

**IMPACT OF AGRICULTURAL EXPORTS ON ECONOMIC GROWTH
IN ETHIOPIA: THE CASE OF COFFEE, OILSEED AND PULSES**

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for the Award of the Masters of Science Degree in Agricultural and Applied Economics
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DECLARATION AND APPROVAL

DECLARATION

This Thesis is my original work and has not been presented in any other university for the award of a degree and that all the sources that I used have been acknowledged.

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DEDICATION

I dedicate this thesis to my beloved husband Sisay Gezu and my beloved Father Yifru Gutema for their love, courage and sincere support.

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ABSTRACT

More than 80 percent of the population in Ethiopia lives in rural areas and their main source of income is agriculture. Agriculture accounts for 45 percent of the Gross Domestic Product (GDP) and employs 85 percent of the labour force. Export of agricultural products constitutes 86 percent of the total foreign exchange earnings. The country has taken different measures to diversify and increase the contribution of the export sector to economic growth such as; export trade duty incentive scheme, export credit guarantee scheme and foreign exchange retention scheme to those wholly engaged in supplying their products to foreign markets. Despite the incentives taken by the country, the export sector has depended on a few agricultural products mainly coffee, oil seeds and pulses which are characterized by fluctuations in quantity, price and have low competitiveness on the world market. The objective of the study was to assess the trend and impact of agricultural (coffee, oilseed and pulses) exports on economic growth of Ethiopia over the last forty years by looking at: the existence of long run relationship between agricultural export and economic growth; the speed of adjustment in the long run and the existence of causality between the agricultural export and economic growth. The analysis was done using co-integration model, Error correction model and Granger causality model. The findings of the study showed that Coffee export and oilseeds export have a positive and significant relationship with economic growth. While, pulses export was found to have negative and insignificant effect on economic growth in short run and positive but insignificant in the long run. On the other hand the causality relationship found that there is bi-directional relationship between coffee export, oilseed export and economic growth whereas unidirectional relationship was found between pulses export and economic growth. Based on the findings, it is recommended that policies aimed at increasing the productivity and quality of these cash crops should be implemented. Also additional value should be added to them before exporting. Correspondingly, there is also a need to devote resources on the production of non-export goods in order to increase exports since they have bi-directional relationship. When this is done, it will lead to a higher rate of economic growth in Ethiopia.

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ACRONYMS AND ABBREVIATION

ADF	Augmented Dickey-Fuller.
AERC	African Economic Research Consortium
CSA	Central Statistics Agency
CIA	Central Intelligence Agency
CLRM	Classical Linear Regression Model
ETB	Ethiopian Birr
ECM	Error Correction Model
EPRDF	Ethiopian People's Revolutionary Democratic Front
ERCA	Ethiopia Revenue and Custom Authority
EEPA	Ethiopia Export Promotion Agency
EEA	Ethiopia Economic Association
FAO	Food and Agriculture Organization
GoF	Government of Ethiopia
GDP	Gross Domestic Product
GNP	Gross National Product
Kg	Kilogram
LDC	Less Developed Country
LR	Likelihood Ratio
MoFED	Ministry of Finance and Economic Development
MoARD	Ministry of Agriculture and Rural Development
MOT	Ministry Of Trade
NBE	National Bank of Ethiopia
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
SSA	Sub Saharan Countries
SNNPR	Southern Nations, Nationalities, and Peoples Region
SNNP	Southern Nations, Nationalities and People
VAR	Vector Autoregressive
USAID	United States Agency for International Development
USD	United States Dollar
WTO	World Trade Organization

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

More than 80 percent of the population in Ethiopia lives in rural areas and their main source of income is agriculture. Agriculture accounts for 45 percent of the Gross Domestic Product (GDP), employs 85 percent of the labour force and generates 86 percent of export earnings (MoFED, 2010). However, Ethiopian farming is largely characterised by peasant holders who grow food mainly for family consumption thus leaving little for commercial purposes. This inadequate volume of production is mainly due to the tardy progress in farming methods and scattered pieces of land holdings. Most of the farm land is cultivated by small scale farmers with traditional agricultural practices. However, the rural and agricultural sector is the foundation of Ethiopian development. Due to this, the sector gets priority in government policies and in the five-year (2003-2007 E.C) development and transformation program. Among others, the rural and agricultural development policy encourages the expansion of large-scale farms, which would have a relative advantage to introduce modern technology and farm management to raise production. The new economic policy resulted in fast economic growth which grew at about 11 percent per annum on average over the last ten years between 2003/04 and 2012/13(MoFED, 2014).

Ethiopia is following agricultural led industrialization economic policy. In the 2011/12 fiscal year the agricultural sector, service sector and industrial sector contributed 44 percent, 45 percent and 11 percent to real GDP of the country respectively (MoFED, 2013).The share of the agricultural sector to the whole economy is decreasing from time to time whereas the growth in service sectors increasing at high rate while the industrial sector is increasing at a low rate. However, even though the agricultural sector has been showing a decreasing contribution to the country's GDP, it still contributes 85 percent of employment and 70 percent of raw materials for local industries (MoFED, 2013).

The economy of the country is mainly dependent on the agricultural sector thus the export sector is also highly dependent on agricultural productivity. Since the export sector is characterized by dependence on primary commodities, the country faces different problems. For instance, in 1983 the provisional government of socialist Ethiopia (Derg) noted that the basic constraints for Ethiopia exports included: the low volume of exportable products, the limited degree of diversification of exports, frequent economic crises and artificial trade barriers by trading partners among others. Moreover, after the downfall of the Derg regime,

the transitional government of Ethiopia stated that it is essential to increase and diversify exports (Abay and Zewudu, 1999). Thus, Ethiopia has taken different measures such as export trade duty incentive scheme which incorporates duty draw-back scheme, voucher scheme and bonded manufacturing warehouse, export credit guarantee scheme and foreign exchange retention scheme to those wholly engaged in supplying their products to foreign markets. When compared to the pre-1991 period, the trade policy regime has become more liberal (Yishak, 2009).

Owing to this policy shift, some improvements in export earnings have improved during the post reform period. According to the Ministry of Trade (MOT), the value of export earnings increased from \$1.03 billion during the first six years of the Derg regime ((1974-1980) to \$15.48 billion in the last six years of the EPRDF regime ((2008-2014)). However, the exports of the country contributed only 0.02 percent in 2012 to the world market (WTO, 2013). The country's export sector has depended on export of a few agricultural products like coffee, oil seeds, pulses, skins and hides (Yishak, 2009).

1.1.1 Overview of agricultural exports in Ethiopia

The share of international trade of Ethiopia is insignificant and the export sector is dominated by primary products for which the income elasticity of the developed country slowly increases as their income increases when compared to consumer goods and producer goods. Ethiopia is the main producer and exporter of coffee in Africa which is grown mainly in two regions of the country; Oromiya and Southern Nation, Nationalities and People (SNNP) region in the south and west part of the country (Bart *et al.*, 2014).

Coffee is cultivated by over four million primary smallholder households and a high percentage of coffee is supplied to the local market (CSA, 2013). In 2012 fiscal year, Ethiopia was the major coffee producer and exporter in Africa and ranked tenth of the largest coffee exporters in the world. The country exported 3.2 million bags of coffee and accounted for 3 percent of internationally traded coffee in the same year (Bart *et al.*, 2014). According to Ethiopia Revenue and Customs Authority (ERCA, 2013), coffee contributes a large portion of total exports of the country, has high contributions to the country's gross domestic product (GDP) and the most crucial source of hard currency. However, since investment in agriculture as a whole is weak in the country, the production of coffee fluctuates from year to year and international coffee market experiences significant price variations.

On the other hand, oil seed is the second major export earner of Ethiopia. The country produces different types of oilseed varieties such as sesame seed, linseed, niger seed,

sunflower seed, soybeans, cottonseed, and rapeseed. From these sesame seed, linseed and niger seed are the major export crops. According to ERCA, in 2011/12 the country exported 367,436.15tons of oilseeds valued at 472.31 million dollars which was an increase of 113,249.69tons from 2010/11 period.

The other crop that Ethiopia exports in high volume next to coffee and oilseeds is pulses. In 2012/13, the country exported 357,518.77tonsvalued at 233.35 million dollars (ERCA, 2013). The increase in demand for pulse in local and international market created economic incentives which resulted in high production and supply of the commodity. The general overview of these three commodities given in Figure 1 below indicate two things; first, through time, the export of the commodities was increasing in volume as well as in values and highly contributed to the total exports of the country on average. Second, the export volume was fluctuating from year to year depending on different factors such as world market price, climate change which can affect the production of the commodity, change in government policy among others.

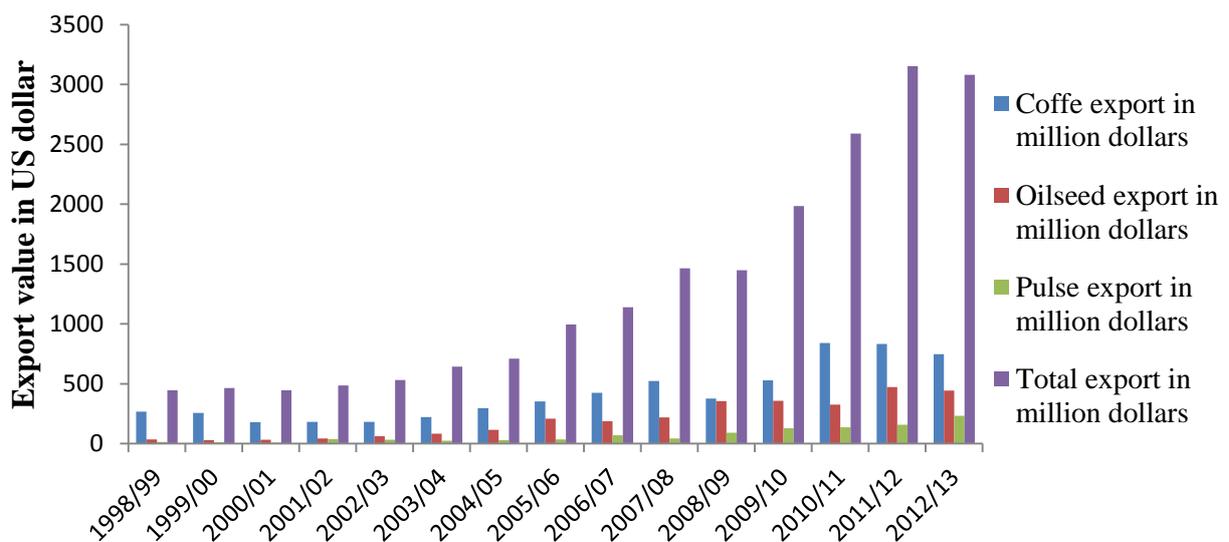


Figure 1: The share of Agricultural exports from total exports of the country (1999-2012/13)

Source: Author’s calculation based on data from ERCA.

1.2. Statement of the problem

Ethiopia’s export sector depends on a few agricultural products mainly coffee, oilseeds and pulses. However, the markets for these products are largely unstable in terms of volume, price and carry a high degree of risk and uncertainty as well as low income elasticity. Such

features are not conducive to the contribution of agricultural exports to the economic growth of the country. It is certain that the exports of primary goods are less competitive on the world market and weigh less against manufactured goods exported by developed countries resulting in deteriorating terms of trade. Despite these unfavorable terms, the country is still dependent on agricultural exports but its impact on the economy has not been evaluated. This study will fill the knowledge gap with reference to coffee, oilseed and pulse exports.

1.3. Objective of the study

1.3.1 General objective

The general objective of this study is to understand the role of agricultural exports in Ethiopian economy with reference to coffee, oilseed and pulses.

1.3.2. Specific objective

The specific objectives are:

- i. To assess the trend of agricultural exports over time.
- ii. To evaluate the impact of coffee exports on economic growth.
- iii. To evaluate the impact of oilseed exports on economic growth.
- iv. To evaluate the impact of pulse exports on economic growth.
- v. To determine the existence of Granger causality between agricultural exports and economic growth.

1.4. Research Questions

- i. What is the trend of agricultural exports in Ethiopia?
- ii. What is the impact of coffee exports on economic growth?
- iii. What is the impact of oilseed exports on economic growth?
- iv. What is the impact of pulses exports on economic growth in?
- v. Do agricultural exports Granger cause economic growth in Ethiopia?

1.5 Justification of the Study

The knowledge of exports is crucial because it is the main creator of employment and affects the growth and development of the Ethiopian economy. The study will be a valuable source of information for policy makers in international trade as they need such information in formulating policies. Policy makers, economists and other interested groups need information on the precise factors that affect exports, the contribution of exports from different sectors to economic growth (GDP) in all countries because it contributes to poverty reduction and job creation (Ireen, 2010).It is also expected that the study will aid policy

makers in their efforts to stimulate the growth of the sector through examining the role of diversification in reducing the export instability and provide relevant information on the three commodities to foreign and local potential investors who want to invest their capital in the sector.

1.6. Scope and limitation of the study

This study assessed the contribution and impact of agricultural exports on economic growth in Ethiopia by using yearly total exports data from 1973-2013. It did not cover earlier periods because of the absence of complete data set. Though Ethiopia exports more than 20 commodities (products) including non-agricultural products, the study is limited to coffee, oilseed and pulse. The selection of these items is based on being the three top exports from the country; this means the study does not consider the overall impact of exports on economic growth. The study used only officially available data and did not regard any illegal flows of the same products to other countries.

1.7. Definition of Terms

Agricultural export: Agricultural export means shipping any agricultural commodity or product whether raw or processed out of the port of a country or selling of agricultural goods produced in the home country to other markets.

Agronomic practice: Agronomic practice are steps farmers incorporate into their farm management systems to improve soil quality, enhance water use, manage crop residue and improve the environment through better fertilizer management.

Birr: Ethiopian currency. (1 \$=20.56 birr)

Causality- A concept that shows the relationship between two or more variables as well as the direction of relationship that exists between those variables.

Co-integration of variables: Procedure for evaluating variables relationship in the presence of stochastic trends in data series. It requires that deviations from equilibrium conditions between two economic variables, (which are individually non-stationary in the short-run) be stationary in the long-run.

Economic growth: The increase in volume and value of goods and services produced by the given economy (country) over time. It is normally calculated as the percentage rate of increase in real gross domestic product, or real GDP.

Pulses: pulses is another name for a number of dried legume seeds from pod plants including kidney beans, chickpeas, peas, lentils, soybeans ,peanuts, Horse beans, Haricot beans, dry peas and Vetches.

