. Moreover, Gross capital formation, active labor force, expenditure on education, openness (the ratio of import and export to GDP) and foreign direct investment are the selected variables to determine economic growth of Ethiopia.

2. Literature review

2.1.Theoretical review

Adam Smith was the first economist who studied the relationship among international trade and economic growth using the concept of absolute advantage. From that day on there have been enormous number of economic researches conducted and that raised a very powerful ideas so as to see the impact of free trade policies on the economy of both developed and developing countries. According to Adam Smith (1776), specialization and labor division are considered as the main determinants of wellbeing and economic growth. Besides, the theory of comparative advantage of David Ricardo has showed that both countries engaged in trade can be mutually beneficial from trade and specialization in which his model termed as a “win-win Approach”. It is believed that trade enhances production and consumption efficiency and thus welfare will surge in both countries participating in trade.

In contrast to the above conclusions, no positive relationship is found between trade openness and economic growth of countries. It instead showed that technological progress exogenously determines the factors that affect the long-run economic growth. Therefore the long run economic growth is not affected by the degree of economic integration with the rest of the world. Trade openness only has a transitional effect to the steady state and long run welfare gains not on the economy of countries.

According to Lill Anderson & Babula (2009) [...]”conventional trade theory associates international trade with a reallocation of resources within the national borders determined by exogenous differences across countries. This reallocation of resources generates efficiency gains that increase the level of aggregate national income”. Similarly endogenous growth theories suggest that the higher the trade is opened to international competition, the greater the economic growth will be in the sense that it will increase the scale of a spill-overs effect of technology from industrialized economy. Moreover, trade liberalization may encourage growth and development of ones economy for some countries that have a capacity to adopt and imitate the knowledge transferred through the globalization channels such as market and foreign direct investment. But it does not mean that trade liberalization is the only driving factor and also it affects growth positively. In some circumstances, it can be also affect the economy of others inversely Romer & Frankel (1999).

Some scholars who believe and give opposing argument on the benefits of trade liberalization, Utkulu, (2004), Vasquez (2002), winter (2002) with an evidence of the maize market failure case of Zambia and the cotton trade problem of Zimbabwe that deduce about

openness may reduce growth by making out of market the local beginner industries unless there is a strong financial and institutional policy implementing practices. It is clear that given the tools of endogenous growth theory, any policy choice can be shown to have growth effects through its effect on the accumulation or allocation of physical or human capital.

Is trade liberalization really has a long term relationship with economic growth in a small economy such as Sub Saharan African country such as Ethiopia that takes world price as given? Empirical evidence in the area of the topic brings different arguments. Some studies showed that countries that have open trade policies to decline the tariff rates of its import and integrated with the rest of the world registered a higher progress in the gross domestic product. Other researches have investigated trivial signal on the relationships between open trade liberalization and economic growth. This section tries to address both the theoretical and empirical literature on exploring the relationship between trade policy and economic growth.

Theoretical literature on the relationship between trade and economic growth tells about the long term benefits of trade on economic growth. As an example, Baro & Martin, (1995), on their working paper contested that opening an economy encourages the growth performance in the long run by disseminating knowledge, familiarizing advanced level machinery oriented items and create a spill over effects through foreign direct investment. On the contrary, Redding, (1999) pointed out that trade openness impedes economic growth through comparative disadvantage in the growth of productivity in specialized sectors which the country does not diversified the production and trade activities to prevent specific product shocks in the economy. In addition to this Rodrik (1997) supports the idea of Redding by arguing the shortcomings of trade openness for the development of any nation to make compatible with the local institutional and political stability and he also suggests how globalization creates labour transformation of the employment relationships and its cause income inequality to occur within and between nations and over the traditional norms that the society have before opening the economy for integration.

2.2. What the Empirical review talk

Does liberalizing trade necessarily bring an economic growth especially for those developing countries including Ethiopia? Various works have been done in the last two decades on the economic Impact of trade liberalization and the results are found are universally unconvincing. As it is explained above some researchers deduce and found a positive relationship between the subjects and some identifies and have found an inverse or no relationship between trade liberalization and economic growth. The following section surveys few empirical works on the economic effects of trade liberalization.

Burhan A. et al (2014) have investigated the impact of trade liberalization on economic growth in Tanzania using the annual time series data covering from 1970-2010 by sub dividing in to two different categories that shows the period of closed economy (1970-1985) and the period of open economy (1985-2010). That tries to identify the impact of trade liberalization on the performance of economy by applying an OLS technique for the two periods separately. The study found a positive and significant impact of trade openness on economic growth. The study also indicates that the positive impact was higher during the closed economy regime than open economy period in Tanzania.

Olaifa et al (2013) studied the relationship between Trade liberalization and economic growth using a yearly data of 1970 to 2012 built on conventional trade theory to investigate whether there have been a long run relationship between Trade Liberalization and economic growth, also evaluate for the impact of structural change employed in the free trade regime. The study supports the international trade theory with an evidence of the positive and significant impact of trade openness on economic growth after the country adopt structural adjustment program undertaken in 1986 with the implementation of free trade agreement. The study concludes as the country is benefited from the economic integration and also recommends to strength the enabling environment for the economic growth such as better infrastructure, financial support for export sectors and strong institutional structure for sustainable growth.

Johnson J. et al (2013) examined the relationship between trade openness and economic growth for the period 1960 to 2010. The study evaluates the causality relationship of openness and economic growth empirically and supports the existence of long run affiliation using the method of co-integration and granger causality tests. From the result they concluded

that investment and trade agreements have a positive effect on the economic growth of Sri Lanka economy.

