

WOLKITE UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

THE NEXUS BETWEEN COFFEE EXPORTAND ECONOMIC GROWTH IN ETHIOPIA: EMPERICAL ANALYSIS

A THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS, COLLEGE OF BUSINESS AND ECONOMICS, SCHOOL OF GRADUATE STUDIES WOLKITE UNIVERSITY IN PARTIALS FULFILLMENT OF THE REQUIREMENTS FOR MASTER OF DEGREE IN ECONOMICS (MAJOR IN DEVELOPMENT ECONOMICS)

JUNE, 2019

WOLKITE, ETHIOPIA

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Declaration

I, AHMYE DEREJE, declare that this thesis entitled: “The nexus between Coffee Exports and Economic Growth in Ethiopia” is outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged.

To the best of my knowledge, this study has not been submitted for any degree in this University or any other University. It is offered for the partial fulfillment of the degree of Masters of Development Economics.

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Date----------

Advisors' Approval Sheet

This is to certify that the thesis entitled "The nexus between Coffee Exports and Economic Growth in Ethiopia, Empirical Analysis "submitted in partial fulfillment of the requirements for the degree of Master's in economics with specialization in Developmental economics, the Graduate Program of the Department/School of Economics, and has been carried out by Id. No 119/09, under my/our supervision. To the best of my knowledge, is an original work and not submitted earlier for any degree either at this University or any other University.

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We, the undersigned, members of the Board of Examiners of the final open defense by AHMYE DEREJE have read and evaluated his/her thesis entitled "The nexus between Coffee Exports and Economic Growth in Ethiopia", and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree. of Master in Developmental Economics.

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Name of Internal Examiner---------- Signature--------- Date------

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SGS Approval ----------Signature----------Date------

Final approval and acceptance of the thesis is contingent upon the submission of the final copy of the thesis to the School of Graduate Studies (SGS) through the Department/School Graduate Committee (DGC/SGC) of the candidate's department.

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Table of Contents

Declaration i
Advisors' Approval Sheet ii
Examiners' Approval Sheet iii
Acknowledgements iv
Table Of Contents v
Acronyms And Abbreviation viii
Abstract ix
Chapter One 1
Introduction 1
1.1 Background Of The Study 1
1.2 Statement Of The Problem 3
1.3. Research Questions 5
1.4 Objective Of The Study 6
1.4.2. Specific Objective 6
1.5 Hypothesis Of The Study 6
1.6 Significant Of The Study 7
1.8 Limitation Of The Study 7
1.9. Definition Of Terms 8
1.10 Organization Of The Paper 8
Chapter Two 9
Literature Review 9
Introduction 9
2.1. Concept And Definitions Of Coffee 9
2.1.1 Coffee In Ethiopia 9
2.2 Theoretical And Literature Review 10
2.2.1 Theoretical Review On Coffee Exports 11
2.2.2 Coffee Export Performance 12
2.2.3coffee Export Marketing Strategy 13
2.2.4 Coffee Product Adaptation 13
2.2.5 Coffee Price Adaptation 14
2.2.6 Coffee Promotion Adaptation 14
2.2.7 Coffee Distribution Adaptation 14
2.3 Theoretical Review On Economic Growth 15
2.4. Empirical Review On Coffee Export 19