Oilseeds: Oil Seeds refer to all class of seeds from which oil is derived. Oil Seeds that are grown and traded as commodities include: soybeans, cottonseed, rapeseed, niger seed, sesame and sunflower seeds. After the oil seed extraction process, the residue can be used as a source of protein for animal feed, creating products such as oil-seed cake and press cake.

CHAPTER TWO

LITERATURE REVIEW

This chapter discusses in detail about what different scholars have done on the agricultural export and economic growth area and empirical evidences which explain about agricultural export contribution to Ethiopian economy. The theory behind the study was also discussed and summarized in conceptual framework.

2.1. Overview of exports and Economic growth

The relationship between export and economic growth is an area that has been given much attention by different authors. According to Jung and Marshal (1985) growth in real exports tends to cause growth in real GNP for three reasons. First, export growth may represent an increase in the demand for the country's output and thus serve to increase real GNP. Secondly, increases in exports may loosen a binding foreign exchange constraint and allow increases in productive intermediate imports and hence result in the growth of output. Finally, export growth may result in enhanced efficiency and thus may lead to greater output. Feder (1982) views a given economy as if it consists of two distinct: an export and non-export sector. According to him, the marginal factor productivities are significantly higher in the former than the latter. This arises from inter-sectorial beneficial externalities (capacity utilization, economics of scale incentives provided for technological improvement and efficient management due to competitive pressures from abroad) generated by the export sector. Thus, growth can be generated by reallocation of the existing resources from the less efficient non-export sector to the higher productivity export sector.

In small open economies, export growth can expand countries' limited domestic markets, and contribute to the economics of scale necessary for industrial developments. Export growth integrates domestic economy with regional and or global economies thereby expanding the dimension of competition to the international markets. Competition promotes resource allocation in developing countries as they transform from less productive farming sector to relatively more productive manufacturing sector. Therefore, factor productivities are improved through export growth (Chow, 1987).

Clearly, since exports are a component of GDP, exports growth contributes directly to GDP growth, they relax binding foreign exchange constraints and allow increases in imported capital goods and intermediate goods (Chenery and Strout 1966, McKinnon, 1964). Exports allow poor countries with narrow domestic markets to benefit from economies of scale

(Helpman and Krugman, 1985). In addition, exports lead to improved efficiency in resource allocation and, in particular, improved capital utilization owing to competition in world markets (Balassa, 1978). The export of the primary product also has effects on the rest of the economy through reducing unemployment and underemployment, inducing a higher rate of domestic saving and investment, attracting an inflow of factor inputs into the expanding export sector, and establish links with other sectors of the economy (Meier, 1995).

2.2. Empirical review on agricultural export

The contribution of agricultural exports to economic growth of the selected 62 less developed countries was done by using panel data for the period 1974 to 1995. The study used the two theoretical models in the analysis, the first model based on agricultural production function, including agricultural and non- agricultural exports as inputs. The second model was dual economy model, that is, agricultural and non- agricultural where each sector was sub divided into export and non- export sector. The results of the study highlighted the role of agricultural exports in economic growth. The study suggested that the export promotion policies should be balanced (Dawson, 2005).

The empirical analysis of agricultural exports and economic growth in Nigeria was done by different Authors. Oluwanseun *et al.* (2013) studied the existence of long run relationship between agricultural exports and economic growth by using time series data from 1980 to 2010. The study made use of unit root tests and Johansen maximum likelihood test of co-integration and discovered that, the long run equilibrium relationship exists between agricultural exports and economic growth and the relationship is elastic in nature meaning that a unit increase in agricultural exports would bring a more than proportionate increase in the Real Gross Domestic Product in Nigeria. Ekiran *et al.* (2014) also examined the relationship between agricultural export and economic growth by using a multivariate Johansen co-integration analysis for the period covering 1980 to 2012 and found that, agricultural exports are long run determinants of economic expansion. The study recommended that the government of Nigeria should direct efforts to improve agricultural exports in the process of economic growth in the country. Currently another empirical analysis of agricultural exports and economic growth in Nigeria was done by Victor (2015) using time series data from 1970 to 2012. The variables used in the study were gross domestic product as the endogenous variables measuring economic growth as a function of real exchange rate, real agricultural exports, index of trade openness and inflation rate as the exogenous variables. The study used economic techniques of Augmented Dickey-fuller

(ADF) Unit root test, Johansen co-integration test and error correction method (ECM) for empirical analysis. The findings of the study showed that agricultural export has contributed positively to the Nigerian economy. Based on the findings, the study recommended that, the government reform agenda should be systematic and sustained irrespective of the professional background of the successive president of the country and that; Agricultural production should be more desired than other sectors that are exhaustive in nature.

Ekanayake (1999) analyzed the causal relationship between economic growth and export growth by using error correction and co-integration models. The author used time series data of eight Asian developing countries covering period 1960 to 1997. The results of the study concluded that there was a bi-directional causality between export growth and economic growth in all the developing countries included in the analysis except Malaysia. There existed strong evidence for long run Granger causality in all countries. Nadeem (2007) provided the empirical analysis of the dynamic influences of economic reforms and liberalization of trade policy on the performance of agricultural exports in Pakistan. The author examined the effect of both domestic supply side factors and external demand on the performance of agricultural exports. The major finding of the study was that export diversification and trade openness contributed more in agriculture exports performance. The results of the study suggested that agricultural exports performance is more elastic to change in domestic factors.

Shida (2008) analyzed the linkage between Agricultural Exports and Economic Growth in Pakistan. The study estimates three simultaneous equations representing GDP, agricultural exports, and total imports while incorporating factors such as income remittances from abroad, investment, and manufactured exports as independent variables by using the three stage least squares systems (3SLS) approach. The study found that, in GDP equation agricultural export was positive and statistically significant, that is a 1% increase in per capita agricultural exports would ultimately result in an increase of 0.22 to 0.36% in per capita GDP and in the agricultural export equation where GDP is independent variable, positive and significant relationship was found indicating the much larger parameter of GDP than Agricultural export was in GDP equation. Therefore, the larger magnitude of GDP compared to Agricultural exports imply that GDP growth has a much greater impact on Agricultural exports growth than Agricultural export growth has on GDP growth. Based on the empirical results, the study suggested these options; either transferring labor out of agriculture to the industrial or the services sectors, or increasing agricultural labor productivity as two alternatives for increasing the rate of economic growth.

The contribution of agricultural exports to economic growth of 42 selected under developed countries was done using panel co-integration techniques. Agricultural and non-agricultural exports were used as independent variables to determine the dependent variable which is economic growth (GDP). The results showed that 33 developing countries had positive elasticity for agricultural exports. By the same token for 37 countries, the elasticity of non-agricultural exports was also positive. Based on the empirical results, the study suggested that the poor countries should adopt balanced export promotion policies but the rich countries might attain high economic growth from non-agricultural exports (Sanjuan-Lopez and Dawson, 2010).

The impact of agricultural export on microeconomic performance of Pakistan was analyzed by using secondary data from the period 1972-2008. The study estimated the relationship between Gross domestic product (GDP) and agricultural and non-agricultural exports as dependent and independent variables respectively by employing Johansen co-integration technique. The main findings of the study depict that agricultural exports have a negative relationship with economic growth of Pakistan while non-agricultural exports have positive relation with economic growth. Basing the empirical results the study suggested that Pakistan have to do structural changes in agricultural exports by converting its agricultural exports into value added products (Syed *et al.* 2015)

Noula *et al.* (2014) studied the impact of agricultural exports on economic growth of Cameroon specifically with reference to coffee, banana and cocoa using co-integration test. Results found mixed effects on economic growth in Cameroon. Coffee export and banana export has a positive and significant relationship with economic growth. On the other hand, cocoa export was found to have a negative and insignificant effect on economic growth. Basing the empirical result the study recommended that, implementation of policies aimed at increasing the productivity and quality of these cash crops and value addition to cocoa and coffee beans before exporting to increase the growth of economic growth in Cameroon.

Boansi *et al.* (2014) examined economic and policy foundations of agricultural exports from Ghana by using co-integration analysis. The study undertaken to help bridge information gap and inform agricultural trade policy prescriptions on how growth observed in Ghana's agricultural export sector could be sustained and scaled up. To achieve the purpose of the study the Johansen Full Information Maximum Likelihood test was used. The study found that, structural weaknesses in production, trade and marketing environments preclude the country from exploiting growth enhancing opportunities in the short-run, while potential

barriers to trade yield similar implication in the long-run and minimization of both short and long-run inhibitions could further enhance agricultural export growth for Ghana. Based on the result found, the study recommended, sustenance and scaling up of the Ghanaian agricultural export sector requires addressing of existing structural weaknesses and inefficiencies in production, trade and marketing, increased diversification of agricultural exports, increased openness to trade, attraction of export enhancing foreign direct investments, and increased domestic production.

Ousmanou *et al.* (2003) examined the relationship between exports and economic growth in 21 SSA Countries by using time series data. The study emphasized on the questions; Are exports and economic growth correlated in Sub-Saharan Africa? If yes, what is the direction of this causation? Is this direction reversed with the change of these countries from import-substitution (IS) to export promotion (EP) strategies? To answer these questions the study used Hsiao's Granger-causality and found that during the IS period, economic growth unidirectional causes total exports in five countries, manufactured exports unidirectionally cause economic growth in one country, bidirectional causality exists between economic growth and total exports in three countries, bidirectional causality exists between economic growth and agricultural exports in one country and bidirectional causality exists between economic growth and manufactured exports in three countries. During the EP period, agricultural exports unidirectionally cause economic growth in nine countries, manufactured exports unidirectionally cause economic growth in three countries, economic growth unidirectionally causes agricultural exports in five countries, economic growth unidirectionally causes manufactured exports in six countries and bidirectional causality exists between economic growth and agricultural exports in three countries.

Muhammad (2010) examined the contribution of agricultural export to economic growth of Pakistan by estimating the relationship between agricultural exports and non-agricultural exports to economic growth of Pakistan by employing Johansen co-integration technique for the period 1972 to 2008. The results of the study indicated that there was negative and insignificant relationship between the agricultural exports and economic growth. The agriculture export elasticity of GDP was -0.14 which means that one percent increase in agricultural exports decreases the country's GDP by 0.14 and the non-agricultural export elasticity of GDP was 0.58. Based on the empirical results, the study suggested that non-agricultural exports should be promoted than agricultural exports.

Barbara *et al.* (2011) investigates the relationship between real export and real GDP in Italy from 1863 to 2004 by using co integration analysis and causality tests. The outcome of

the study suggested that these variables co-move in the long run but the direction of causality depends on the level of economic development: in the period prior to world war 1st the growth of the Italian economy led that of exports, while in the post-world war 2nd period the causal relationship was reversed with the expansion of exports that determined the growth of the Italian economy.

The causal relationship between economic growth and exports in Jordan was done by using the Granger methodology in order to determine the direction of the relationship between the two variables during the period 2000-2012. The study found that there is a causal relationship going from the economic growth to Export, and not vice versa. Based on the outcome of causality tests, the changes in the economic growth help explain the changes that occur in the Export. The study suggested that, the directed effect towards policies that will enhance economic growth such as import substitution industrialization, in order to impact more on exports (Ruba *et al.* 2014).

2.2.1 Shortcomings of reviewed previous empirical analyses

A vast amount of the literature reviewed above has employed the vector auto regressive models to analyze the relationship between export and economic growth and some of the data used in these studies was short span averaging twenty to twenty five years. Auto regressive model would probably have to have more lags to be useful for prediction. Having high number of lags leads to over parameterization of the model implying that there is loss in the number of degrees of freedom, especially that they have used many independent variables.

Some of the study analyzed the relationship between export and economic growth by using non-stationary data. A non-stationary time series has a different mean at different points in time and its variance increases with the sample size. Non-stationary data, as a rule, are unpredictable and cannot be modeled or forecasted. The results obtained by using non-stationary time series may be spurious in that they may indicate a relationship between two variables which in essence does not exist. Therefore, for the purpose of forecasting, such (non-stationary) time series may be of little practical value. In order to achieve consistent and reliable results, the non-stationary data needs to be transformed into stationary data.

The co-integration test among the variables has been tested in some studies by using only Angle-Granger two steps procedure. Testing for co-integration using the Engle-Granger procedure alone has a number of weaknesses. The test for co-integration is likely to have lower power against the alternative tests and the test procedure assumes that there is only one

co-integration vector, when in fact there could be more, that is any linear combination of these vectors is obtained when estimating a single equation (Harris, 1995). Therefore, the Johansen procedure takes care of the above shortcomings by assuming that there are multiple co-integrating vectors.

2.3 Theoretical and Conceptual framework

2.3.1 Theoretical review on economic growth

Economic growth refers to an increase in the productive capacity of an economy as a result of which the economy is capable of producing additional quantities of goods and services. For a country economic growth is desirable to bring economic development. The components of economic growth and importance have been discussed under a number of economic growth theories in the following section.

Classical theory of economic growth

Classical economists centered their attention on the economic growth of nations which is explained by the theory based on the class structure of the capitalist economy. They identify three classes: workers, capitalists and land owners. They have their own specific role in the economic process. Workers own labor and sell it on the labor market for a subsistence wage. Land owners rent their land to capitalists to obtain rent. Capitalists own the produced means of production and organize production by employing labor and land. They earn profits. The behavior of all these agents is governed by their attempt to get as much as possible from the resources they own.

The classical economics assumes that among these groups only capitalists save from what they earn (Salvadori, 2003). The allocation of income is not determined by preferences or by the type of income earned but mainly by the social group to which those who receive the income belong. The mechanism by which savings are transformed into investment can be direct, if the savers are entrepreneurs, or indirect, through the capital market, if the savers are not entrepreneurs. This means classical economists accept the view that all savings are transformed into investment. However, while they accept this idea, it is difficult to say that they share the neoclassical view that the means of equalization between savings and investment is interest rate. For classical economists, adjustment on the capital market between savings and investments occurs mainly through adjustments in the labour market. Moreover, unlike neoclassical growth theory, the rate of growth of the economy is determined by the interplay between savings and population growth rate, the former being

completely employed in investment and the latter being endogenously given as an increasing function of the real wage rate.

Adam Smith (1776) showed that the level of output basically depends on inputs of three factors of production namely; labor, capital and land. The productivity or technologies of these factors are supporting elements of growth. The importance of non-economic factors such as political stability, the security of private property, and the role of laws and institutions in facilitating economic growth were also explained. Rostow (1990) defined the Smithian growth model as a function of three components; factor inputs, technology and non-economic factors. An economy will transfer to a higher level if some or all these factors are increased. By this, the economy will move from one static equilibrium position to another. However, it is shown that this process has a limit where increase in input use may not necessarily bring increase in output.