Edwards & Henry (1991) contended about the abundances and significance of open economy and outward oriented economies had a better performance than closed economies due to the promises of trade liberalization which results a moderate growth rate of export and positive impact of aggregate growth by permitting higher capacity utilization and more efficient resource allocation and technological diffusion. The research finding pointed out that human capital formation tends to increase the positive impact of trade openness on economic growth.

Greenaway & Morgan (2002) tries to show the mixed effects using a dynamic panel framework and different indicators of liberalization and found the controversial empirically both positive and negative results and their result suggest that, on average, openness appears to have been connected with a falling in growth for the particular sample in developing countries explain about the reform and adjustment programs to facilitate and improve the functioning of markets with an objective to support factor allocation and build-up. Completely removing or decreasing the anti-export barriers of the liberalizer country was vital for any program.

Greenaway, Morgan & Wright (1997) assess on a group of countries which have liberalized in the post-1985 period using a panel estimation techniques with the view of before and after, with and without liberalizing based on the implementation of the restructuring program. Based on a “core” new growth theory using a cross country time series data found deterioration on economic growth for a particular sample on average. However their finding was robust both for the sample and specification.

Seid (2012) the theory of multistage production function international journal work based empirically investigated the impacts of trade liberalization on economic growth and poverty reduction in Ethiopia using the Dynamic Computable General Equilibrium Simulation Model simulated alternative policies scenarios showing full and indiscriminating liberalization, gradual and rationalized liberalization, instantaneous tariff liberalization and found the result as he expected to be a positive relationship trade liberalization has positive impact on the declining of poverty and economic growth in the long run.

Babula et al (2009) reviewed the most cited empirical analysis that focuses on the linkage between international trade versus economic growth, the link between trade and productivity growth and conclude the existence of positive impact of trade liberalization on the growth of the economy putting caution of their concern on the problems of measurement error and endogeneity which handles most empirical analysis. They also have a caveat in relation to the ability of the developing countries to gain a productivity growth by opening the economy to the rest of the world. Their finding conclude the review with a suggestion of investing on human capital to achieve the property right and make enhancing to create a strong institutional frame work in line with opening the economy has a positive impact for the economic growth of a country.

Onafowora et al (1998) “Can trade liberalization stimulate economic growth in Africa?” examines the possible effects of liberalization arise from policy amendments towards export and investment for 12 sub Saharan African countries by expanding the Balassa (1978) and Feder (1983) augmented production function growth model for the inclusion of export and investment using vector auto regression error correction method, found that from the sample of 12 countries 10 of the countries registered a positive economic growth from the change in trade policies of outward looking strategies of export expansion.

Jeffery & Andrew (1991), empirically estimated the sub-Saharan African countries future based sources of slow economic growth as a more optimistic view following the approach of Barro (1991), they used countries gradual adjustment from the current income level to the steady state level of per capita income using some selected variables through a panel data analysis and their finding suggested the reason for the stagnant economic growth apart from landlocked geographical features and lack of openness for international markets, poor economic policies and political instabilities take the lions share. The authors used the Sala and martin Cobb Douglas production function and included some policy variables such as higher rates of central government savings as a share of GDP associating with a faster economic growth.

Wacziarg, (2003) new evidence on trade liberalization and growth for a country specific revisiting study argued that relationship between economic integration and economic growth by extending the Sachs and Warner (1995) finding of the relationship of growth and openness by updating the datasets and present a time path of economic growth, Physical capital investment and openness during the periods of trade liberalization regime. In contrast of their

cross sectional result their finding relying on quantitative data and thorough review of country-specific case studies of trade policy reform shows that external liberalization brings an average robust positive effect on economic growth, openness and investment rates for over the time period 1950-1998 for those countries liberalized their economy get an average 1.5 percentage , 1.5 to 2 percentage increase of investment rate and trade to GDP ratio on average 5 percentage within country sense compared before liberalization.

The causality relationship among Trade liberalization, human capital and economic growth has been empirically assessed by Chaudhry et al (2010) using the annual data from 1972 to 2007 based on the neoclassical theory. The study has employed Granger causality co-integration method and found and confirmed the short run and long term relationship between the engaged variables as well as they explain the direction of causality as from liberalizing trade to human capital accumulation with a technological advancement and intern to economic growth. From their result shown all the variables were statistically significant and put an evidence of a 3.06 percent GDP growth registered due to a 1 percent increase of trade openness in Pakistan.

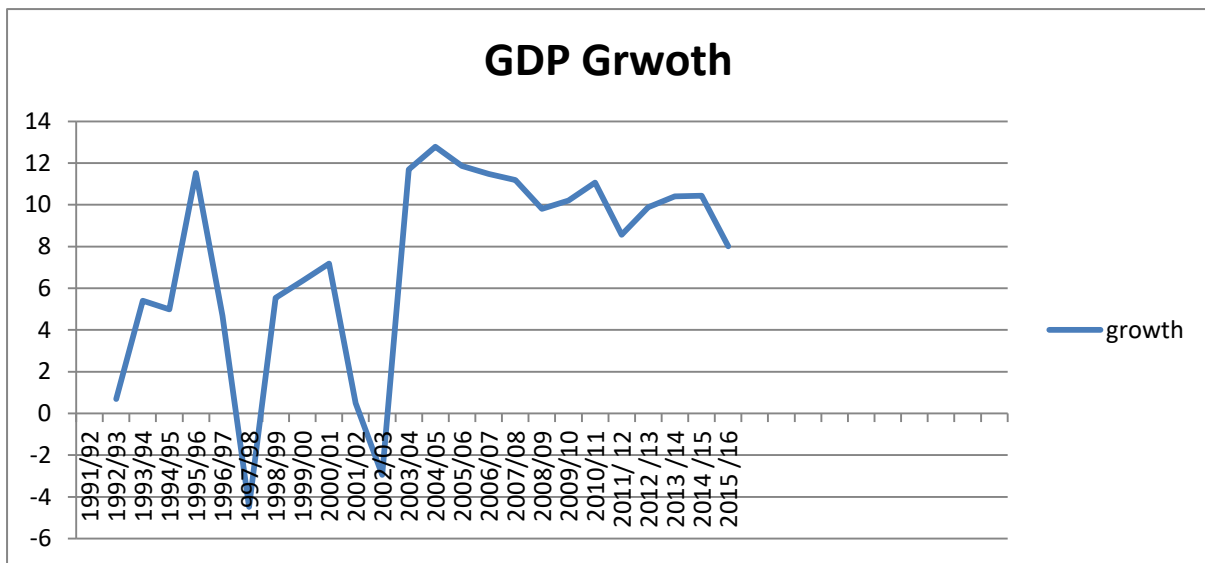
Ethiopia, undertaking the process of accession to become a member of world trade organization, adopted structural adjustment and other trade and transformation policies since 1992 and working to integrate itself with the global community gives priority for trade liberalization and working on the industrialization part to expand its export practice from primary agricultural products to manufacturing. Therefore, as it is described on the above theoretical and empirical reviews the benefits of trade openness has no clear cut conclusion whether trade liberalization has positive correlation with growth under all circumstances. The aim of this paper is to investigate empirically the relationship between trade liberalization and economic growth.