Table of Contents

2.5. Conceptual Framework 23
Chapter Three 24
Methodologyand Data Description 24
3.1 Descriptionof The Study Area 24
3.2 Methods Of Data Collection 24
3.3 Definitions Of The Variables 24
3.4. Methods Of Data Analysis 25
3.4.1 Model Specification 26
3.5 Econometrics Analysis 27
3.5.1unit Root Test 29
3.6 Optimal Lag Length Selection 31
3.7 Co-Integration Test 32
3.7.1 Engle Granger Method 33
3.7.2 Phillips Ouliaris Method 34
3.7.3 Johansen's Method 35
3.8 Vector Error Correction Model 37
3.9 Granger Causality Test 40
3.10 Test Of Volatility 42
Chapter Four 44
Results And Discussions 44
4.1 Trend In Coffee Exports In Ethiopia 44
4.2 Trend In Pulses Exports In Ethiopia 45
4.3. Descriptive Analysis Of The Data 46
4.4 Econometrics Analysis 46
4.4 .1 Unit Root Test And Order Of Integration 46
4.4.2 Laglength Selection Criteria 48
4.5 Diagnostictests 50
4.5.1 Serial Correlation 50
4.5.2 Normality Test 50
4.5.3 Hetroscedasticity 51
4.5.4 Test Stability 51
4.6 Vector Error Correction Model 52
4.6.1 Long Run Vector Error Correction Equation 54
4.6.2 Short Run Vector Error Correction Equation 55
4.7 Granger Causality Test 55

Table of Contents

4.8 Test of Volatility: Impulse Response and Variance Decomposition 56
4.8.1 Impulse Response Of Vem 57
4.8.2 Variance Decomposition Of Vem 58
Chapter Five 59
Conclusion And Policy Recommendations 59
5.1 Summary 59
5.2 Conclusions 59
5.3 Recommendations 60
5.3 Areas For Further Research 61
Reference 62
Appendix 65

ACRONYMS AND ABBREVIATION

ADF	Augmented Dickey-Fuller.
CSA	Central Statistics Agency
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
MoFED	Ministry of Finance and Economic Development
MoARD	Ministry of Agriculture and Rural Development
MOT	Ministry of Trade
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
TSP	Trend Stationary Processes
DSP	Difference Stationary Processes
LAF	Labor Force
ECTA	Ethiopia coffee and tea authority
ECX	Ethiopia community exchange
CAP	Capital Formation
RGDP	Real Gross Domestic Product

ABSTRACT

The country has taken different measures to diversify and increase the contribution of coffee export to economic growth such as; export trade duty incentive scheme, export credit guarantees scheme and foreign exchange retention scheme to those wholly engaged in supplying their products to foreign markets. This paper investigated the relationship between coffee export and economic growth of Ethiopia, for the period 1974-2017G.C.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 relationship of coffee exports on economic growth of Ethiopia over the last forty-three years by looking at the existence of long run relationship between coffee export and economic growth. The speed of adjustment in the long run and the existence of causality between the coffee 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 has a positive and significant relationship with economic growth. On the other hand, the causality relationship found that there is uni-directional relationship between coffee export and economic growth that means coffee does granger cause of RGDP.

Finally, CUMSUM test confirms the long-run relationships between the variables and also shows the stability of the coefficients. Based on the findings, it is recommended that policies aimed at increasing the productivity and quality of this coffee production should be implemented. Also additional value should be added to them before exporting that means the roasted coffee and other things can be added. When this is done, it will lead to a higher rate of economic growth in Ethiopia.

Keywords: *RGDP, Coffee export, VECM, Granger causality, Impulse response, Variance decomposition, Ethiopia*

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The world trade was growing at an alarm rate. This stimulates the importance of exporting for coffee and countries. Global market rivalry, globalization processes, and the subsequent performance difficulties stimulated by exporters cause the increasing interest in this subject (Sousa et al., 2008). An ultimate strategy of exporting is to ensure firm's survival or growth, and might attain competitive advantage in international markets with a positive influence on current and future performance of coffee export (Navarro et al., 2009). Therefore, many countries recently allocate more attention and resources in order to coffee export their products to foreign markets (Julian and O'Cass, 2003).

Coffee is one of the most important traded commodities in the world. The sector's trade structure and performance have large development and poverty implications, given the high concentration of production by small-holders in poor developing countries. Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries (Ponte 2002; Daviron and Ponte 2005). There is a growing willingness-to-pay for premium, high quality coffee by rich consumers and the demand for specialty and certified coffee is on the rise.1 Moreover, international coffee markets have experienced significant price variation over the last decade prices were five times higher in 2011 than in 2002.