In general, the Classical economists suggested a number of factors that promote economic growth in explaining the theories of economic growth. They started from the basic factors of production such as labor, capital, land and technology and continued to the non-economic factors such as political stability, the security of private property, the role of laws and institutions, the expansion of towns and growth of population; and non-market variables such as education and customs. Most of these variables are also considered as the factors of production and are used to explain growth in the modern theories of economic growth.

The Keynesian theory of economic growth

The Keynesian theory of economic growth assumes households save constant proportion of their income and producers convert these savings into investment. However, unlike other theories of economic growth, the Keynesian theory of economic growth noted that not all savings are transferred into investment. Thus, it is not the level of saving rather level of investment that determines growth. In a special case where all savings are converted into investment, the economy is said to be in the steady state (Salvadori, 2003). Harrod (1936) and Domar (1946) were among the first economists to develop macroeconomic model to formally analyze the problem of growth in the Keynesian framework. They emphasized the relationship between consumption and saving by households and investment decision by entrepreneurs although these behaviors were not theoretically developed.

The consumption-saving decision is defined by an exogenously given propensity to consume while the investment decision is defined by the accelerator principle. In Harrod and Domar model (1936), production is obtained only by means of physical capital and labor.

Given the Keynesian assumption of fixed prices, firms choose the best technique at the given prices. Thus, there is only one cost minimizing technique which implies that the capital-labor ratio and the capital-output ratio are uniquely determined. The model focuses only on the equilibrium of the goods market because of the assumption that the market mechanism is not able to attain full employment of labor. The goods market is said to be in equilibrium when savings are equal to the desired investment. An economy growing along a path with equilibrium on the goods market is said to be on its warranted growth path. Along this path one obtains $G_w = s/v$ where G_w is called the warranted rate of growth of income, s is the rate of saving and v is the capital-output ratio. The behavioral hypothesis on producers and the Keynesian multiplier yield that if the warranted growth path also ensures full employment of labor (a rare case), then the economy is said to be on the golden age growth path (Salvadori, 2003).

At a later development, Kaldor (1956) held that it is not saving, investment, technical progress and population growth that are the causes of growth-these being the features of growth-but the attitude of investing by the society and in particular entrepreneurs. In this, Kaldor follows the Keynesian approach in conceiving the expansion of the economy as driven by psychological and social factors like human attitude to risk taking and money making (Kaldor, 1956).

Neoclassical growth theories

The neoclassical theory of economic growth is different from the classical theory of economic growth in the sense that the former produces rising wage and constant long run returns to land and other natural resources while the latter assumes constant real wages and growing land and other natural resources rents. According to Agenor and Montiel (1996), Robert Solow (1956) was the first economist to develop a model that represents the neoclassical theory of economic growth incorporating this idea. Later on, his model was further developed by Trevor Swan (1956). The latest model was then renamed as the Solow-Swan model (1956). The neoclassical growth theory is best represented by this model. The Solow-Swan model was built up on aggregate constant return to scale production function that combines labor and capital (with diminishing marginal returns) in the production of a composite good (Solow, 1957).

Production is distributed between savings and consumption on the basis of the Keynesian saving rule. Savings are assumed to be a fixed fraction of output, and technology improves at an exogenous rate. If savings are equal to the level of investment, then the

economy is said to be in the steady state. The convergence process towards the steady state is ensured by the assumption of decreasing productivity of capital. The model had attempted to solve the stability problem of full-employment steady state by assuming a neoclassical production function that allows for flexible coefficients of production (Salvadori, 2003).

Without technological progress, Heijdra and Ploeg (2006) suggest that Solow-Swan model would imply that countries with similar production technologies as well as comparable saving and population growth rates should converge to similar steady state levels of output. This convergence property-known as Absolute Convergence Hypothesis- means that poor countries starting with a relatively low standard of living and a lower capital-labor ratio should grow faster during the transition as they catch up with the rich countries, but ultimately both groups arrive at the same level of per capita income (Agenor and Montiel, 1996).

Later on, other economists developed an alternative hypothesis that states rich countries grow faster than poor countries. This hypothesis is known as Conditional Convergence Hypothesis. Ramsey (1965) had also developed a model that further explains the neoclassical theory of economic growth by making the saving rate of households endogenous. This replaced the *ad hoc* saving/consumption function by forward looking theory based on utility maximization. The Ramsey model yields very similar growth predictions as the Solow-Swan does. However, unlike the Solow-Swan model, it features the Ricardian equivalence that the particular method used to finance government spending does not matter in affecting consumption, investment and output or in short government debt and tax have equivalent impact on macroeconomic variables and rules out over-saving (Heijdra and Ploeg, 2006).

Endogenous growth theories

Unlike the traditional growth theories which view economic growth as a result of exogenous factors, Paul Romer, Robert E. Lucas and Robert J. Barro independently came up with a new type of growth theory which endogenizes technology in the eve of 1990s. This theory is known as Endogenous Growth Theory. The recent literature highlights the existence of a variety of channels through which steady state growth may emerge endogenously.

The new growth theory stressed the importance of innovation, human capital accumulation, the development of new technologies and financial intermediation as important determinants of economic growth. The experience of East Asian countries also provides several lessons on the impact of policies on economic growth. It is agreed that government

intervention aimed at removing obstacles to market mechanisms or other sources of market failures is not harmful to growth (Agenor and Montiel, 1996). According to Salvadori (2003), the aim of the endogenous growth theory is twofold. First, to overcome the shortcomings of the neoclassical growth theory which does not explain sustained growth, and second, to provide a rigorous model in which all variables crucial for growth such as savings, investment and technology are the outcome of rational decisions.

Since the main objective of the endogenous growth theory is to develop economically meaningful accumulated factors, then the rate of interest should never be driven too low. This is considered as a necessary condition for perpetual growth. The accumulation of factors can be facilitated either by removing the scarcity of natural resources or by introducing technical progress. As far as the former is concerned, for example, labour has been straightforwardly transformed into a fully reproducible resource, human capital. As for technical progress, one of the main features of the endogenous growth theory is the capacity to endogenize the investment decision yielding technological progress which consists mainly in the introduction of new intermediate and/or final goods.

In general, it has been shown that there is continuity from classical to endogenous growth theories, partly through Keynesian theory concerning the fact that the steady state is conceived as endogenously determined by the model. By contrast, neoclassical economists see it as exogenously determined by factors considered outside the realm of economic explanation. There is also continuity between classical, neoclassical and endogenous growth theory as opposed to Keynesian theory, in terms of saving-investment relationship. While the former theories conceive saving as wholly transformed into investment, and therefore, growth being determined by saving itself, Keynesian theory conceived investment as the source of growth and no relationship between the former and the latter variable necessarily exists (Salvadori 2003).

2.4. Conceptual framework

Most of under developed countries like Ethiopia have only two abundant factors of production labor and land, with little capital. For those countries, the dominance of agriculture is one of the major distinguishing features. In their trade, export tends to be dominated by the primary products. As true for Ethiopia, the balance of payment position is against the developing countries as their export performance is low. The causes of low export performance in Ethiopia start from low investment in export sector in general and the agricultural sector in particular. The main source of export in the country is agricultural

commodities and there are different factors which can affect the competitiveness in international markets and contribution of these commodities to the economic growth. The main factors are world market price, government policy, level of infrastructure development, availability of financial source and weather condition among others. If the volume and quality of the agricultural product is improved; the competitiveness in international market and the share of the international market will increase and the foreign earning generated from agricultural commodities will also increase which have high contribution for capital formation and positive impact on economic growth (GDP).

The contribution of agricultural export and economic growth has forward and backward relationship. As the economy grows, it can supply improved agricultural inputs, which incentive agricultural productivity and in turn increase volume and contribution of agricultural product export. In Ethiopia there is excess and cheap labor force as compared to capital. Due to this, the cost of agricultural product is low and the country can export at low prices. Thus, as the price of Ethiopian export is low, the real exchange rate is low which means the value of Ethiopian birr depreciates. This leads to high demand for Ethiopian export in international markets. The conceptual framework is stated in short in the following diagram.

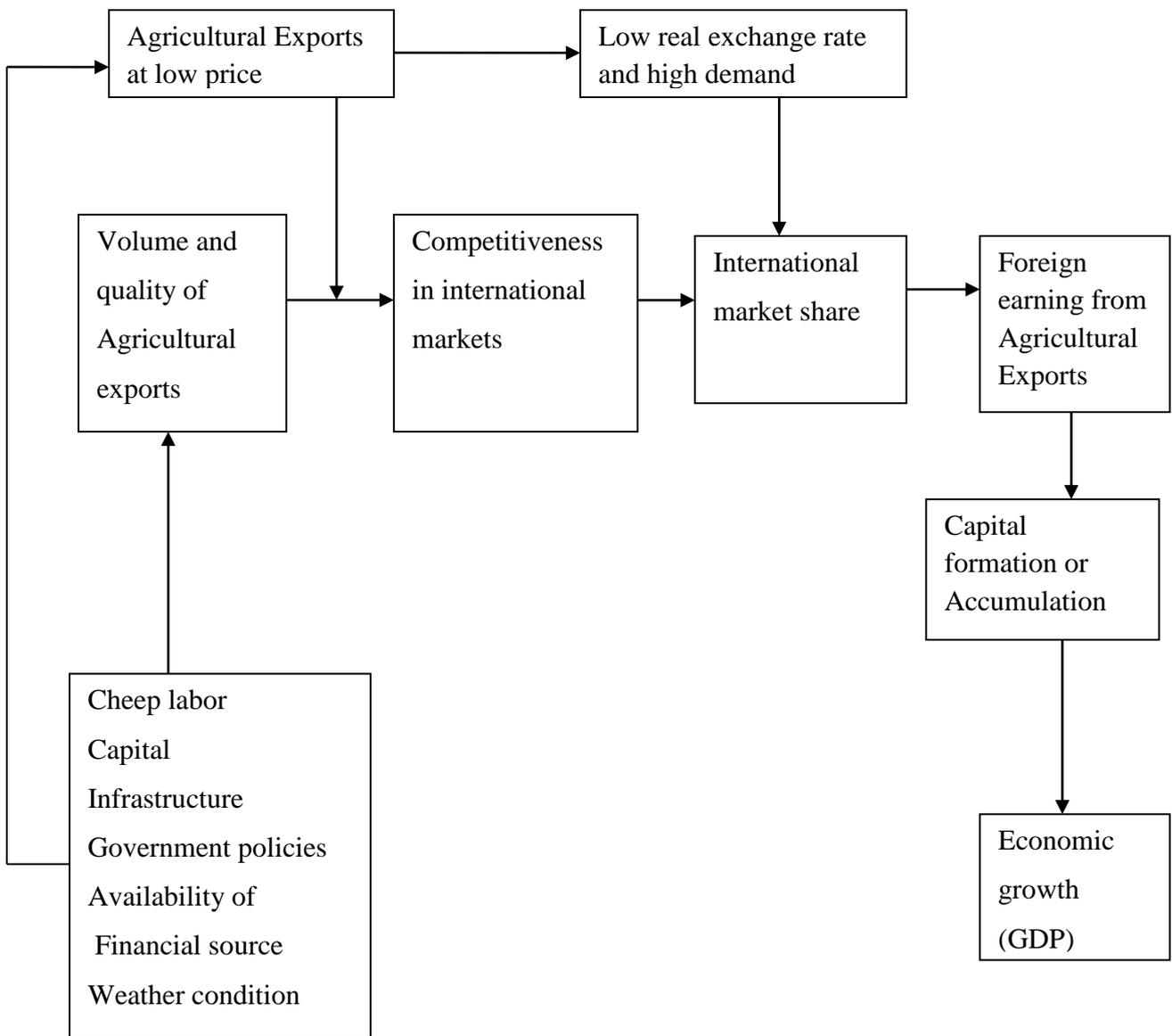


Figure 2: Conceptual framework

Source: Own conceptualization

CHAPTER THREE

METHODOLOGY

3.1. Study area

This study was carried out in Ethiopia located in the horn of Africa. Ethiopia is located at 3 degrees and 14.8 degrees latitude, 33 degrees and 48 degrees longitude in the Eastern part of Africa and situated between the Equator and the Tropic of Cancer. It is bounded on the Northeast by Eritrea and Djibouti, on the East and Southeast by Somalia, on the South by Kenya and on the West and North West by Sudan and South Sudan. Ethiopia has a total area of 1,127,127 square kilometers with the population of 85 million which makes her the tenth largest in the world and the third most populous state in Africa after Nigeria and Egypt (CSA, 2007).

The country has 9 regional states divided according to the main ethnic lines such as Oromiya regional state, Amahara regional state, Tigray regional state, Afar regional state, Benishangul-Gumuz regional state, Harari regional state, Somalia regional state, Southern Nation Nationalities and People regional state and Gambella regional state.

The main export commodities of Ethiopia such as coffee, oilseed and pulse production are mainly from Oromiya, SNNP, Amahara and Tigray region. Coffee is produced in two regions; Oromiya and SNNP. The export standard coffee from Oromiya region is mainly from four areas such as Jimma, Nekemte, Harar and Bebeke. There are three areas in SNNP such as Kefa, Sidamo and Yirgacheffe. Oilseed is produced mainly in the north and western parts of the country. The export standard oilseed production comes from Amhara region specifically in Metama, from Tigray region in Hummera and Oromiya region in Wellega.

Almost all regions of the country produce pulses but Tigray, Amhara, Oromiya, Benshangul-gumz and SNNP regions produce more than 99 percent of the total national production. Among these regions, 42 percent of production is concentrated in the Amhara region while Oromiya region consists of 43 percent of total pulse production in the country (CSA, 2013).

3.2 Methods of data collection

This study is mainly based on secondary yearly export data on selected commodities and for other control variables mentioned in the model from Central Statistical Agency (CSA), National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MoFED), Ethiopian Revenue and Customs Authority (ERCA) and various publications of

International Monetary Fund (IMF) and World Bank (WB) covering the period from 1973 to 2013.