3. Description of Ethiopian Economy

For the last consecutive 10 years, the Ethiopian economy measured by GDP growth showed average growth rate of 10.7 percent annually., the growth has been achieved since 1992 after a country opened itself to the rest of the world as a result of massive policy reform which increase foreign investment and both import and export of the country. The growth of real GDP has an increasing trend though there have been fluctuations in some of the periods under consideration. Since the country is dependent on natural rainfall there is a seasonal drought. Furthermore, continuous border conflicts with Eretria challenges the social and economic activity. According to the World Bank's 2017 report Ethiopia is among the fastest growing country. In 2017 Ethiopian economy is expected to grow by 8.3 percent relative to 2.7 percent growth of the global economy. Despite the fact that the country is a net fuel importer, it manages to register a continuous economic growth by opening its market for a better integration with both neighbouring African countries and globally. Agriculture employees 85 percent of the population's and more than 85 percent of the total export is agricultural products³.The country is working to achieving its goal of becoming middle income level economy in 2025. This in turns requires adjustment policy and technological adaptation activities to be benefited from the trade gains through trade liberalization. As it is presented in the figure below, positive growth rate of GDP has been achieved from 1993-1997 as a result of massive policy reform which increased the foreign investment and both import and export. However, the growth rate became negative, and shows a break in 1998 as a result of recurrent draught of 1997. The economy rebounded strongly on a catch-up, to record real GDP growth of 5.2 per cent in 1999. Real GDP growth fell again in 2002/03 owing to the negative impacts of the border war with Eritrea. The outlook on growth is a strong rebound as the government shifts attention from the war effort to developmental tasks, the average real GDP growth from 2003-2011 is 10.4 % which places the country among the top performing economies in sub-Saharan Africa.

³ www.weforum.org, the world's fastest growing economy in 2017

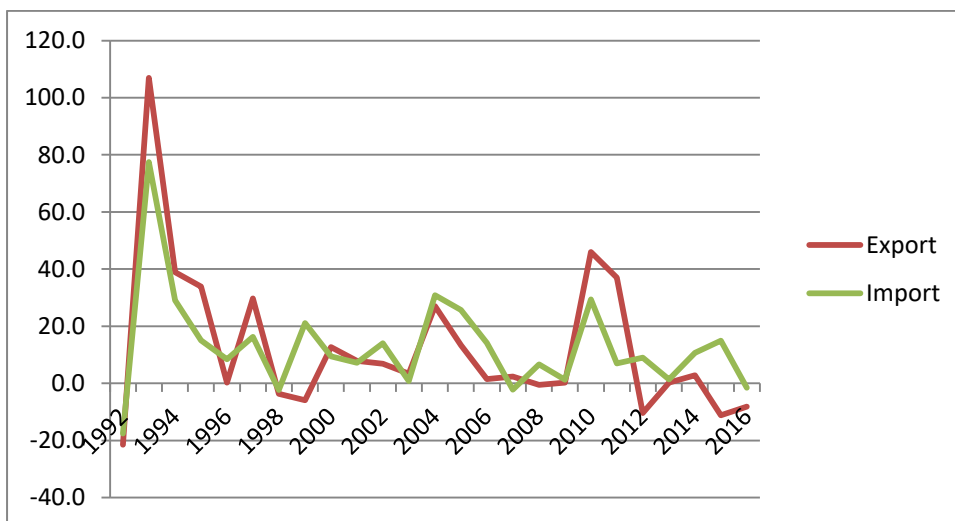
Figure 1 Growth rate of GDP over 1992-2016



Source: NBE and own computation

Between the year 1992 and 1995, both export and import have registered a record high growth rate. This is the result of economic reforms such as opening the import and export sector, devaluations and other different structural adjustment program of the World Bank. Export and import growth in Ethiopia is always subject to fluctuations. Often time's international price fluctuation of agricultural commodity is a major reason. For instance in 2010 and 2011 Ethiopia's export bums due to the fact that international price for agricultural commodity was high.