Most of developing Countries over the past two 10 years, have progressively increased their share in global trade from just under one quarter to about one third. Asia and particularly China account for most of the change that has been facilitated by diversification of coffee exports. While developing countries in Asia share in total world coffee exports increased from 11.7% in 1985 to 21.5% in 2005, the share of Africa decreased from 4.3% to 2.9% over the same period (Bacchetta, 2007).

Coffee producers in Africa accounted for about 12% of global supply and less than 11% of global exports of the product for the 2009/10 season. These contributions to the global coffee market are almost equal to Indonesia's, the third largest world producer of the commodity. Notwithstanding the small contribution of African countries to the global coffee market, the commodity constitutes a large proportion of both GDP and exports share in some of the continent's small economies. For example, in Ethiopia and Rwanda, coffee exports generated about 26% and 22%, respectively, in export revenue in 2016. Particularly notable, coffee production is predominantly produced by small scale farmers who contribute more than 95% of total production in Ethiopia. Therefore, global coffee market conditions have important implications for growth and poverty reduction in the country.

Ethiopia, in 1983, for instance, the Provisional Government of Socialist Ethiopia stress that the basic constraints for Ethiopian coffee export include the little volume of exportable products, the limited degree of diversification of exports which are made up of mainly unprocessed primary products, common economic crisis which significantly reduce the demand and prices of primary products, etc. Owing to this policy shift, some progresses in coffee export performance (EP) have been registered. Trade statistics show that coffee export incomes have improved during the post reform period.
The 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,2017).

Ethiopia is the main producer and exporter of coffee in Africa which is grown mainly in four regions of the country; Oromiya, Southern Nation, Nationalities and People (SNNP) region, Amhara and Bishangulgumz nation in the South, West, North and North 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 are significant.

Coffee is Ethiopia's number one source of export revenue generating about 25-30 percent of the country's total export earnings. Ethiopian coffee production is predominantly characterized by traditional farm management system, limited use of fertilizers and pesticides coupled with a manual coffee cultivation system and drying method. In spite of these limitations, Ethiopia's coffee production in Marketing Year (MY) 2013/14 has marginally increased at a rate of 0.3 percent. Post also predicts coffee production in MY 2014/15 with increase slightly due to favorable rainfall during the *Bulg*rainy season (a short rainy season between mid-March and the end of May). During the current, Ethiopia exported large volumes of coffee. However, the larger export volume failed to generate a proportionate increase in foreign exchange earnings as a result of a decline in international coffee prices. The Government of Ethiopia recently announced a plan to restructure the coffee development sector by

designating a specialized institution that can provide technical support to the coffee value chain. *Chat* production continues to increase at the expense of coffee production.

According toexport trade of raw coffee to seller the coffee increasing value added. Foreign investors cannot be involved in export trade of these items from Ethiopia.Businesses that wish to export from Ethiopia should know the export procedures needed to obtain export permit by commercial banks; should prepare Application for Quality Testing and Certification to obtain Export Authorization Certificate from the Quality and Standards Authority of Ethiopia; should fill the Customs declaration. We have included all these export procedures in Ethiopia and also applied on goods exported from Ethiopia.

The major reason for low coffee export is that The Ethiopian coffee farm management system and agronomic practices are traditional and lack of new technologies into the country's coffee production system. Besides, extension services provided to small holder farmers are inadequate. In addition to this-, use of improved seeds as the supply of improved seed is only limited to areas located around coffee research stations in the country, Lack of designated government institution to technically support coffee production. In the old days, there used to be a designated specialized government agency supporting the production and marketing of coffee. This agency is dissolved many years ago leaving the sector with little institutional and technical support from the government.