3.3 Model specification

Various economic growth theory have been discussed in this study under theoretical frame work, such as Classical growth theory which assumes non-economic factors of production like population growth, political instability ,the security of private property and the role of law and institutions in addition to economic factors of production land ,labor, capital and technology. Endogenous growth theory depends on the implication that, policies which embrace openness, competition, change and innovation will promote growth and conversely, policies which have the effect of restricting or slowing change by protecting or favoring particular existing industries or firms are likely over time to slow growth to the disadvantages of the communities. This theory use the simple production function $Y=AK$ where Y is output, A is technological progress and K is capital and assumes non-diminishing return to capital which criticized by different Authors. This study used the Solow-Swan production function, an economic model of long-run economic growth set within the framework of neoclassical economics as a base to develop the economic growth model for this study. This model attempts to explain long-run economic growth by looking at capital accumulation, labor and technological progress and due to its particularly attractive mathematical characteristics, Solow-Swan shows to be a convenient starting point for various extensions. Therefore, since the economy of Ethiopia is labor intensive and the study did not focus on the non-economic variables of the classical growth theory, the following neoclassical production function was used:

$$Y=f(L, K).....(1)$$

This production function is expanded by adding agricultural exports as follows:

$$Y_t=f(L_t,K_t,COFX_t,OLX_t,PUX_t).....(2)$$

This model can be rewritten by including, exchange rate and consumer price index (proxy for inflation) as control variables as follows:

$$RGDP_t=f(LF_tCA_tCOFX_tOLX_tPUX_tER_tCPI_t\mu).....(3)$$

Where $RGDP_t$ is the annual real gross domestic product, LF_t is the total labor force CA_t is the gross domestic fixed capital formation, $COFX_t$ is coffee export, OLX_t is oilseed export, PUX_t is pulse export, ER_t exchange rate and CPI_t is consumer price index and error term μ .

Finally, from equation 2 and 3, equation 4 is derived by taking natural logarithm on both sides of equation 3 in order to discard the differences in the units of measurements for the variables and to minimize the gap between independent variables and dependent variables. It is then used to analyze the impact of agricultural exports on economic growth in Ethiopia from 1973 to 2013.

$$LRGDP_t = \beta_0 + \beta_1 L LF_t + \beta_2 L CA_t + \beta_3 L RER_t + \beta_4 L CPI_t + \beta_5 L COFX_t + \beta_6 L OLX_t + \beta_7 L PUX_t + \varepsilon_t \dots \dots \dots (4)$$

Where; $LGDP_t$ is natural logarithm of real gross domestic product, LLF_t is natural logarithm of labor force, LCA_t is natural logarithm of gross domestic fixed capital formation, $LRER_t$ is natural logarithm of real exchange rate, $LCPI_t$ is natural logarithm of consumer price index, $LCOFX_t$ is natural logarithm of coffee export, $LOLX_t$ is natural logarithm of oilseed export, $LPUX_t$ is natural logarithm of pulses export and ε_t is error term β_0 is the constant term and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6,$ and β_7 are the parameters of independent variables to be estimated.

3.4 Definition of variables and their expected sign

In this study the variables considered as independent and dependent have the following contextual meaning and sign.

Gross Domestic Product (GDP): It is dependent variable since the study is looking at the relationship between the real GDP and agricultural export in Ethiopia. It is defined as the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Total Labor Force (LF): This variable captures the effect of labour force on economic growth since the development on the agricultural sector improves the productivity of labour. Labour is considered to play a vital role in export-growth relationship. The neoclassical theory, stipulates that as the input (labour and capital) increases total output increases. It is therefore expected that labour force will have a positive relationship with economic growth.

Gross Domestic Fixed Capital Formation (CA): Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements(fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, commercial and industrial buildings. The neoclassical theory, stipulates that an increase in capital as an input in production leads to increases in output. It is therefore expected that Gross Fixed Capital Formation will have a positive relationship with economic growth.

Real Exchange Rate (RER): Real Exchange rates are included in the model to reflect the price competitiveness in the international markets and to ascertain its indirect influence on economic performance via export channel. It has been argued that exports in developing countries depend on the world demand for tradable goods. Thus, the fluctuations of the real exchange rates may be crucial for a small open economy like Ethiopia, which is influenced by the changes in the international market prices. In this regard, a positive correlation between real exchange rate and economic growth is anticipated (Henriques and Sadorsky 1996).

Consumer Price Index (CPI): The consumer price index is used as a proxy for inflation since our data on the three agricultural exports is in terms of their exchange value over years. So in order to compute the effect of inflation a consumer price index is employed. Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. Therefore consumer price index is expected to have negative relationship with economic growth.

Coffee Exports (COFX): Coffee is the leading export commodity in Ethiopia. Export expansion is a significant catalyst in improving productivity growth. Therefore, export expansion helps to concentrate investment in agricultural sectors which in turn increase the overall total productivity of the economy. Additionally, export growth may also relieve the foreign exchange constraint, allowing capital goods to be imported to boost economic growth. Therefore positive relationship will be expected on economic growth.

Oilseed Exports (OLX): Oilseed is the second exportable commodity in Ethiopia and shows increasing trend indicating the increasing demand for oilseed in the world market as well as production in the country. Since export is a catalyst for productivity growth and elevates the foreign currency constraint, oilseed export is expected to have positive relationship with economic growth.

Pulse Exports (PUX): Pulse is the third exportable commodity in Ethiopia and currently shows increasing situations. Since, export expansion helps to concentrate investment in these sectors, which in turn increase the overall total productivity of the economy; pulse export is expected to have positive relationship with economic growth.

Table 1: Variables and expected signs

Variable	Variable name	Expected sign
RGDP_t	Real gross domestic product	
LF_t	Total labor force	+
CA_t	Gross domestic fixed capital formation	+
RER_t	Real exchange rate	+
CPI_t	Consumer price index	-
COFX_t	Coffee export	+
OLX_t	Oilseed export	+
PUX_t	Pulses export	+

3.5. Methods of data analysis

Objective one

To determine the trend of agricultural exports over time in Ethiopia, descriptive analysis was done by using figures. Descriptive analysis can be useful for two purposes such as to provide basic information about variables in a dataset and to highlight potential relationships between variables.

Objective, Two Three and four

To analyze whether the selected agricultural exports (coffee, oilseed and pulse) have short run and long run impact on economic growth of Ethiopia, different time series data techniques were used. To determine the impact of agricultural exports such as coffee, oilseed and pulse on economic growth, co-integration and error correction model were used. Before the analysis, the stationarity of time series data was tested. Augmented Dickey-Fuller (ADF)

and Phillips-Perron (PP) test was used to test the stationarity of the variables then co-integration analysis was done to see if there is long-run relationship between the agricultural exports such as coffee, oilseed and pulse on the economic growth of the country.

3.5.1 Stationary and non-Stationary

A non-stationary time series has a different mean at different points in time and its variance increases with the sample size. Non-stationary data, as a rule, are unpredictable and cannot be modeled or forecasted. The results obtained by using non-stationary time series may be spurious in that they may indicate a relationship between two variables which in essence does not exist. In order to achieve consistent and reliable results, the non-stationary data needs to be transformed into stationary data.

Regression of non-stationary time series may cause a spurious or non-sense regression. On the other hand, a series is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not the actual time at which the covariance is computed (Gujarati, 2004). Therefore, the first thing in an econometric work is to check whether a series is stationary or not since non-stationary series behavior can only be studied only for the period under consideration. Each set of time series data will therefore be for a particular episode. Consequently, it is not possible to generalize it to other time periods. Therefore, for the purpose of forecasting, such (non-stationary) time series may be of little practical value.

A non-stationary time series that becomes stationary after differencing d times is said to be integrated of order d (Gujarati, 2004). This would be written as I (d). A series may be difference or trend stationary. A difference stationary series becomes stationary after successive differencing while a trend stationary series becomes stationary after deducting an estimated constant and a trend from it. To establish the order of integration of a series, a unit root test was performed. There are many tests for examining the existence of unit root problem. Dickey and Fuller (1979, 1981) constructed a method for formal testing of non-stationary. The Dickey – Fuller (DF) is suitable, if the error term (μ_t) is not correlated and it becomes inapplicable if error terms (μ_t) are correlated. To allow for the various possibilities, the DF test is estimated in three different forms:

$$\Delta Y_t = \delta Y_{t-1} + \mu_t \dots \dots \dots (5) \text{ (Without drift and trend)}$$

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \mu_t \dots \dots \dots (6) \text{ (With drift)}$$

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \mu_t \dots \dots \dots (7) \text{ (With drift and trend)}$$

Where t is the time or trend variable. In each case the null hypothesis is:

$H_0 = \delta = 0$; that is, there is a unit root (the time series is non-stationary), and

$H_1 = \delta < 0$; that is the time series is stationary

But in case μ_t is correlated, Dickey and Fuller have developed a test, known as the Augmented Dickey–Fuller (ADF) test. This test is conducted by augmenting the preceding three equations by adding the lagged values of the dependent variable Y_t . The ADF test here consists of estimating the following regressions:

$$\Delta Y_t = \delta Y_{t-1} + \alpha_t \sum_{t=1}^m \Delta Y_{t-1} + \varepsilon_t \dots \dots \dots (8) \text{ (Without drift and trend)}$$

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \alpha_t \sum_{t=1}^m \Delta Y_{t-1} + \varepsilon_t \dots \dots \dots (9) \text{ (With drift & no trend)}$$

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \alpha_t \sum_{t=1}^m \Delta Y_{t-1} + \varepsilon_t \dots \dots \dots (10) \text{ (With drift & trend)}$$

Where, β_0 and t are the constant and the time trend, respectively. The ADF test assumes that the errors are statistically independent and have a constant variance. Thus, an error term should be uncorrelated with the others and has a constant variance. The test is first carried out with a constant and trend on the variable in level form. Secondly, it is carried out with a constant only and finally without constant or trend on the differenced variable depending on which was significant in the level form. If the ADF test statistic is greater than the critical value, then the series is stationary and if the ADF statistic is less than the critical value the series is non-stationary. The following hypotheses will be used to test for stationarity:

$H_0 = Y_t$ has unit root or not stationary

$H_1 = Y_t$ is stationary or does not have unit root

The other method of unit root test is Phillips-Perron (1988). This test is a modification and generalization of DF's procedures. While DF tests assume that the residuals are statistically independent (white noise) with constant variance, Phillips-Perron (PP) tests consider less restriction on the distribution of the disturbance term (Enders, 1995). Phillips-Perron tests undertake non-parametric correction to account for auto correlation present in higher AR order models. The tests assume that the expected value of the error term is equal to zero, but PP does not require that the error term be serially uncorrelated. The critical values of PP tests are similar to those given for DF tests and this study applied both methods for accurate results. If dependent and independent variables fail the stationary test, the data

generating process of these variables are non-stationary. These tests are performed on both level form and first differences of both variables. The Implication of the unit root test result on the estimation procedures is that if all variables in the equation are found to be non-stationary at level form, I (0), but stationary at first difference I (1), then co-integration test will be conducted to find the existence of a long-run (L-R) equilibrium relationship.

3.5.2 Co-integration test

Granger (1981) introduced the concept of co-integration. Co-integration is the statistical implication of the existence of long run relationship between the variables which are individually non-stationary at their level form but stationary after first difference (Gujarati, 2004). The theory of co integration can therefore be used to study series that are non-stationary but a linear combination of which is stationary. Two main procedures are used to test for co-integration: The Engle and Granger (1987) test and the Johansen (1988) co-integration test.

The Engle and Granger test is a two-step test which first requires that the variables be integrated of the same order. The first step consists of estimating the equation in level form while the second step consists of testing the stationarity of the residuals of the estimated equation. The existence of co-integration is confirmed if the residuals are stationary at level form (Engle & Granger 1987). The Engle and Granger (1987) co-integration test is based on residuals:

$$\varepsilon_t = Y_t - \beta_0 - \beta_1 X_t \dots \dots \dots (11)$$

For testing co-integration, we use the following equation:

$$\Delta \varepsilon_t = \mu + \varphi \varepsilon_{t-1} + \varepsilon_t \dots \dots \dots (12)$$

To test for co-integration we set:

H₀ = no co-integration ($\varphi = 0$)

H₁ = co-integration ($\varphi \neq 0$)

The co-integration in multiple equations can be examined by Johansen (1981) and Johansen Juselius (1990) approach. Johansen procedure of co-integration gives two statistics. These are the value of LR test based on the maximum Eigen – value and on the trace value of the stochastic matrix. The Johansen test uses the likelihood ratio to test for co-integration. Up to (r-1) co-integrating relationships may exist between a set of r variables. The hypothesis of co-integration is accepted if the number of co- integrating relationships is greater than or equal to one. The decision rule compares the likelihood ratio to the critical value for a

hypothesized number of co-integrating relationships. If the likelihood ratio is greater than the critical value, the hypotheses of co-integration is accepted, if not it is rejected. The generalization of Johansen's procedure is as follows:

$$\Delta y_t = \alpha \beta' y_{t-1} + \sum_{i=1}^{p-1} \Pi_i \Delta y_{t-i} + \varepsilon_t \dots \dots \dots (13)$$

where y is a $(K \times 1)$ vector of $I(1)$ variables, α and β' are $(K \times r)$ parameter matrices with rank $r < K$, Π_1, \dots, Π_{p-1} are $(K \times K)$ matrices of parameters, and ε_t is a $(K \times 1)$ vector of normally distributed errors that is serially uncorrelated but has contemporaneous covariance matrix π . Johansen's procedure relies on the rank of Π and its characteristics roots. If rank $(\Pi) = 0$, the matrix is null (no co-integration) and equations in vector y_t are common VAR in first differences. If Π has full rank ($\Pi = k$), the vector process is stationary and the equations in y_t are modeled in levels $I(0)$. If rank $(\Pi) = 1$, there is evidence of a single co-integrating vector. There are two likelihood ratio (LR) test statistics for co-integration under the Johansen approach. The trace (λ_{trace}) and the maximum Eigen value (λ_{max}) statistics which are specified as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^n \ln(1 - \lambda_i) \dots \dots \dots (14)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \lambda_{r+1}) \dots \dots \dots (15)$$

Where T is the number of observations and the λ_i are the estimated Eigen values. For any given value of r , large values of the trace statistic are evidence against the null hypothesis that there is r or fewer co-integrating relations in the VECM. The trace test attempts to determine the number of co-integrating vectors between the variables by testing the null hypothesis (H_0) that $r = 0$ against the alternative (H_1) that $r > 0$ or $r \leq 1$ (r equals the number of co-integrating vectors). The maximum Eigen value tests the null hypothesis (H_0) that the number of co-integrating vectors is equal to r against the alternative (H_1) of $r+1$ co-integrating vectors. If the value of the likelihood ratio is greater than the critical values, the null hypothesis of zero co-integrating vectors is rejected in favor of the alternatives. Therefore, this study was employed both the Johansen (1988) co-integration by emphasizing on the value of maximum Eigen value (λ_{max}) statistics and Engle and Granger co-integration test for the accuracy of the results.