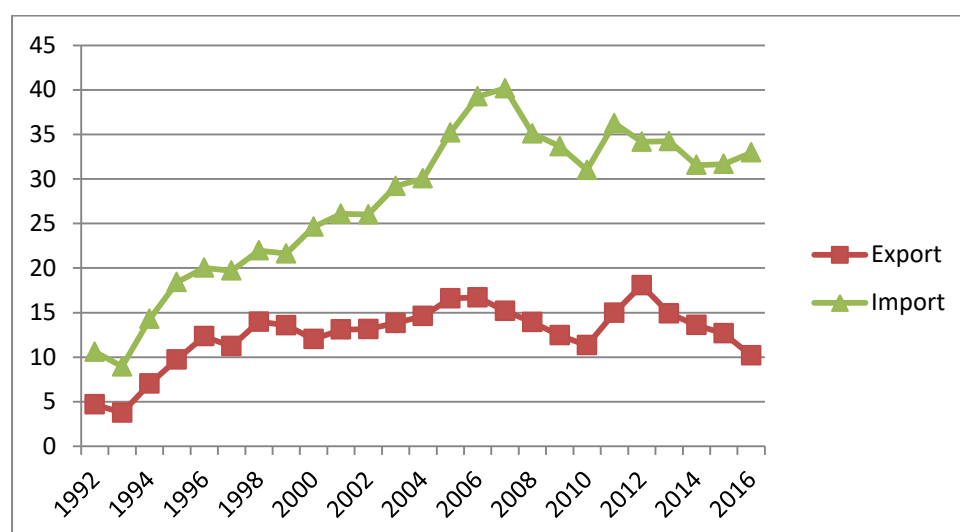
Figure 2 Growth rate of Import and Export over 1992-2016



Source: NBE and own computation

In Ethiopia the share of import to GDP is always growing overtime. The demand for industrial products both for consumption and development purpose is continuously growing. However, the share of export to GDP is almost stabilized below 15 percent in most of the times under investigation. The share of import to GDP is always higher than that of export to GDP. This implies most of the export items of Ethiopia are primary agricultural commodities and the price of these commodities are less than that of industrial products that Ethiopia imports in bulk. That means the gain from export do not finance its import. This demands urges diversification of export to at least processed agricultural products which the country is working to transform to industrial lead economy.

Figure 3 Share of Exports and Imports to GDP



Source: NBE and own computation

4. Methodology, Result and Discussion

4.1. Introduction

The study has used a secondary data of 37 years ranging from 1980-2016 in which those data are collected from relevant national and international data bases including National Bank of Ethiopia, Ministry of Trade, Ministry of Finance and Economic Corporation , world bank and others. This section presents the methodological frame work, the empirical result and discussion.

4.2. Model specification

In order to examine the impact of trade liberalization on the Ethiopian economy, the growth rate of RGDP is considered as a proxy for the economic growth as of the case for Onafowora & Owoye (1998). The dependant variable of our model is explained by labour force (represented by active population of the country due to the fact that labour force survey in Ethiopia did not take place annually), Real Gross Capital Formation, Consumer Price Index, Trade Openness which is estimated as export plus import over gross domestic product $[(X+M)/GDP]$ as a measurement for trade liberalization and expenditure on education⁴ are used. Different studies have mentioned different variables that can potentially affect the economic growth of a country. However, the above mentioned variables are selected to be included in the model as regressors.

The overall structure of the model as a function has the following approach

$$RGDP_t^* = f(K_t, LAB_t, CPI_t, TO_t, EDUEXP_t)$$

Where:-

$RGDP_t^*$: = the growth rate of Real Gross domestic Product at period t

K_t = Real Gross Capital Formation at period t

LAB_t = Labor force at period t

CPI_t = Consumer Price Index at period t

TO_t = Trade openness at period t

$EDUEXP_t$ = Real expenditure on education at period t

⁴ Expenditure on education is an estimate of human capital and it is expected to have a positive impact on economic growth

The mathematical form of the model presented above can be rewritten as:-

$$\mathbf{RGDP}_t^* = \beta_0 + \beta_1\mathbf{K}_t + \beta_2\mathbf{LAB}_t + \beta_3\mathbf{CPI}_t + \beta_4\mathbf{TO}_t + \beta_5\mathbf{EDUEXP}_t + \varepsilon_t$$

Where,

β_0 = is constant or intercept term; and $\beta_1 - \beta_5$ are the coefficients to be estimated

ε_t = error term

Furthermore, the functional form of the equation is transformed in to logarithmic system as follows in order to improve a statistical testing by using their elasticity.

$$\mathbf{LnRGDP}_t^* = \beta_0 + \beta_1\mathbf{LnK}_t + \beta_2\mathbf{LnLAB}_t + \beta_3\mathbf{LnCPI}_t + \beta_4\mathbf{LnTO}_t + \beta_5\mathbf{LnEDUEXP}_t$$

4.3. Summary of statistical results

In advance to the detailed time series econometric analysis a summary of descriptive statistics taken place for the annual data of 1980 to 2016 for the five selected variables with 36 observations. The table attached on the annex 1 shows a summary statistics of the variables included in the econometric analysis to achieve the objectives of the study. As it is clearly shown on the annex 1, the average real domestic product is 269,401.24 Million birr. The average gross investment measured by growth capital formation is Birr 77,247.25 million. The average consumer price index has registered 40.53, Active populations which explained as working population group aged from 15 to 64 years is about 32,337.65million. Holding other things constant the availability of active population is an asset for the economy to bring a positive impact whenever the working group is fully employed. Otherwise it will have a negative effect due to the fact that shortage of enough financial support for the population. Expenditure on Education in this study is used as a proxy of human capital as a share and it is on average about 1.87 percent of GDP. The average of trade openness that has been used as a proxy of trade liberalization measured as the ratio of export plus import to growth domestic product is 14.6 % of the Growth domestic product.

4.4. Stationarity test ⁵

When there is a stationary process the mean, the variance and auto covariance stays unchanged regardless of the period which we measure and it is known as time invariant because of the variables depend only on the lags between the two consecutive periods (Verbeek 2004).