The Government of Ethiopia has recently noted this problem and plans to restructure the coffee envelopment sector by a designating a specialized institution that can provide technical support to the coffee value chain. However, this specialized coffee institution has not yet materialized, in recent days, *Chat,* a plant chewed by humans for its stimulating effect, is competing for farm land with coffee. Some small holder coffee farmers resorted to producing *Chat* instead of coffee as they are increasingly attracted by the high prices and greater yield they get from the cultivation of *Chat*. A significant number of farmers particularly in the eastern part of the country have switched from coffee production to *Chat* production. This phenomenon has increased over the past year. The increased farmland competition from *Chat* is becoming more and more aggravated owing to the high demand as well as price of *Chat* in both the local and neighboring countries market. *Chat* is a drought, disease, and pest resistant plant which can be harvested three to four times a year and generates better income for farmers than other cash crops including coffee.

1.2 Statement of the Problem

Export plays a decisive role in the nation's economic growth and a mechanism to progress the current account of their balance of payments. Therefore, growing export coffee is the main macroeconomic

objectives of many nations both developed and developing country. Besides, coffee Export is also one of the components in the Aggregate Demand and thus low rate in exportation entails low level of income in terms of Gross Domestic Product. Even though all countries the types of land they have and implement strategies that target to increase coffee exports, empirical macro-economic data suggest that there has been little response in this area (Grenier, et al (2005). One important point that bear in mind that as a macro-economic variable and coffee export is performed under complex environment.

Most African countries produce Robusta coffee, with a few having a mix of both Robusta and Arabica varieties. Countries producing Arabica coffee, especially the Colombian Mild will have a windfall in export earnings, which may lead to increased investments to boost output.Coffee exports are valuable when customers started to pay good price for coffee but for further value in order that the coffee export deliver.

The Ethiopian government has given more emphasis to coffee export and economic growth to boost production and productivity of the coffee. Accordingly, different varieties were released by the national research system and disseminated to the beneficiaries with its coffee packages, and reported as they are under export (MoA, 2016). Following these efforts, the export and economic growth of coffee is steadily increasing over years, while the area allocated to coffee went constant.

As noted by (Calof, 1993),yet despite the importance of size as an influential variable, little consensus exists whether size has any significant effect on coffee export. Besides that, most of the studies that were conducted on coffee export were in developed countries. But, only a few studies conducted in developing countries with regard to coffee export issues (Calof&Viviers, 1995; Morrisey, 2005).

As noted by (Donkers, 2001), most of the researchers have used different variables in explaining the export performance to know the factors that affect coffee' export. For instance, many studies incorporated coffee export as influential variable and he used cross sectional data including other variables.

According to (ICO, 2013), we look at the structure and performance of the coffee export sector in Ethiopia. In 2012, Ethiopia exported 3.2 million bags, making it the most important African coffee exporter and the tenth largest exporter in the world. Its share of the international coffee trade that year was about 3 percent. Coffee is the most important export product of the country, accounting for about a quarter of the value of all exports in 2012.

(Tefera, 2013)Smallholder farmers produce 95 percent of coffee in Ethiopia's. It is produced under several types of production systems, including forest, semi-forest, garden, and plantation coffee (Tulu, 2008). Forest coffee is grown in the wild under natural forest cover and is gathered by farmers from

trees with minor tree maintenance. Semi-forest coffee is also grown in forest conditions, but there is some limited maintenance by farmers, mostly annual weeding.

At sea (CSA, 2013) Coffee is cultivated by over 4 million primarily smallholder farming households and, with those employed in ancillary activities to coffee production, even more households are dependent on coffee for part of their livelihoods (LMC, 2003). Furthermore, coffee plays an important role in social gatherings and is important in local consumption, as more than half of Ethiopia's coffee production is consumed locally (CSA, 2013).

The socio-economic features of the coffee growers notably, size of land holding and experience, presented in a country. It could have an important bearing on the production practices of the coffee growers. The average land holding size in respect of marginal, small, medium and large growers was important to identify the farmers across all the regions. According to the Ethiopia coffee and tea authority, in Ethiopia there are above 4.5 million hectare lands available to coffee production. But now time, ituses very small. They do not understand, how many hectares available in coffee production and how implementing the process.