3.5.3 Error Correction Model (ECM)

In order to examine the short run relationships of the model, the error correction model has been used. Error correction term included in the model, explains the speed of adjustment towards the long run equilibrium. Initially, if the variables confirm the existence of co integration, then the Error Correction Model (ECM) will be estimated. Granger and Weiss (1983) and Engle and Granger (1987) pointed out that if two variables are co-integrated in first difference, their relationship can be expressed as the ECM by taking past disequilibrium as explanatory variables for the dynamic behavior of current variables. The ECM method corrects the equilibrium error in one period by the next period (Maddala, 1992). Therefore, the deviation from the long run relationship should be included as an explanatory variable in an Error Correction Model which can be presented as follows:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \mu_{t-1} + \varepsilon_t \dots \dots \dots (16)$$

Where $\Delta Y_t = Y_t - Y_{t-1}$, $\Delta X = X_t - X_{t-1}$, β_1 and β_2 are the dynamic adjustment coefficients, μ_{t-1} is the lag of residual representing short run disequilibrium adjustments of the estimates of the long run equilibrium error, while ε_t is the random error term (Gujarati, 2004). The error correction coefficient must be negative which indicates the existence of a short-run relationship. The size of the error correction coefficient determines the speed of adjustment towards equilibrium. In this study the Error correction model (ECM) is estimated as follows;

$$\begin{aligned} \Delta LGDP_t = & \beta_0 + \beta_1 \Delta LLLF_t + \beta_2 \Delta LCA_t + \beta_3 \Delta LER_t + \beta_4 \Delta LCPI_t + \beta_5 \Delta LCOFX_t + \beta_6 \Delta LOLX_t \\ & + \beta_7 \Delta LPUX_t + \alpha ECM_{(t-1)} + \varepsilon_t \dots \dots \dots (17) \end{aligned}$$

Where; $\Delta LGDP_t$ is the change in natural logarithm of real gross domestic product, $\Delta LLLF_t$ is change in natural logarithm of total labor force, ΔLCA_t is change in natural logarithm of gross domestic fixed capital formation, ΔLER_t is change in natural logarithm of real exchange rate, $\Delta LCPI_t$ is change in natural logarithm of consumer price index, $\Delta LCOFX_t$ is change in natural logarithm of coffee export, $\Delta LOLX_t$ is change in natural logarithm of oilseed export, $\Delta LPUX_t$ is change in natural logarithm of pulses export, β_0 constant term, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7 are parameters of the independent variables and ε_t is the stochastic error term. ECM_{t-1} represents short run disequilibrium adjustments of the estimates of the long run equilibrium error and α is the coefficient of the error correction term.

Objective Five

For objective 5, Granger causality was used. Granger starts from the premise that the future cannot cause the present or the past. In multivariate time series analysis, causality test is done to check which variable causes (precedes) another variable. Given two variables X and Y, X is said to Granger cause Y if lagged values of X predicts Y well. If lagged values of X predict Y and at the same time lagged values of Y predict X, then there is a bi-directional causality between X and Y. Granger (1969) devised some tests for causality which proceed as follows. Consider two time series, Y_t and X_t : The Series Y_t fails to Granger cause X_t if in a regression of Y_t on lagged Y's and lagged X's, the coefficients of the latter are zero. That is, consider:

$$Y_t = b_0 + \sum b_j Y_{t-j} + \sum c_j X_{t-j} + \varepsilon_t \dots\dots\dots (18)$$

Then, if $c_j = 0$ and $j = 1, 2, \dots, k$, X_t fails to cause Y_t . We test the hypothesis that $H_0: c_j = 0$ against $H_1: c_j \neq 0$ by using an F test. In this study, where we was examined if coffee, oilseed and pulse exports granger causes economic growth (proxied by GDP) or vice versa, the model is given by:

$$\ln RGDP_t = b_0 + \sum b_j \ln RGDP_{t-j} + \sum c_j \ln COFX_{t-j} + \varepsilon_t \dots\dots\dots (19)$$

$$\ln COFX_t = b_0 + \sum b_j \ln COFX_{t-j} + \sum c_j \ln RGDP_{t-j} + \varepsilon_t \dots\dots\dots (20)$$

$$\ln RGDP_t = b_0 + \sum b_j \ln RGDP_{t-j} + \sum c_j \ln OLX_{t-j} + \varepsilon_t \dots\dots\dots (21)$$

$$\ln OLX_t = b_0 + \sum b_j \ln OLX_{t-j} + \sum c_j \ln RGDP_{t-j} + \varepsilon_t \dots\dots\dots (22)$$

$$\ln RGDP_t = b_0 + \sum b_j \ln RGDP_{t-j} + \sum c_j \ln PUX_{t-j} + \varepsilon_t \dots\dots\dots (23)$$

$$\ln PUX_t = b_0 + \sum b_j \ln PUX_{t-j} + \sum c_j \ln RGDP_{t-j} + \varepsilon_t \dots\dots\dots (24)$$

Where $\ln RGDP_t$ is natural logarithm of real gross domestic product, $\ln RGDP_{t-j}$ is lagged value of natural logarithm of real gross domestic product, $\ln COFX_t$ is natural logarithm of coffee export, $\ln COFX_{t-j}$ is natural logarithm of lagged coffee export, $\ln OLX_t$ is natural logarithm of oilseed export, $\ln OLX_{t-j}$ is natural logarithm of lagged value of oilseed export $\ln PUX_t$ is natural logarithm of pulse export, $\ln PUX_{t-j}$ is natural logarithm of lagged pulse export and ε_t error term. From the above equation if $c_j = 0$ and $j = 1, 2, 3, \dots, k$ then $\ln COFX_{t-j}$ fail to cause $\ln RGDP_t$ under the null hypothesis of $c_j = 0$ against the alternative hypothesis $c_j \neq 0$ by using F-test $\ln RGDP_{t-j}$ fail to cause $\ln COFX_t$ in equation 19 and 20; $\ln OLX_{t-j}$ fail to cause $\ln RGDP_t$, $\ln RGDP_{t-j}$ fail to cause $\ln OLX_t$ in equation 21 and 22

respectively; $\ln\text{PUXt-j}$ fail to cause $\ln\text{RGDPt}$ and $\ln\text{RGDPt-j}$ fail to cause $\ln\text{PUXt}$ in equation 23 and 24. In the view of the Granger, the presence of co-integration vector shows that granger causality must exist in at least one direction.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents the results of the trends and impact of agricultural exports on economic growth in Ethiopia from the period 1973 to 2013. It is composed of three main sections. Section one gives the trends. Section two gives a brief interpretation of statistical analysis before providing the compressive econometric analysis for each objective. Section three presents the results of econometric analysis (Unit roots, Co-integration, Error correction method and Granger-causality test) for each objective used to test the causal linkage between GDP and agricultural exports.

4.1 Trends of agricultural exports in Ethiopia

Agriculture is the most important sector in the Ethiopian economy. It generates about 86 percent of the export earnings (CSA, 2007). At present, the country's leading agricultural exports products include coffee, oil seeds, pulses, livestock products (leather, live animals and meat), fruits, vegetables and flowers. From these; coffee, oilseed and pulse are the major source of export revenue of the country.

4.1.1 Trend in coffee exports in Ethiopia

African's coffee production is focused on east African, which Accounts for around two thirds of continent's total output .Within East Africa, Ethiopia is the key producer, accounting 51% of African output. The leading export destination of Ethiopian coffee is Germany, Saudi Arabia, the USA and Japan. This reflects the tremendous growth in Ethiopia coffee output following liberalization of the sector which increased by 139% in the decade from 2004-2013. The country provides between 220,000 and 250,000 tons of coffee annually and coffee covers 34 percent of all exports of the country (Bertelsmann, 2012). According to Ethiopian revenue and customs authority, the country exported 118,000 tons of coffee, valued at about US dollars 340 million in 1996/97 and 199,127.77 tons of coffee, valued at about US dollars 746.6 million in 2012/13 which shows an increasing trend. The country exported 3.2 million bags of coffee and accounted for 3 percent of internationally traded coffee in 2012 (Bart *et al.*, 2014). However, Ethiopian exports have been prone to fluctuation as a result of periodic falls in output, volatile international prices and pressures of supplying the domestic market. Figure 3 indicates the trend of coffee exports in US dollar over the last 14 years. Two observations can be made: first, there were high growth rates in the values of coffee exported and the real value at the end of 2011/12 was three to four times higher than it was at the

beginning of 1998/99. Second, there was a significant drop in the real value of exports from the trend line in 2009. This was because of reduction in volume of production, low international price and disturbance to coffee export licenses by government (Bart *et al.*, 2014).

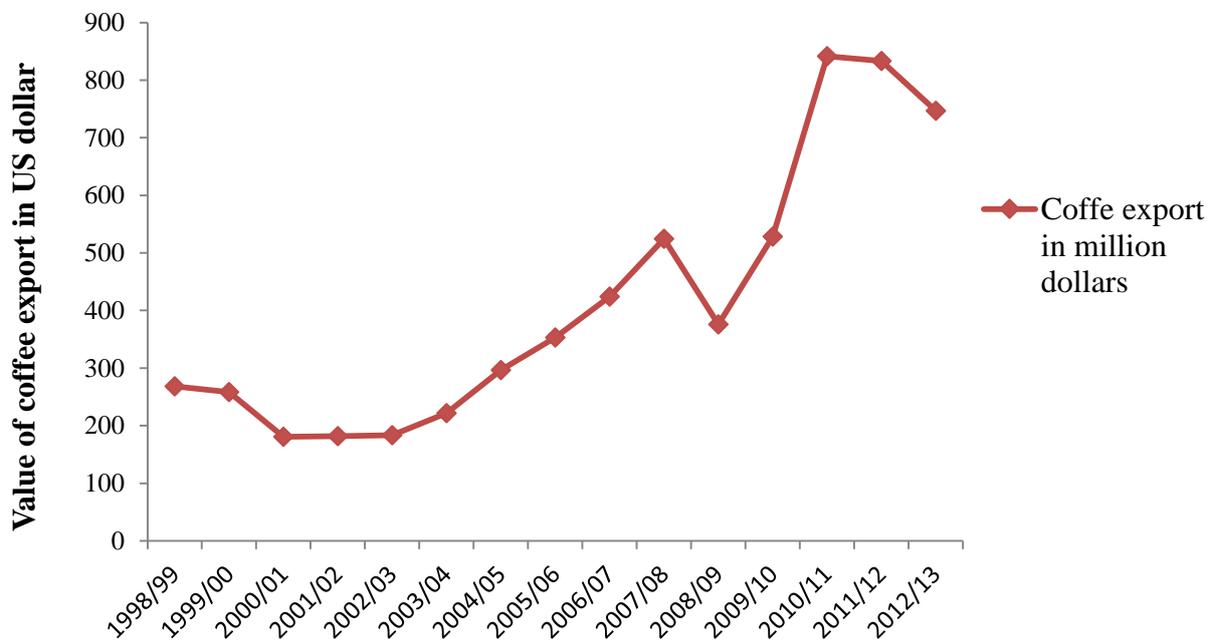


Figure 3: Trend in coffee exports in Ethiopia in USD from 1998/99-2012/13

Source: Author’s calculation based on data from ERCA.

4.1.2 Trend in Oilseed exports in Ethiopia

Oilseeds are the second largest export earner for the country next to coffee, contributing 14 percent to total export of the country and produced by more than three million farmers (ERCA, 2013). Ethiopia is the sixth world producer of sesame seed and the fifth for linseed. Exports consist of sesame seed in which the country is the third exporter in the world next to India and Sudan (Wijnandset *al.*, 2009). Ethiopia oilseed especially sesame seed is the most important for Edible oil, confectionary, biscuit and bakery industry, Tahini industry, Halva industry and Pharmaceutical ingredients (Getahun,2013).Ethiopia sesame seed exports accounted for 12 percent of the total volume of the world exports of sesame seed in 2005. During the same period, the volume of Ethiopia’s exports increased by 83.2 percent from 139,653 tons in 2007 to 255,783 tons in 2009. The average annual price of Ethiopia sesame seed has increased from 791USD/ton in 2005 to 1,308 USD /ton in 2009(USAID, 2010). However, Ethiopia oilseed export is subject to fluctuation as a result of periodic falls in output because of high dependence on rainfall, high post harvest loss, and

low level of improved input utilization and in sufficient or limited rural feeder roads and transportation, volatile international prices and low negotiation capacity of exporters (Getahun, 2013). Figure 4 shows the trends of oilseed exports for 14 years as well as fluctuation in exports performance from year to year.

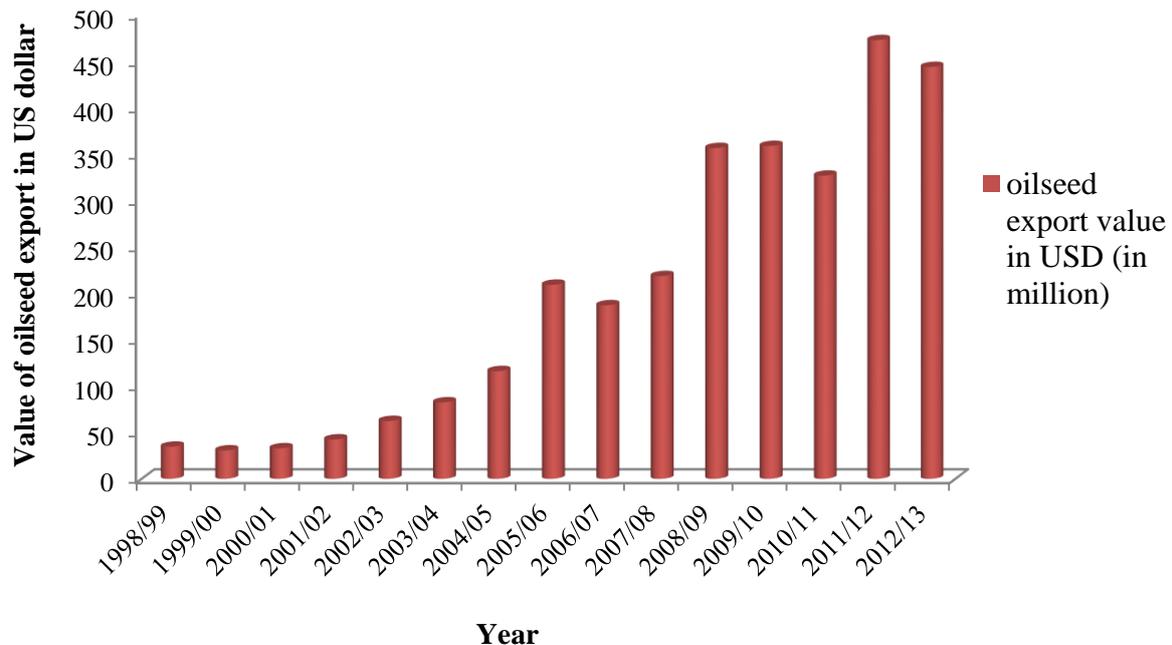


Figure 4: Trend in oilseed exports in Ethiopia in USD from 1998/99-2012/13

Source: Author’s calculation based on data from ERCA.