Augmented Dickey-fuller test is used to detect the stationarity of the variable and the important part of testing stationarity is equivalent to checking the unit root. Dickey and Fuller prolonged the test of stationarity technique to an augmented type by comprising an extra lagged term of the explained variable to eliminate autocorrelation because of the error term is uncertain whether it is white noise. A null hypothesis of variables are not stationary (have a Unit root) is tested against the alternative hypothesis of variables are stationary. In case of testing variables in their level and at their first difference, the ADF test is performed without constant and with constant and trend.

As it is evidently shown in the table below, the Augmented Dickey Fuller test validates the existence of unit root for all variables at their level however, variables become stationary at the first difference of the logarithmic transformation. Furthermore an ADF test was conducted at the first difference of each variable, the null hypothesis of non-stationarity is rejected at all levels of significances (1%, 5% and 10%) as shown in the table annexed.

Table 4.1. Stationarity test of variables at level and at first difference with constant, with constant and trend

variable	Level		First Difference	
	With constant	With constant and trend	With constant	With constant and trend
LGDP	3.190805	-0.700254	-4.323757	-5.666394
LK	0.441513	-1.976243	-7.652076	-8.074921
LLAB	-2.669344	-2.910175	-7.962737	-8.624342
LCPI	1.133028	-1.003691	-5.276088	-5.537620
LEDUEXP	0.867190	-1.496545	-5.083109	-5.198854
LTO	1.023376	-2.713992	-3.278028	-3.534596
1%	-3.626784	-4.234972	-3.632900	-4.243644
5%	-2.945842	-3.540328	-2.948404	-3.544284
10%	-2.611531	-3.202445	-2.612874	-3.204699

Source: own computation from Eviews 7

⁵ As it is known that there exists a unit root for the macro level data's it is a prerequisite to check the stationarity using an augmented dickey-Fuller method of testing and all the variables were found to be non-stationary at their level but become stationary after the first difference I(1).

4.5. Co-integration test

It is possible to investigate those variables that are not stationary in level which could have a continuing relationship, and at the same time the variables become cointegrated. Cointegration analysis is undertaken to examine the existence of a long run relationship between growth rate of real gross domestic product and the explanatory variables, using Johansen's (1991) maximum likelihood co-integration method. Provided that there exist an evidence of cointegration between the variables, the model specification will lead to Error Correction Model (ECM) for each dependent variable or Vector Error Correction Model (VECM) for equation series with more than one dependent variable which is concerned with preserving information about both forms of co variation. In other words, co-integration testing can become a basis of determination of equation estimation to see whether variables have long-term relationship or not(Enders, 2010)

Johannsen cointegration test is suitable for such types of study to understand whether there has been long run relationship among the variables since the numbers of variables in the equation are more than two. The trace and max Eigen value test statistics results show that there is a significant long-run relationship between liberalization and economic growth. Zero maximum rank implies that the null hypothesis that says there is no co integration between the variables RGDP*, K, LAB, CPI, EDUEXP and TO. With a comparison, the trace statistics and maximum Eigenvalue the study fall to accept the hypothesis's of no cointegration between the variables interest.

As briefly discussed on the previous section Johansson cointegration test is the best suitable technique for such types of model in order to know whether there exists a long run relationship between variables of interest. As it is presented below under table 4.2, the rank of the test being zero implies the null hypothesis of no integration alongside with an alternative hypothesis of there is at least one cointegration. Based on the results of the Max-Eigen value statistics and trace statistics there is one co integration results at 1% level of significance and which makes researcher falls to accept the null hypothesis and proves the existence of a long run relationship between variables.

Table 4.2. Cointegration Analysis using Johansen test

Data Trend	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	2	1	0	0	0
Max-Eig	0	1	0	0	0

Source: own computation from Eviews 7

*Critical values based on MacKinnon-Haug-Michelis (1999)

4.6. Error correction model

Engle & Granger (1987) proposition explains that when sets of variables are being Co-integrated, there occurs a binding error-correction demonstration of the time series process. Thus, when the dependant and explanatory variables are both integrated of order one and have got co-integration, we can use error correction illustration. The coefficient of the error correction term is defined as the speed of adjustment that indicates how the disequilibrium occurred in the short term is going to adjust itself in the long term.

The long- run equation and interpretation of the ECM is as follows (see the annex for the detail)

$$LnRGDP_t^* = 0.98LnLAB_t + 0.55LnK_t + 1.33TO_t - 0.22EDUEXP_t + 0.026 LnCPI_t$$

(0.159)*** (0.118) *** (0.584) ** (0.073) ** (0.138)

The main explanatory variable, trade liberalization, represented by trade openness has a positive and significant impact on economic growth at 5 percent level of significance. This result is in line with prior expectations and major literatures such as Babatunde (2009) Greenaway et al (2002) , Felix G.(2003) and others who all concluded a positive relationship between trade liberalization and economic growth. It is well known that the country imports capital goods from the rest of the world in which these capital and intermediate inputs in turn used for further production of goods and services in the entire economy-GDP. Similarly, export of the country has also significant contribution in foreign exchange earnings, enhancing competitiveness, boosting the quality of products and others. Statistically, a unit increase/decrease in the openness of the country leads about 1.3 unit increase/decrease (positive change) in the country's economic growth. Economic interpretation of the result is

that, a unit Birr injection on trade openness has a higher multiplier effect on the general economy by Birr 1.3.

The other important variable to determine economic growth of the country is gross capital formation or investment. Not surprisingly, as gross capital formation comprises more than 35 percent of the country's economy, it has a positive and statistically significant impact on economic growth and this is consistent with the result of (Berhane, 2015). To be specific, a unit percentage change in gross capital formation leads to 0.56 percentage change in the country's economic growth. This finding revealed the importance of gross capital formation (investment) to the country's economic performance. As investment is the main component of aggregate demand, its increment usually leads increase in economic growth. Especially in a country like Ethiopia where its GDP is far from potential output, a change in investment has significant impact on the entire economy.