There is a place of an economic environment that will support the production of a high value coffee. The marketing system is planning to install a differential local price so that incentives are given to produce high quality and quantity of coffee in our country. The policy will have the creation of grades and standards to implement the new price structure.

The problem among researchers on absence of consensus about what are the factors that determine coffee export. In most cases, the Ethiopian farmers produce coffee with limited knowledge and it affected the quality and productivity of coffee. The government gives more emphasis the export of raw coffee, but not gives emphasis for the production process and exporting processed coffee. The governments do not advertise in foreign market. Most literatures support that the above mentioned problems. Therefore, the different mixtures of empirical results suggest that related researches need to be conducted in developing countries for the purpose of contributing to the theoretical puzzle. This study, therefore, aims at filling up the gap by examining the factors that effect on coffee exporter which is found in Ethiopia.

1.3. Research Questions

- What is the trend of coffee exports with economic growth in Ethiopia?
- What are the long run relationships between coffee exports with economic growth?
- What is the short run relationship between coffee exports with economic growth?

- What is the causal relationship between the component of coffee export and economic growth in Ethiopia?

1.4 Objective of the Study

The general objective of this study is to examine the role of coffee exports in Ethiopian economy with reference to coffee

1.4.2. Specific Objective

The specific objectives are:

- To assess the trend of coffee exports with economic growth in Ethiopia
- To investigate empirically the long run relationship between coffee exports with economic growth
- To investigate empirically the short run relationship between coffee exports with economic growth
- To determine the existence of Granger causality between coffee exports and economic growth in Ethiopia

1.5 Hypothesis of the Study

As mentioned above, the main objective of this study is to examine the causal relationship between coffee export and economic growth in Ethiopia. Following the framework will present in the preceding section, the following groups of hypotheses will be tested. The study will focus on the nexus between economic growth and proxy determinants of coffee export.

For a hypothesis test, the researcher is usually interested only in the slope. The intercept is a necessary component of the regression line, telling where the line will be placed in the vertical direction. But there are relatively few examples of situations where the researcher must test for the significance of the intercept.

Ho: The value of coffee export asset in absolute term and as the ratio of real GDP, and coffee export will have no statistically significant effect on the economic growth of Ethiopia.

HA: The value of coffee export asset in absolute term and as the ratio of real GDP and coffee export will have statistically significant effect on the economic growth of Ethiopia.

Ho: The value of real GDP asset in absolute term and as the ratio of, coffee export and GDP will have no statistically significant effect on the coffee export of Ethiopia.

HA: The value of real GDP asset in absolute term and as the ratio of, coffee export and GDP will have statistically significant effect on the coffee export of Ethiopia.

1.6 Significant of the Study

The significance of this study is first to test the relationship between variables hypothesized and to have empirical knowledge with regard to the impact of coffee export and experience, Managerial International experience, Managerial education level, and Managerial commitment to exporting on Ethiopian coffee export performance.

Second, most of the theoretical development and empirical testing of theories in this field has been conducted in developing country contexts. This study fills a much needed gap in the literature with empirical findings concerning coffee export behavior of developing country.

Third, this study will deliver a guideline for coffee exporting, how they can benefit from the overall exporting activities by improving a general knowledge towards the coffee export market strategy, building their knowledge and enhancing commitment to exporting for better success in their international operations.

Finally, this study will advance in public policy issues relating to exporting by providing some guidelines to policy makers for the purpose of designing and aiming the activities that enhance the coffee export operations successfully and effectively.

1.7 Scope of the Study

This study assessed the contribution and nexus of coffee exports on economic growth in Ethiopia by using yearly total exports data from 1974/75-2016/2017. Though Ethiopia exports more than 8 commodities (products) including non-agricultural products, the study is limited to coffee. The selection of these items is based on being the one 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.

1.8 Limitation of the Study

Because of time and financial constraints, the area coverage of this study will be delimited to coffee exporters that exist in Ethiopia.