4.1.3 Trend in pulses exports in Ethiopia

Pulses have been cultivated and consumed in large quantities in Ethiopia for many years. The major varieties of pulses grown in Ethiopia are: Horse beans, chick peas, Haricot beans, Lentils, dry peas and Vetches (EEPA, 2004).Pulses production and exports is increasing from time to time as a result of increasing in the number of importing countries and tangible and positive effort of organizing supplies through Ethiopia commodity Exchange (ECX).Export of pulse crops were increasing and contributing 7 percent to total export of the country (ERCA, 2013). In 2004,37,395 metric tons worth US\$ 11.8 million were exported, but declined to 19,018 metric tons or US\$ 6.2 million in 2005. Exports again picked up in 2006 and 2007 increasing from 41,668 metric tons (US\$18.8 million) to 105,400 metric tons (US\$ 51.7 million). In 2008 and 2009, exports were about 31,708 metric tons (US\$ 23.1 million) and 52,144 metric tons (US\$ 31.6 million) (USAID, 2010) respectively.

However, Ethiopian pulses export is experiencing fluctuation as a result of varying in output level, low international price, high domestic demand and buyer's perception about quality of products is so low(Kassahun,2013). Figure 5 depicts the trend in pulses exports.

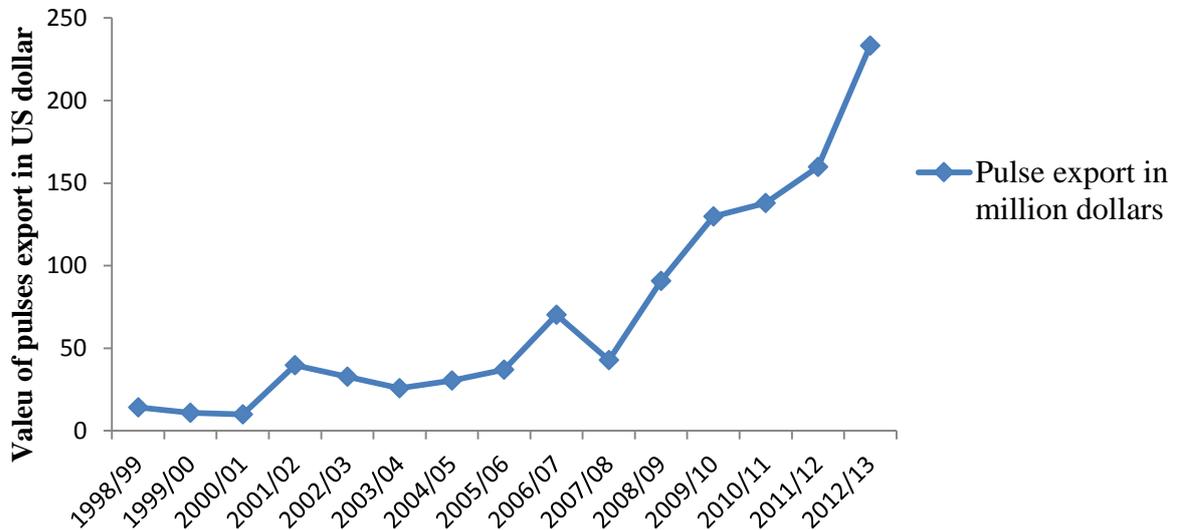


Figure 5: Trend in Pulse exports in Ethiopia in USD from 1998/99-2012/13

Source: Author's calculation based on data from ERCA.

4.2. Descriptive analysis of the data

Before going to provide a comprehensive econometric analysis, the study gives the brief interpretation of statistical analysis. Table 2 reports the descriptive statistics and interprets that the average real GDP at market prices is 204714.7million birr. The average fixed capital formation was39218.12million birr. The mean value of labor force is 25.62million people. The average consumer price index is63.63and the average real exchange rate is 202.02.On the average pulse export is 348.98 million birr. From 1973 to 2005, pulses have been exported in Ethiopia below its average export. By 2008, pulse export had an increment of 297.84 million birr from its mean export. After this period pulse exported from Ethiopia stood high from its mean value. The average coffee export is 2681.7 million birr. In Ethiopia, coffee export stood below its average from 1973 to 1995, where it witnessed an increase a year later. After that year coffee has been exported above its mean export. On average, oilseed export is 1279.65 million birr. From 1973 to 2004 oilseeds has been exported below its mean value, but after that period on ward, oilseeds export experienced a

dramatic increase above its mean value. This could be attributed to many reform programs that have been put in place by the government. Skewness is a measure of departure from symmetry. The variable LAB, RER and CPI included in the analysis is positively skewed or is rightward skewed, while the variables RGDP, COFX, OLX and PUX, are normally distributed or skewness is almost equal to zero.

Table 2: Descriptive statistics

	GDP	LF	CAP	RER	CPI	COFX	OLX	PUX
Mean	204714.7	25.62	39218.12	202.02	63.63	2681.7	1279.65	348.98
Max	626557	44.94	374935	407.2	206.22	14424.85	12477.21	4790.4
Min	96432	11.42	1312.38	93.6	9.84	147.37	9.27	1.75
Skew	0.0001	0.2210	0.0000	0.2208	0.0234	0.0027	0.0001	0.0000

4.3 Econometrics analysis

4.3 .1 Unit root test and order of integration

In order to achieve a meaningful regression with time series data, it is necessary to test the existence of unit roots in the variables. The variables used in the analysis need to be stationary and/or should be co-integrated in order to infer meaningful relationship from the regression. The unit root test provides the order of integration at which the variables can be stationary.

The tests were performed on all series (Real gross domestic product, total labor force, gross fixed capital formation, coffee export, oilseed exports, pulse exports, exchange rate and consumer price index) by using the Augmented Dickey-Fuller (1978) and Phillips-Peron (1988) tests. The ADF test is a parametric test (pre-determined parameters) and it has low power whereas PP test is based on non- parametric modification of Augmented Dickey-Fuller tests.

The results of Augmented Dickey fuller test and Phillips-Peron tests were applied to the variables mentioned in the model of this study at level I (0) meaning testing the existence

of unit root of the raw data as it is without differencing and first difference I (1) which means testing the existence of unit root of once differenced data are presented in Table 3 and Table 3, respectively.

Table 3: Unit Root Test at level form I (0)

Variables	ADF		Phillips-Peron(PP)	
	P-value	test- statistics	P-value	test -statistics
LGDP	1.000	3.074	1.000	3.074
LLF	0.993	0.942	0.993	0.942
LCA	0.892	-0.499	0.892	-0.499
LRER	0.711	-1.108	0.712	-1.108
LCPI	0.995	-1.168	0.997	-1.046
LCOFX	0.935	-0.224	0.936	-0.224
LOLX	0.993	-0.965	0.993	-0.965
LPUX	0.915	-0.370	0.915	-0.370

Values of Mackinnon test for ADF and PP: 1% = -3.5

5% = -2.888

10% = -2.578

The result reported in table 3 above indicates stationarity test of the variables at level form I(0).The null hypothesis of non-stationarity cannot be rejected even at 10% level for any of the variables because the critical values of Mackinnon test for ADF and PP are (-3.5) at 1%; (-2.888) at 5%and (-2.578) at 10%. To reject the null hypothesis, ADF and PP test statistics should be greater than the critical value, or in other words, the P-value should be significant at specific level of confidence. Since the null hypothesis was not rejected for all the variables at any convenient significant level, so all the variables had unit root at levels. Therefore, we can conclude that all the variables data are non- stationary at level.

Table 4: Unit Root Test at level form I (1)

Variables	ADF		Phillips-Peron(PP)	
	P-value	test statistics	P-value	test statistics
LRGDP	0.008	-3.506***	0.008	-4.159***
LLA	0.002	-3.966***	0.000	-4.939***
LCA	0.000	-6.338***	0.000	-11.488***
LRER	0.003	-3.784***	0.006	-4.237***
LCPI	0.003	-3.846***	0.000	-5.046***
LCOFX	0.001	-3.983***	0.000	-5.077***
LOLX	0.009	-4.108***	0.001	-4.631***
LPUX	0.000	-5.216***	0.000	-8.420***

***significant at 1%

Values of Mackinnon test for ADF and PP: 1% = -3.5

5% = -2.888

10% = -2.578

From the result in Table 4, the Augmented Dickey Fuller (ADF) and the Phillips-Perron (PP) test statistics for the first differences of all the variables series data were significant at 1% level of significance. This showed that, the series data is stationary at first difference and hence the variables are considered as integrated of order one or I (1) process. This result is in line with Gemechu (2002), Fentahun (2011) and Kagne (2007) who examined the impact of real exchange rate on economic growth of Ethiopia, the Export performance and economic growth in Ethiopia and found stationary data at first difference for labor force and capital.

4.3.2. Test for Co-integration

The order of integration which enters the specified economic growth model is already specified for each variable. All the variables are integrated of order one I (1). The next step is to estimate the long-run relationship between economic growth and agricultural export in Ethiopia using Johansson maximum likelihood methods and the two steps Engel and Granger procedure. In order to proceed with Johansen co-integration technique, the lag order and deterministic trend assumption for the VAR should be specified.

During unit root test the assumption of including constant but no trend was accepted. Therefore, the deterministic trend assumption for the VAR excludes trend and includes constant. For the selection of the lag order, there are different types of lag selection criteria, which includes the sequential modified likelihood ratio (LR), Akaike information criteria (AIC), Final prediction error (FPE), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQIC). However, it is not unusual that different criteria give a different number of maximum lag lengths (Hang, 2011). The problem is the choice of criteria to use. To overcome this problem, the model is run with different lag orders, chosen by different criteria and the LR test, and then implement the residual serial correlation and the residual normality test (Lutkepohl, 2005). An appropriate lag order needs to satisfy those tests. Therefore in this study the lag length selected by Schwarz information criterion and Sequential Modified Likelihood Ratio approach fulfills these requirements as well as prior knowledge of economic theory are used. The following table shows the lag length chosen by different information criteria.

Table 5: Results of lag order selection criteria

Lags	LL	LR	FPE	AIC	HQIC	SIC
0	-387.418	NA	2.0e+08	21.967	22.091	22.319
1	-368.854	37.128*	7.7e+07	20.992	21.130	21.386*
2	-368.102	1.503	7.9e+07	21.006	21.159	21.446
3	-366.287	3.631	7.6e+07*	20.960	21.129*	21.444
4	-365.543	1.487	7.7e+07	20.974	21.159	21.503
5	-364.155	2.776	-7.6e+07	20.953*	21.153	21.525

*indicates the lag length selected by the criteria

LR: Sequential Modified Likelihood Ratio

FPE: Final Prediction Error

AIC: Akaike information Criteria

SBIC: Schwarz Information Criterion

HQIC: Hannan-Quinn Information Criterion

Table 5 indicates that while LR and SC information criteria choose 1 lag order, FPE and HQ select 3 lag orders and AIC selects 5 lag orders. Therefore, the information criteria provides conflicting lag orders as expected. However, from the theoretical point of view since the data is annual data, 1 lag order is a reasonable lag order selection. Thus the Johansen co-

integration test conducted under the assumption of no trend but a constant in the series and 1 lag for the VAR. Most of the time the trace and maximum Eigen value statistics might give conflicting results. To deal with this problem Johansen (1990) recommended basing on one of them to identify the number of co integration vectors. Thus, this study used the maximum Eigen value. Table 6 shows the co-integration test results for the economic growth model based on maximum Eigen values.

Table 6: Results of the test for the number of co integration vectors

H0:rank=0 rank	Eigen value	λ_{max}	5%critical value	1%critical value
0	-	77.729	51.42	57.69
1	0.816	38.589	45.28	51.57
2	0.618	30.983	39.37	45.10
3	0.539	25.823	33.46	38.77
4	0.476	17.150	27.07	32.24
5	0.349	10.454	20.97	25.52
6	0.230	7.849	14.07	18.63
7	0.178	3.76	6.65	6.65

From Table 6, maximum statistics indicated 1 co-integrating vector (equation). Since at the null hypotheses of co-integration rank ($r=0$), the max value of 77.73 is greater than the 5% critical values of 51.42. Again at 1% critical value, the maximum value (77.73) is greater than 57.69. Therefore the Null hypothesis of no co-integration is rejected.

Null Hypothesis: Residual has a unit root.

Table 7: Unit root test of Residual

	Test-statistics	p -value
Augmented Dickey-Fuller test statistic	-4.074**	0.0011
Phillips-perron(PP)	-4.074**	0.0011
Test critical values:1% level	-4.29	
**5% level	-3.74	
10% level	-3.45	

The results in Table 7 show that the ADF test statistic and Phillips-Peron (PP) in absolute term is greater than the set of critical values provided by Davidson and MacKinnon (1993) at 5% and 10% (which is given in appendix A). The regression functions have dependent, constant and independent variable, thus the t statistics value obtained is compared with the critical value given at 1%, 5% and 10% and those indicated in the row given as $M=3$. The t statistics values are greater than the critical values at 5% and 10%. The P-values are also less than the 1% that means it is significant, so the null hypothesis of no co-integration is rejected for the entire model.

The evidence of co-integration by both methods indicates the existence of long run relationship among the variables. Therefore, coffee export, oilseed export, pulse export, labor force, gross domestic capital formation, real exchange rate and consumer price index proxy to inflation are long-run determinants of economic growth in Ethiopia.

4.4 Results of Long run relationship

After determining the order of integration and proving the existence of co-integration among the variables, then the model can be predicted. Therefore, the long run parameters were determined by applying long run model stated in equation four. The result is given in table 8.

Table 8: Long run relationship between agricultural export and economic growth

Dependent:	Coef.	Std. Err.	T	P>t
lnRGDP				
_cons	8.450	0.289	29.20	0.000***
lnLF	0.157	0.042	3.72	0.001***
lnCA	0.190	0.133	1.42	0.164
lnRER	0.153	0.032	4.75	0.000***
lnCPI	-0.061	0.039	-1.54	0.134
lnCOFX	0.069	0.024	2.89	0.007***
lnOLX	0.091	0.015	5.96	0.000***
lnPUX	0.015	0.014	1.02	0.316

***significant at 1%

Adj. R squared=0.7234

DW statistics=1.715876

Results in Table 8, show that the significant variables were $\ln LF$, $\ln RER$, $\ln COFX$, and $\ln OLX$ at 1% level of significance and $\ln CA$ and $\ln CPI$ are not significant. The adjusted R square is high (about 72 percent). This means that the dependent variable was explained by independent variables around 72 percent. There is a positive significant relationship between the dependent variable $\ln RGDP$ and four independent variables $\ln COFX$, $\ln OLX$, $\ln LF$ and $\ln RER$. This means that if one of these independent variables increases, the dependent variable will also increase and vice versa.