In line with the neoclassical theory of economic growth, active labor force has also positive and statistically significant impact on the country's economy. According to ILO 2016 data, more than half of the country's population is active labour force with relatively better employment rate. Usually labor force is considered as important elements of factors of production. Especially in Ethiopia where capital is relatively scarce and labor is abundant, bulk of labor force is engaged in the production of goods and services. The country's economic policies are designed to exploit this comparative advantage of production input. The subsistence agricultural sector is almost labor dependent with limited technological practices. Similarly, industrial sector of the country is emphasising on labor intensive sectors like agro processing and textile industries. Thus, this research revealed that a unit percentage change in active labor force leads around 0.98 percentage change of economic growth in the same direction.

The impact of macroeconomic stability, proxy by CPI, has positive but insignificant impact on economic growth of the country, which is against prior expectation. In fact, the coefficient of inflation on economic growth function is inconclusive- some found positive while others found negative. Lower and moderate level of inflation is usually considered as incentive for producers and hence important to boost production. On the contrary, higher level of inflation is detrimental factor for consumption and production; and thus the sustainability of economic growth is questionable. During the sample period, Ethiopia sustained relatively moderate inflation; that is why CPI has positive but insignificant impact on economic growth.

Contrary to prior expectation and theoretical agreement, government expenditure on education is statistically significant at one percent level of significant. But, it is impossible to interpret negative coefficient of government expenditure on education. One argument would be the deteriorating level of quality of education so that simple education on expenditure would snatch the scarce resource from other productive sectors.

The outcome of the above regression is based on several classical assumptions including but not limited to; stability of the model, no serial correlation, homoscedasticity and normality. Therefore, it is mandatory to check whether these assumptions are met or not. With regard to stability of the model, the author deployed Chow forecast test and found that the model is stable at 5 percent level of significance. The other important assumption is the error term is not serially correlated. To check this assumption, Durbin-Watson statistics is used in this research. For the rejection of null hypothesis of “the error term is serially correlated”, the DW statistics should be around 2. According to the model of this research, it is 1.9 and exactly satisfies the condition of no serial correlation in the model’s error term. Harvey test of homoscedasticity revealed that there is constant variance in the regression. The other central assumption to linear regression model is normality. If the error term is not normally distributed, it is not possible to make decision based on conventional t and f statistics. Therefore, the author deployed Histogram Normality test and revealed the error term is normally distributed. As a result decision making (rejecting and accepting null hypothesis) based on standard t and f tables is sound in this model (the results for diagnostic tests are attached in the annex).

The Error Correction Model in the short- run

The Error correction model derived from the regression results and the estimated short run coefficients are;

$$\begin{aligned}
 \Delta \ln \text{RGDP}_t^* = & 0.125 \Delta \ln \text{RGDP}_{t-1}^* + 0.31 \Delta \ln \text{LAB}_t + 0.20 \Delta \ln \text{K}_t + 0.19 \text{TO}_t + 0.04 \text{EDUEXP}_t + 0.026 \Delta \ln \text{CPI}_t \\
 & (0.166) \quad (0.156) * \quad (0.584) *** \quad (0.047) ** \quad (0.039) \quad (0.08)
 \end{aligned}$$

The last step is to run the Error Correction Model, since there is a confirmation of the presence of long run relationship amongst variables. Annex 4 shows the short run dynamic relationship and the set of short run coefficients in the ECM, which relates the changes in LogRGDP to changes in other variables and the error term in the lagged periods. Hence the lagged difference terms capture the short run changes in the corresponding logarithmic

transformed variables. ECT-1 has a negative sign coefficient that is found to be significant at 5 percent. The coefficient of ECT-1 is the speed of adjustment to the temporary disequilibrium or deviation from the equilibrium, in this study the speed of adjustment is about 18.98% which implies that the disequilibrium is adjusted by 18.98% yearly. Thus, the speed of adjustment is relatively slow and requires some years to be fully adjusted. As it illustrated below on the summary of table, lagged RGDP has a positive effect on the current year GDP with a significant level of 5%. Change in active population and trade openness also has a positive impact on the economic growth but they are both statistically insignificant.

5. Conclusion and Recommendation

This paper aimed at analysing whether there exists a long term relationship between trade liberalization and economic growth and to know the impacts of liberalization both in the long run and short run dynamics, for Ethiopia using a time serious data of 1980-2016. Johansson co-integration methodology was employed and the result from co integration analysis gives a confirmation of the long term relationships among the variables. As all variables are integrated of order one and there exists co integration relationship, ECM became more appropriate model. According to the finding, trade liberalization is one of important significant variables to determine economic growth in Ethiopia. Its multiplier effect is very high in the long run. As the country become more open, then it is possible to reap the benefits of international trade by importing capital and intermediate goods as well as finding bulk market for domestically goods and services in the international market. In other words, the effect of trade liberalization is well transferred to the rest of the economy.

In line with neoclassical growth theories, labor and capital are also significant variables with positive sign. As labor and capital are the basic factors of production, there is no wonder if their impact is positive and significant. In a country where more than 50 percent of the population is active labor force with relatively better employment rate, it can be considered as an engine for economic growth. Similarly, having investment share to GDP more than 35 percent is the proof of significant contribution of investment to the country's economic growth.

But, government expenditure on education has the sign which is contrary to the prior expectation and difficult to justify under normal circumstances. The author considered the result may be due to low level quality of education, though access to education is expanding continuously. Higher government expenditure on education with low quality cannot bring a significant change in a sense that the expenditure would not meet its objective. The other macroeconomic variable expected to affect economic growth is consumer price index used as a measurement of macroeconomic stability. The finding revealed that CPI has insignificant impact on economic growth but with positive coefficient.