4.4.1 Impact of coffee exports on economic growth

The findings in Table 10 reveal that coffee export ($\ln COFX$) has a positive and significant effect on economic growth in Ethiopia indicating a 1 percent increase in coffee export resulted in increase of economic growth by 0.0692 percent and stands less elastic. This result suggests the importance of coffee for Ethiopian economy. Being the principal cash crop, coffee is the oldest and the most highly marketed commodities. Coffee has been exported from Ethiopia (the oldest exporter of coffee as a commodity in the world) for more than 1500 years (ECX, 2008).

Coffee production overlaps with many biologically richest regions of the world. Given the right conditions, coffee production can be both economically and ecologically beneficial. Originally, coffee farming was done in shade of trees, which provided natural habitat for many animals and insects. In Ethiopia coffee produced in 4 ways; forest coffee, semi-forest coffee, garden coffee, and plantation coffee where forest coffee accounts for about 10 percent, semi forest coffee for about 35 percent, garden coffee for about 35 percent, and plantation for about 20 percent (5 percent government, 15 percent private) of total coffee production in Ethiopia (ECX, 2008).

The government of Ethiopia has given high priority for coffee production and export by providing extension service to advise the small holder farmers on how to increase productivity. Commercial farms are encouraged to participate in the growing of coffee through provision of different incentives like land, and income tax exemption among others. Likewise exporters of coffee are given different incentives to encourage them to export high quantity of coffee on time. These include export trade duty scheme, duty draw-back scheme, voucher scheme, bonded manufacturing warehouse, export credit guarantee scheme and foreign exchange retention scheme. These different measures taken by government have improved the production of coffee and export level in Ethiopia (Yishak, 2009).

According to Paulo (2000), during the second half of the nineteenth century up to the world economic crisis of the 1930s, the coffee sector played an important role in many countries such as Brazil, Colombia, Costa Rica, and a bit later and to a lesser degree in other countries in South and Central America. Similarly Naula *et al.* (2013) points out the positive and significant effect of coffee export on economic growth of Cameroon.

4.4.2 Impact of oilseed exports on economic growth

The Oilseed export (lnOLX) result from table 10 reveals that oilseed export has a positive and significant effect on economic growth of Ethiopia indicating a 1 percent increase in oilseed export results in 0.091 percent increase in economic growth and stands less elastic. Ethiopia has been significantly increasing its supply to world markets which 90 percent being sesame seed. The main importers of Ethiopian Sesame are China, Israel, and Turkey (Wijnands, 2007).

In the long term, there is high potential for increasing the export of oilseed, especially sesame seed to the European market. Europe is a major user of sesame seed for bakery applications and confectioneries. Currently, the main suppliers to European Union countries are India and Sudan. Like China, India could well reduce its sesame supply to the world market as it focuses increasingly on industrialization instead of agriculture. Therefore, the European market presents Ethiopia with a good opportunity to complement existing suppliers and even replace them should their supply decline. The only requirement Ethiopian farmers and traders need to meet is to adequately prevent the adulteration of seeds (Wijnands, 2007). Growth and improvement of the oilseed sector can substantially contribute to the economic development at national, regional and family level. Oilseeds are considered as a high value export product by the Ethiopian government and enhance it by investment incentives such as duty and tax exemptions for foreign investments (EIA, 2013).

The Ethiopian government has indicated that the oilseeds sesame seed, niger seed, and sunflower seed are high-priority export crops. Since these oilseeds are an export-oriented product, there is a small degree of local consumption. Though, the production of oilseed in Ethiopia is dominated by smallholder farmers, it is also cultivated by some commercial farms which can enhance the production level (PCI, 2013).

4.4.3 Impact of pulse exports on economic growth

In case of Pulses export (lnPUX) finding from table 10 reveal that pulse export has a positive but insignificant effect on economic growth in the long run in Ethiopia. The factors

that contribute to the insignificant impact of pulse export on economic growth of the country are: First, productivity is below potential due to: low input usage, especially chemical fertilizers capable of increasing yields in field trials by 10 to 80 percent; limited availability of seed and limited familiarity with the variety of existing pulse types, and; limited usage of modern agronomic practices.

The current limited use of chemical fertilizers on pulses is due to: lack of awareness of the benefits of fertilizer; limited access to credit; and the lack of phosphate fertilizers imported into Ethiopia. In many of the rural areas, the majority of the farmers mistakenly thought that pulses did not need chemical fertilizers. Agronomic practices such as the timing of plowing, crop rotation, weeding and harvesting and lack of diversification from cereals to pulse are critical things which can result in limited productivity (Shahidur *et al.* 2010). Although the availability of pulses have never been in surplus in the subsistence farming community, recently it is observed that the production and supply of some pulses is increasing due to the demand increase both in local and international markets (ECX, 2010).

Secondly, high level of local consumption, fluctuating and low level of international price. Export can be unprofitable if domestic prices are relatively higher than the international prices. Domestic prices rose much faster than international prices in the boom, while in the decline, world pulse prices fell more sharply than domestic prices. The implication is that price increases in local markets made exporting pulses less attractive. Therefore, much of the pulse production in Ethiopia (65 to 90 percent) is consumed on-farm, and only the remainder is marketed, demonstrating that smallholder farmers primarily produce pulses for subsistence needs, and the income benefit may not be realized (Shahidur *et al.*, 2010).

Thirdly, while there has been substantial growth in recent years, the current export market is underdeveloped because of complex marketing chain which can reduce the quality of the product. Quality is an important parameter that determines both the price and volume of pulse exports. Exporters estimate that they reject 10 to 25 percent of produce due to quality standards, which impacts directly on farmers' earnings and indirectly economic growth. The pulses being exported raw without value addition through processing, reduce the exchange value (Shahidur *et al.* 2010).

4.4.4 Impact of Labor force (LLF) on economic growth

The long-run result showed that, labor force (lnLF) directly influence economic growth. The relationship is positive and highly significant. The result of the labor force (lnLF) indicates that economic growth increases by about 0.157605 percent in the long run

due to an addition of one percent in labor force. This means that labor force expansion and economic growth in this study moves in the same directions. The study reports the less share of capital in economic growth as compared with labor's share in growth. The reason may be that Ethiopia is the second densely populated country in Africa and labor force is constantly and consistently growing. Human capital is growing due to expanding education, skill and training facilities and provision of better health facilities even in rural or backward areas of the country. Besides these, investment in education and health has increased in private sector as well as by the government. Therefore, Human capital is considered as the primary source of economic growth. This is supported by Gemechu G.(2002) and Shewengizawu H. (2003) who has previously looked at exports and economic growth in Ethiopia and the role of diversification in reducing impacts of export instability on Ethiopian economic growth by including labor force as independent variable in their model. Muhammad (2012) used labor as one of the independent variable in his model and found relationship between labor and GDP not only positive but more elastic in Pakistan economy. Noula (2014) who have looked at the relationship between labor force expansion and economic growth in Cameroon confirmed that one of the sources of economic growth in Cameroon is from an active labor force.

4.4.5 Impact of gross domestic fixed capital formation (lnCA) on economic growth

The gross domestic fixed capital formation (lnCA) proxy for investment has positive sign and statistically insignificant in explaining the economic growth in the long run. The positive sign indicate the direct relationship between capital and economic growth by confirming the theory mentioned in theoretical framework. The insignificance condition of the capital is indicating low level of investment and low capital intensive economy of Ethiopia. The country follows agricultural led industrialization economic policy where agriculture is bridge to manufacturing sector and the manufacturing sector is also concentrate on labor intensive than capital intensive to avoid unemployment since the country have high level of human resource .This result is in line with Muhammed (2015), Gemechu (2002) and Kagnew (2007) who looked at the Agricultural export and economic growth in Pakistan and export performance and stability in Ethiopia.

4.4.6 Impact of Real exchange rate (lnRER) on economic growth

Real exchange rate has positive sign and is statistically significant in explaining the economic growth in the long run. Increase /appreciation/ of real exchange rate by 1 percent

increases economic growth by 0.1535 percent. The finding suggests the need to shift in the structure of both production and trade towards products with demand elastic and high value added products since the relationship found is inelastic. This result is in line with the work of Fentahun (2011) and Kagnev (2007) who has previously looked at the impact of real exchange rate on economic growth of Ethiopia and the Export performance and economic growth in Ethiopia respectively.

4.4.7 Impact of consumer price Index (lnCPI) on economic growth

The study has found an inverse relationship between growth and inflation (lnCPI). Increases of inflation by 1 percent decreases economic growth by -0.06. The coefficient of lnCPI is negative (-0.06) and insignificant. This result is confirming the negative relation between growth and inflation rate. Therefore economic growth can be facilitated even by lowering moderate inflation. This result is supported by Ghosh and Phillips (1998), Christoffersen and Doyle (1998), Khan and Senhadji (2001), Gokal and Hanif (2004) and Noula (2014) who have previously examined the relationship between inflation and economic growth and found the inverse relationship between them.

4.5 Post-estimation diagnostic tests for long-run relationship model

4.5.1 Autocorrelation test

Autocorrelation refers to the existence of a relationship between error terms across observations of a time series. Error covariances are therefore different from zero. This constitutes a violation to one of the assumptions of the classical linear model. Autocorrelation is manifested by OLS estimators which are not BLU (Best linear unbiased). In this study, auto correlation was tested using the Breusch-Godfrey serial correlation LM test. The Durbin-Watson test is not used because it is biased. The decision rule is to accept null hypothesis of no autocorrelation among the error term across the observation of time series if the probabilities of the F-statistics of the intermediary equation are greater than 0.05, which depict the absence of auto correlation. On the other hand, Alternative hypothesis of autocorrelation among the error term of the observation is not rejected if the probabilities of the F-statistic of the intermediary equation are lesser than 0.05. The test results are shown on table 9.

Table 9: Autocorrelation test result

Breusch-Godfrey for autocorrelation LM test

H0: No serial correlation

F-statistics	Df	Prob> F
1.716	(1,32)	0.2002

From the test results presented on table 9, the probabilities of the F-statistic (0.2002) are greater than 0.05. Therefore, H₀ is not rejected, meaning autocorrelation is absent.

4.5.2 Heteroskedasticity test

In order to ensure that the residuals are randomly dispersed throughout the range of the independent variable, Heteroskedasticity test was used. The variance of the error should therefore be constant for all values of the independent variable. In the presence of Heteroskedasticity, the distributions of the OLS parameters are no longer normal. Heteroskedasticity is tested in this study using the Breusch-Pagan-Godfrey test. The decision rule is to reject the null hypothesis if the probability of the F-statistic and observed R^2 are less than 0.05, meaning Heteroskedasticity is present. On the other hand, if the probability of the F-statistic and observed R^2 are greater than 0.05, the null hypothesis is not rejected, implying that there is no Heteroskedasticity. As such, errors are homoscedastic. The test results are shown on table 10:

Table 10: Heteroskedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

H₀: Constant variance

F-statistic	1.49Prob F(7,33)	0.2046
Obs*R-squared	9.85Prob chi2(7)	0.1970

From the test results presented on table 10, both the probabilities of F-statistic (0.2046) and the R-squared (0.1970) are greater than 0.05 indicating the absence of Heteroskedasticity. Therefore, the errors are homoscedastic.

4.5.3 Misspecification test

In regression analysis, specification is the process of developing a regression model. This process consists of selecting an appropriate functional form for the model and choosing which variables to include. Therefore misspecification can occur because of omitting influential or including non-influential explanatory variables, improper functional form and measurement errors.

Omitting influential variables from a regression model causes these variables to become part of the error term. Therefore one or more of the assumptions of the Classical Linear Regression Model (CLRM) will be violated, and including non-influential explanatory variables, since the variable does not belong to the correct model, its population coefficient should be equal to zero and none of the CLRM assumption is violated and OLS estimators are both unbiased and consistent. However, it is unlikely that they are efficient and if the added variable is correlated with other variable which is already in the model, unnecessary element of multicollinearity will be introduced. The Ramsey RESET test of misspecification was applied. The test results are shown on table 11.

Table 11: Misspecification Test

Ramsey RESET test of misspecification

H0: correct specification

F-statistics	Prob> F	F-critical
F(3, 30) = 6.29	0.0019	7.05

From the test results presented on table 11, the F-statistic (6.29) are less than the critical F value (7.05) indicating the absence of misspecification. Therefore, we fail to reject the null hypothesis since it carries the correct specification. Therefore the long run results were favorable in all tests and thus useful for analyses and forecasting.

4.6 Results of the Error Correction Model

The error correction coefficient tells us the speed at which our model returns to equilibrium after an exogenous shock. As a result, the error correction term should be negatively signed to indicate a move towards long run equilibrium. The coefficient of error term α in equation 17 means that the system corrects its previous period dis-equilibrium at

speed of α present yearly, because our data is yearly data. The sign of α should be negative and significant to indicate the validity of long run equilibrium relationship of the model. A positive sign indicates a move away from equilibrium. The coefficient should lie between 0 and 1, 0 suggests no adjustment one time period later, while 1 indicates full adjustment. The result of the error correction term is presented in table 12 with corresponding short run coefficients of the variables using equation 17.

Table 11: Results of Error Correction Model

Dependent variable:D (lnRGDP)	Coef.	Std. Err.	t	P>t
_cons	0.013	0.017	0.71	0.480
ΔlnLF	0.149	0.038	3.91	0.000***
ΔlnCA	0.192	0.367	0.52	0.606
ΔlnRER	0.151	0.054	2.77	0.009***
ΔlnCPI	-0.046	0.033	-1.41	0.168
ΔlnCOFX	0.061	0.022	2.78	0.009***
ΔlnOLX	0.043	0.020	2.12	0.042**
ΔlnPUX	-0.009	0.010	-0.97	0.340
ECM_(t-1)	-0.566	0.151	-3.74	0.001***

***significant at 1%,** significant at 5%

Adjusted R-squared = 0.4849

F-statistic (8, 31) = 5.59

Prob(F-statistic) = 0.0002

Durbin-Watson stat =1.610716

In table 12, it can be deduced that both dependent and independent variables are stationary at first difference. This is because the coefficient of the error correction term is negative, less than one (-0.566) and highly significant at 1%. The results of the entire model in the short run reveal that the exogenous variables did not all have the expected signs. The variables of interest, coffee export and oilseed export have a positive effect on economic growth and significant at 1% and 5% level. Pulse export has a negative effect on economic

growth, which contradicts what was expected. Labor force growth and real exchange rate has positive and significant effect on growth which is in line with what is expected.

The coefficient of the ECT is, -0.57 is highly significant at 1% percent and has the appropriate negative sign. Thus, it will rightly act to correct any shocks from the long-run equilibrium up to the tune of 57 percent. This significant value of the ECM explains the existence of long-run equilibrium relationship between agricultural export and economic growth in Ethiopia. This established long-run equilibrium relationship in the result reveals that the findings can be used for forecasting and policy recommendations. Analysis of autocorrelation and Heteroskedasticity test were carried out in order to confirm appropriateness of the short run ECM.

4.6.1 Post-estimation diagnostic tests for ECM

Table 12: Autocorrelation test result for ECM

Breusch-Godfrey for autocorrelation LM test

H0: No serial correlation

F-statistics	Df	Prob> F
2.246	(1,30)	0.1239

From Table 13, the probabilities of F-statistic are greater than 0.05, confirming the absence of autocorrelation. The test for Heteroskedasticity was also conducted using the Breusch-Pagan-Godfrey Test. The following results were obtained.

Table 13: Heteroskedasticity test for ECM

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Ho: Constant variance

F-statistic	0.21Prob> F	0.6506
Obs*R-squared	0.22Prob> chi2	0.6404

Results in Table 14, indicate the absence of Heteroskedasticity since the probabilities of both F-statistic and R-squared are greater than 0.05. Thus, the errors from the ECM are homoscedastic. Therefore, the ECM is void of autocorrelation and Heteroskedasticity.

4.7 Granger causality test between economic growth and agricultural exports

The finding of stationarity of the variables and co integration between Agricultural exports and gross domestic product immediately implies that there is long-run causality in at least one direction (Granger 1988), either from Agricultural exports to gross domestic product or vice versa. Therefore, it would be useful to test long-run non-causality if co integration is found. The result of the long run causality between Agricultural (coffee, oilseed and pulse) exports and economic growth is presented in table 15.

Table 14: Long run causality test

Sample: 1973 – 2013

Null hypothesis	F-statistics	P-value
lnCOFX does not granger cause lnRGDP	9.024	0.028 **
lnRGDP does not granger cause lnCOFX	7.457	0.039**
lnOLX does not granger cause lnRGDP	10.07	0.023**
lnRGDP does not granger cause lnOLX	33.89	0.002***
lnPUX does not granger cause lnRGDP	9.812	0.024**
lnRGDP does not granger cause lnPUX	0.771	0.473

***significant at 1%,** significant at 5%

The causal relationship between Agricultural exports and economic growth of the country was analyzed with the application of Granger (1969) causality test. Table (14) indicates both the null hypothesis that coffee export and oilseed exports does not Granger causes economic growth and economic growth does not Granger cause coffee and oilseed exports are rejected. While the null hypothesis that economic growth does not Granger causes pulses export is not rejected and the null hypothesis that pulses export does not granger cause economic growth is rejected. These results provide evidence of bi-directional causality between coffee exports and economic growth as well as oilseed export and economic growth running in both directions. Whereas unidirectional causality between pulses exports and economic growth running from pulse export to economic growth. The result implies that agricultural export growth causes economic growth and *vice versa* in case of coffee and oilseed exports. These results provide evidence in support of the export-led growth hypothesis and as well as the existence of reverse causality. Agricultural exports growth is one of the fundamental reasons for economic growth in Ethiopia and economic growth also cause agricultural exports to grow. Therefore effort should be direct towards policies that will

enhance economic growth (GDP) such as improvement of human capital, labour force skills, investment, import substitution and technological development which will prepare required facility background for more quality and value added agricultural exports. The findings also suggest that there is a need to promote value added agricultural export expansion policies in order to achieve high economic growth.

CHAPTER FIVE

CONCLUSSION AND POLICY RECOMMENDATIONS

This chapter provides the conclusions of the study and some policy recommendations which need to be applied in order to increase the agricultural exports efficiency level. A section for suggestions for further study is also given.

5.1. Conclusions

The main objective of this study was to empirically determine the contribution and impact of agricultural export on economic growth of Ethiopia using annual data for the period 1973 to 2013. Descriptive and time series techniques were used to determine the trends of agricultural exports and to evaluate the impact of agricultural exports on economic growth (GDP) respectively. These are Unit root tests (ADF and PP tests), a co-integration test (Johansen's procedure and Engle and Granger) to know the existence of long-run relationships between economic growth and agricultural exports, Error correction method and Granger-causality tests, the Breusch-Pagan-Godfrey Heteroskedasticity test, the Breusch-Godfrey Serial Correlation LM Test and Ramsey RESET test of misspecification was used to test for appropriateness of the estimations in order to avoid any spurious regression.

The results of the unit roots test indicated that all the variables are stationary in first differences-I (1), therefore, I(1) series were adopted to test for co-integration and causality between real GDP and agricultural exports. The co-integration tests results showed that the long-run relationships exist between the GDP and agricultural exports and in its set up, error correction method estimates the long-run relationship between economic growth and agricultural export as well as fluctuation in the short-run.

Agricultural exports trends in Ethiopia have shown increasing patterns over time. The results of the long run showed a positive and significant association between coffee export and economic growth. Equally a positive and significant effect is found between oilseed export and economic growth in Ethiopia and a positive but insignificant relationship is found between pulse export and economic growth. As concerns the control variables, Labor force has a positive and significant impact on economic growth. It is equally revealed that real exchange rate has a positive and significant effect on real GDP. The result of error correction mechanism shows the fair speed of adjustment for the short run disequilibrium which is 57 percent and the corresponding short run coefficient of the variables revealed the positive and significant relationship between coffee export, oilseed export, whereas negative and insignificant relation between pulse export and economic growth was observed. The fairly

speed of adjustment could be related to the emphasis given to the export growth and expansion policies by government and other favourable conditions.

Finally, Granger causality of coffee and oilseed exports and economic growth is bi-directional running in both directions. Whereas uni-directional causality was suggested between pulses export and economic growth since the coefficients are not statistically significant in pulses regressions. The results are indicating a need to promote value added agricultural export expansion policies in order to achieve high economic growth.

5.2. Recommendations

The immediate policy recommendation that emerges from this study is that the government in power should attempt to diversify and promote exports in order to fully exploit the benefits of the sector and promote economic growth.

To increase the impact of coffee export on economic growth, a concerted effort should be directed toward productive channels of coffee in the economy so as to enhance sustainable economic growth through increased coffee export. Modern production technologies of coffee must be quickly introduced to upgrade the traditional methods currently used and Encouraging large commercial farms through providing new potential land and enforcing the implementation of different export incentives given for the exporters. Government should emphasize towards value addition than exporting raw coffee since the relationship with economic growth is inelastic.

The impact of oilseed export on economic growth of Ethiopia will increase if the government concentrates towards the productive channels and value addition to the product to increase the export effect on economic growth. Since the impact of this product is inelastic to economic growth, the government should emphasize on facilitating the ground for value addition on oilseed rather than exporting raw product and emphasize towards awareness creation on how to adequately prevent the adulteration of seeds.

Although pulse exports indicated insignificant effect on economic growth of Ethiopia, a concerted effort should be directed toward productive channels of pulses to fulfill the high domestic consumption and promising international demand of the crop. The government should concentrate on the area of encouraging large farms and create awareness on fertilizer and pesticides use by farmers since they neglected the use of fertilizer for pulse production unknowingly to increase output.

With the bidirectional relationship between economic growth and coffee and oilseed exports, the government should increase the growth of non-exportable goods and services to

increase the economic growth which contributes towards agricultural export growth. The findings also suggest that there is a need to promote value added agricultural export expansion policies in order to achieve high economic growth.

Generally, the government of Ethiopia should improve resources and development investment in agricultural research and extension services in order to improve the use of genetic materials and purchase inputs.

5.3 Areas for further research

This study could not exhaust all aspects of agricultural export, in relation to the national and the regional level in Ethiopia. For example, looking at the contribution of other agricultural exports other than the ones examined in this study. Furthermore, issues on the effect of non-agricultural export to economic growth are not discussed. Since it is clear from this study that agricultural export contributes to economic growth, the direct contribution of primary commodity export on economic growth needs to be assessed in terms of scope and degree of impact.

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APPENDICES

APPENDICE A: Davidson and MacKinnon (1993) Generated the Correct Critical Value for Co-integration Test-Engle-Granger Approach

Asymptotic critical values for co-integration tested

	1%	5%	10%
M=2			
Constant	-3.90	-3.34	-3.04
Constant + trend	-4.32	-3.78	-3.50
M=3			
Constant	-4.29	-3.74	-3.45
Constant + trend	-4.66	-4.12	-3.84
M=4			
Constant	-4.64	-4.10	-3.81
Constant + trend	-4.97	-4.43	-4.15
M=5			
Constant	-4.96	-4.42	-4.13
Constant + trend	-5.25	4.72	-4.43
M=6			
Constant	-5.25	-4.71	-4.42
Constant + trend	5.52	-4.98	-4.70

Source: Davidson and Mackinnon, 1993. Table 20.2.p.722

APPENDICE B: Quantity of agricultural exports (coffee, oilseed and pulse) in metric tons with their corresponding unit value birr/kg from 1984-2009

Year	COFX		OLX		PUX	
	Vol.	Unit.va	Vol.	Unit va.	Vol.	Unit va.
1984	73834	6.32	12466	1.25	19953	0.85
1985	69999	9.50	5630	1.37	7550	1.67
1986	80216	6.54	8219	1.19	4427	1.92
1987	71165	6.17	17821	1.24	12499	1.29
1988	92141	6.80	5390	2.05	11943	1.37
1989	88916	4.56	6941	1.21	23354	1.54
1990	58232	4.61	2558	1.42	14759	1.06
1991	32249	5.22	176	2.18	1398	0.28
1992	67374.5	8.0	392.0	3.0	1527.0	2.7
1993	69160.0	10.4	10188.0	4.3	9840.0	2.8
1994	82198.6	21.9	12132.4	4.1	25782.6	4.0
1995	97578.8	17.7	7831.7	5.4	28968.7	2.7
1996	123165.5	18.7	14069.3	5.3	30468.2	2.9
1997	120049.6	24.1	66553.7	4.7	30909.0	3.3
1998	101232.3	20.9	51366.3	5.3	29832.6	3.4
1999	116558.4	18.3	43130.8	5.9	23527.3	3.4
2000	99134.0	15.3	55051.4	4.9	26861.2	2.7
2001	110346.9	12.6	76604.4	3.6	109227.5	2.6

2002	126127.6	11.3	82801.2	4.8	66154.4	2.6
2003	156408.6	12.3	105945.5	6.7	73279.8	2.7
2004	161060.6	18.0	170797.6	6.3	121653.0	2.5
2005	147725.0	20.8	265649.0	6.9	110437.7	2.9
2006	176438.0	21.2	234976.1	7.0	158751.8	3.9
2007	170741.2	28.7	152091.1	13.4	233021.0	5.7
2008	133997.7	29.3	286986.6	13.3	137968.7	6.9
2009	172217.2	40.1	298998.1	15.6	225663.0	7.4

Source:ERCA

APPENDICE C: The value of real gross domestic product and agricultural exports from 1973-2013 in thousand birr

Year	RGDP	COFX	OLX	PUX
1973	96432	147369	76578	51749
1974	97651	152679	83985	64855
1975	98835	324637	31242	55872
1976	99589	519302	17505	43346
1977	99233	505298	12245	17303
1978	102859	592647	9270	22472
1979	108023	563649	15492	23802
1980	108920	469861	28904	25050
1981	109170	511538	24749	36568
1982	120202	495873	15349	28790
1983	111616	590445	27859	20263
1984	101803	466269	15640	16875
1985	111910	664790	7686	12635
1986	126611	524348	9793	8481
1987	125936	439181	22015	16093
1988	126868	626448	11029	16317
1989	132336	405103	8387	35961
1990	128347	268451	3633	15716
1991	125406	168324	383	386

1992	139412	536982	1186	4050
1993	139480	718019	44187	27704
1994	147455	1799034	50130	103287
1995	162373	1724008	41938	77224
1996	169247	2307394	74239	87854
1997	167917	2889531	314660	102953
1998	178513	2112713	271462	101658
1999	184625	2133646	255329	80021
2000	198321	1520101	269598	72800
2001	201561	1393809	278738	281409
2002	197331	1418324	395565	171244
2003	220477	1926679	712738	194679
2004	248355	2901327	1082215	306609
2005	277013	3076494	1835270	320969
2006	309687	3741745	1654707	619560
2007	344332	4897344	2037090	1333631
2008	378907	3932229	3819429	946826
2009	418947	6913380	4670849	1677731
2010	466215	13617880	5282979	2232692
2011	517027	144248	817411	176265
2012	567803	135699	798094	323663
2013	626557	137081	124772	479044

Source: National Bank of Ethiopia (NBE)

APPENDICE E: Result of Testing Granger Causality between Economic growth and all independent variables

Sample: 1973-2013

Null-hyphotesis	F-statistics	P-value
lnLF does not granger cause lnRGDP	31.975	0.0027***
lnRGDP does not granger cause lnLF	16.334	0.0096***
lnCA does not granger cause lnRGDP	2.4742	0.1077
lnRGDP does not granger cause lnCA	55.366	0.0009***
lnRER does not granger cause lnRGDP	9.5667	0.0252**
lnRGDP does not granger cause lnRER	12.556	0.0155**
lnCPI does not granger cause lnRGDP	.19453	0.8982
lnRGDP does not granger cause lnCPI	1.6919	0.2177
lnCOFX does not granger cause lnRGDP	9.0243	0.0279**
lnRGDP does not granger cause lnCOFX	7.4573	0.0386**
lnOLX does not granger cause lnRGDP	10.069	0.0230**
lnRGDP does not granger cause lnOLX	33.895	0.0024***
LnPUX does not granger cause lnRGDP	9.812	0.0241**
LnRGDP does not granger cause lnPUX	0.77095	0.4737

***significant at 1%, ** significant at 5%

Source: Author calculation on data from NBE from 1973-2013

APPENDICE F: Graphical representations of non-stationary variables at level form

I(0)



Source: Model output

APPENDICE G: Graphical representations of stationary variables at first difference

I(1)



Source: Model output