Based on the finding of the research the following policy implications are drawn, Since trade liberalization is the most significant variable both in the long run and short run to affect economic growth, the government should promote and enhance openness more in

international market. By doing so, the country could reap the benefits of international trade, including competitiveness, quality improvement and technology transfers, etc. Several mechanisms to boost trade liberalizations should be implemented like minimizing tariff, quota, policy restrictions, custom clearance procedures and others more than the existing amount. The government also need to enlarge the engagement of active labor force on the production of goods and services by creating more jobs. In a country where labor force is relatively abundant, economic policies should be directed towards utilizing these inputs. Finally to attain and continue a sustainable economic growth the government should give more support for both domestic and foreign investment by improving the institutional capacity and service delivering's, because creating conducive business environment is vital for attracting investors and hence avoiding the bottlenecks on establishing investment would have significant contribution to enlarge investment and finally economic growth.

Bibliography

- Babatunde, M. A. (2009, June). Can Trade Liberalization Stimulate Export Performance in Sub Sahran Africa. *Journal of International and Global Economic Studies*, 2(1), 68-92.
- Baro, R., & Martin, X.-i. (1995). Technological Diffusion, Conevergence & Growth . *Journal of Economic Literature Clasification*.
- Berg, A., & Anne, K. (2003, February). Trade, Growth and Poverty: A Selective Survey. *IMF Working Paper*, 03.
- Chaudhry, I. S., Malik, A., & Faridi, Z. M. (2010). Exploring the Causality Relationship between Trade Liberalization, Human Capital And Economic Growth: Empirical Evidence From Pakistan. *Journal of Economics and International Finance*, 175-182.
- Chude, Patricia, & Izuchukwu. (2013, December). Impact of Government Expenditure on Economic Growth in Nigeria. *International Journal of Business and Management Review*, Vol.1, No.4,, pp.64-71,.
- Edwards, E. (1991). Trade Orientation, Distordons and Growth in Developing Country.
- Engle, R., & Granger. (1987, March). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, Vol. 55, No. 2, 251-276.
- F.N.Echekoba, V.I., Okonkwo; , & P.K, Adigwe. (2015). Trade Liberalization and Economic Growth: The Nigerian Experience (1971-2012). *Journal of Poverty, Investment and Development*, 14(ISSN 2422-846X).
- Ferede, T., & Seyoum , A. (2004). *The Structure of the Ethiopian Economy - A SAM-based Characterisation*.
- Frankel, J., & David, R. (1999, June). Does Trade Cause Growth? *The American Economic Review* , Vol. 89, No. 3, 379-399.
- Greenway, D., Morgan, W., & Wright, P. (1997). Trade Liberalization and Growth in Developing Countries: Some New Evidence. *World Development*, 25.
- Greenaway, D., Morgan, W., & Peter , W. (2002). Trade liberalisation and growth in developing countries. *Journal of Development Economics*, 67.
- Hamad, M. M., Burhan , A., & Stabua , A. (2014). The Impact of Trade Liberalization on Economic Growth in Tanzania. *International Journal of Academic Research in Business and Social Sciences*, 4(5), 514-532.
- Jeevita, M., Jay S, M., & Boopen, S. (2011). Trade Openness and Economic Growth: Evidence From Mauritius. *ICITI*.
- Jeffery , S., & Andrew , W. (1991). Sources of Slow Growth in African Economies. *Journal of African Economics*, 335-76.

- Lill, A., & Ronald, B. (2008). The Link Between Openness and Long-Run Economic Growth. *Journal of International Commerce and Economics*.
- OLUGBENGA A., O., & OLUWOLE, O. (1998). Can Trade Liberalization Stimulate Economic Growth in Africa? *World Development, Vol 26, No 3*, 497-506.
- Parikh, A., & Stirbu, C. (2004). Relationship between Trade Liberalisation, Economic Growth and Trade Balance: *Hamburgisches Welt-Wirtschafts-Archiv (HWWA)*.
- Redding, S. (1999). Dynamic Comparative Advantage and the Welfare Effects of Trade. *Oxford Economic Papers, 51*.
- Report, I. C. (2006). *The Federal Democratic Republic of Ethiopia Poverty Reduction Strategy Annual Progress Report*.
- Rodrik, D. (1997). Has globalization gone too far. *California Management Review*.
- Romain, W., & Karen, W. (2003, December). TRADE LIBERALIZATION AND GROWTH: NEW EVIDENCE.
- Seid, Y. (2012). Impacts of Trade Liberalization on Growth and Poverty in Ethiopia. *International Journal of Business and Social Science, 3*.
- Shafaeddin, S. (2005). Trade Liberalization and Economic Reform in Developing Countries. *Discussion Paper*.
- Umme, M. H., & Munshi, A. N. (2012). EFFECT OF TRADE LIBERALIZATION ON ECONOMIC GROWTH OF DEVELOPING COUNTRIES: A CASE OF BANGLADESH ECONOMY. *Journal of Business, Economics & Finance, 1(2)*.
- Wooldridge, J. (2006). *Introductory Econometrics* (Vol. 120). New York: South Western Cengage Learning.

Annexes

Annex 1. Statistical Summary

	GDPR	GDPR_1	K	LAB	CPI	LEDUEXP	TO
Mean	26.11413	26.07784	24.67533	17.23865	3.318038	1.865944	0.139900
Median	25.92127	25.91401	24.48598	17.25380	3.143811	0.816536	0.075038
Maximum	27.42053	27.34764	26.46461	17.69393	5.037008	8.202546	0.644234
Minimum	25.39816	25.39816	23.50002	16.53428	2.201614	0.176296	0.016054
Std. Dev.	0.614544	0.581667	0.849843	0.338740	0.841544	2.198331	0.166470
Skewness	0.763704	0.788527	0.679725	-0.370813	0.654534	1.552467	1.544596
Kurtosis	2.298106	2.375228	2.428971	2.066481	2.397328	4.344993	4.329968
Jarque-Bera	4.356178	4.316163	3.351860	2.191428	3.201845	17.65151	17.43921
Probability	0.113258	0.115547	0.187134	0.334301	0.201710	0.000147	0.000163
Sum	966.2226	938.8021	912.9873	637.8300	122.7674	69.03992	5.176313
Sum Sq. Dev.	13.59589	11.84179	26.00037	4.130816	25.49505	173.9757	0.997636
Observations	37	36	37	37	37	37	37

Source: own computation using Eviews 7

Annex 2. Stationarity test of variables at level and at first difference with constant, with constant and trend

variable	Level	First Difference		
	With constant	With constant and trend	With constant	With constant and trend
LGDP	3.190805	-0.700254	-4.323757	-5.666394
LK	0.441513	-1.976243	-7.652076	-8.074921
LLAB	-2.669344	-2.910175	-7.962737	-8.624342
LCPI	1.133028	-1.003691	-5.276088	-5.537620
LEDUEXP	0.867190	-1.496545	-5.083109	-5.198854
LTO	1.023376	-2.713992	-3.278028	-3.534596
1%	-3.626784	-4.234972	-3.632900	-4.243644
5%	-2.945842	-3.540328	-2.948404	-3.544284
10%	-2.611531	-3.202445	-2.612874	-3.204699

Source: own computation using Eviews 7

Annex 3. Co-integration analysis using Johansen test

Dependent Variable: D(LRGDP)

Method: Least Squares

Date: 09/10/17 Time: 17:37

Sample (adjusted): 1982 2016

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRGDP	0.049744	0.039011	1.275113	0.2127
DRGDP-1	0.125169	0.166846	0.750207	0.4594
DK	0.200461	0.047539	4.216793	0.0002
DLAB	0.312373	0.156241	1.999303	0.0554
D CPI	0.001925	0.080390	0.023945	0.9811
EDUEXP	0.049744	0.039011	1.275113	0.2127
TO	0.191672	0.096886	1.978330	0.0634
R-squared	0.405665	Mean dependent var		0.055725
Adjusted R-squared	0.278308	S.D. dependent var		0.060970
S.E. of regression	0.051796	Akaike info criterion		-2.906160
Sum squared resid	0.075118	Schwarz criterion		-2.595091
Log likelihood	57.85780	Hannan-Quinn criter.		-2.798779
Durbin-Watson stat	2.182881			

Source: own computation using Eviews 7

Annex 4. Estimation Result for the long run

• Dependent Variable LnRGDP
Method: Least Squares
Date: 09/24/17 Time: 12:21
Sample: 1980 2016
Included observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LnK	0.555398	0.118131	4.701549	0.0000
LnLAB	0.979150	0.159291	6.146913	0.0000
TO	1.329250	0.584628	2.273667	0.0298
EDUEXP	-0.220710	0.073884	-2.987274	0.0054
LnCPI	0.026807	0.138879	0.193021	0.8482
R-squared	0.968948	Mean dependent var		26.11413
Adjusted R-squared	0.965067	S.D. dependent var		0.614544
S.E. of regression	0.114860	Akaike info criterion		-1.365109
Sum squared resid	0.422174	Schwarz criterion		-1.147417
Log likelihood	30.25452	Hannan-Quinn criter.		-1.288363
Durbin-Watson stat	1.886370			

Source: own computation using Eviews

Annex 5. Estimation Result for the short run ECM

Dependent Variable: D(LRGDP)
Method: Least Squares
Date: 09/21/17 Time: 17:37

Sample (adjusted): 1982 2016

Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LnK)	0.200461	0.047539	4.216793	0.0002
D(LnLAB)	0.312373	0.156241	1.999303	0.0554
D(LCPI)	0.001925	0.080390	0.023945	0.9811
D(TO)	0.191672	0.096886	1.978330	0.0634
D(EDUEXP)	0.049744	0.039011	1.275113	0.2127
D(L GDPR _1)	0.125169	0.166846	0.750207	0.4594
ECM	- 0.189856	0.083766	-2.266499	0.0313
R-squared	0.405665	Mean dependent var		0.055725
Adjusted R-squared	0.278308	S.D. dependent var		0.060970
S.E. of regression	0.051796	Akaike info criterion		-2.906160
Sum squared resid	0.075118	Schwarz criterion		-2.595091
Log likelihood	57.85780	Hannan-Quinn criter.		-2.798779
Durbin-Watson stat	2.182881			

Source: own computation using Eviews 7

Annex 6. Heteroskedasticity Test: Harvey

Heteroskedasticity Test: Harvey

F-statistic	0.822587	Prob. F(5,31)	0.5432
Obs*R-squared	4.333975	Prob. Chi-Square(5)	0.5024
Scaled explained SS	2.567025	Prob. Chi-Square(5)	0.7664

Source: own computation from Eviews 7

Annex 7. Normality test

Series: Residuals

Sample 1980 – 2016

Observation 37

Skewness	0.163074
KUrtosis	1.363163
Jarkue-Bera	2.025807
Probability	0.363163

Source: own computation from Eviews 7

Annex 8. Stability test

Chow Forecast Test

Equation: UNTITLED

Specification: LGDPRM LKR LLF TORM LED LCPI

Test predictions for observations from 2000 to 2016

	Value	df	Probability
F-statistic	1.048708	(17, 15)	0.4670
Likelihood ratio	28.97961	17	0.0347

Source: own computation from Eviews 7