Even if there are different internal and external quantitative and qualitative factors that might affect coffee export performance, the limited of this study on the above mentioned main explanatory variables. This is because of the following reasons: First, with regard to qualitative factors, it is difficult to formulate as such a cause and effect type of equation. Second, external macro variables like- socio-cultural, economic, political/legal, and the foreign market characteristics- are also the factors which appear in the conceptual framework. But they are excluded from this study because of their uncontrollable and similar influential nature to all exporters. Third, if we see the

respondents of this study, they are the managers of the firms who are the busiest persons in the firm. On this regard, if the explanatory variables become very bulky in addition to this, if we incorporate many explanatory variables, we must have also many respondents as much as possible for the purpose of using the proposed model effectively. Hence, this study will be based mainly on quantitative evidence on important explanatory variables in order to capture their effects on Ethiopian coffee export performance.

1.9. Definition of Terms

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

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.

JarqueBera: -the test statistics measure the difference of the skewness and the kurtosis of the series with those from the normal distribution. A normal distribution of jarquebera is between 0 and 3.

1.10 Organization of the Paper

This paper will organize into five chapters. Following the introduction part, chapter two will explain the theoretical and empirical literature review in relation to the relationship between coffee export and economic growth. Chapter three will focus on the model specification, methodology employed and data. Chapter four will provide the data analysis and Presentation, and finally chapter five will discusses the conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

INTRODUCTION

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

2.1. Concept and Definitions of Coffee

Ethiopia is widely considered the birthplace of coffee. Many experts say that Ethiopia is the only place that coffee grew natively and the apocryphal story of Kaldi is told over and over. Kaldi was a goat herder who discovered coffee after witnessing the vigor that his goats received from eating the cherries. He later brought these cherries to the monastery and shared them with the monks who exclaimed that they were the Devil's work and hurled them into the fire. The aroma of the beans roasting in the fire was heavenly and the beans were raked from the fire and crushed to put out the embers. Realizing their mistake, they placed them into a jug and covered with hot water for preservation. Later the monks drank the brew and it helped them keep awake during nightly devotions. While this story is fun, in all actuality, it was likely that the people of the nomadic tribe first discovered the coffee plant and its invigorating properties. Many such stories about the origin of coffee are apocryphal and its actual discovery is something of much speculation.

2.1.1 Coffee in Ethiopia

Ethiopia is endowed with a good production environment for growing coffee with a combination of appropriate altitude, temperature, rainfall, soil type, and pH. Ethiopia is the center of origin for *Coffee Arabica*. The country possesses a diverse genetic base for this Arabica coffee with considerable heterogeneity. Ethiopia produces a range of distinctive Arabica coffees and has considerable potential to sell a large number of specialty coffees (Nure, 2008). Little of the lower-value Robusta coffee is produced in Ethiopia, being better suited for production in lower altitude equatorial climates. Coffee production in Ethiopia is almost exclusively situated in the two regions of Oromia and the Southern Nations, Nationalities, and People Regions (SNNPR) in the south and west of the country.

Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries (Ponte 2002; Daviron and Ponte 2005). There is a growing willingness-to-pay for premium, high quality coffee by rich consumers and the demand for

specialty and certified coffee is on the rise.1 Moreover, international coffee markets have experienced significant price variation over the last decade – prices were five times higher in 2011 than in 2002.

We study the structure and performance of the coffee export sector in Ethiopia, Africa's most important coffee producer, over the period 2003 to 2013. We find an evolving policy environment leading to structural changes in the export sector, including an elimination of vertical integration for most exporters. Ethiopia's coffee export earn-ings improved dramatically over this period, i.e. a four-fold real increase. This has mostly been due to increases in international market prices. Quality improved only slightly over time, but the quantity exported increased by 50 percent, seemingly explained by increased domestic supplies as well as reduced local consumption. To further improve export performance, investments to increase the quantities produced and to improve quality are needed, including an increase in washing, certification, and traceability, as these characteristics are shown to be associated with significant quality premiums in international markets.

2.2 Theoretical and Literature

Coffee is one of the most important traded commodities in the world. The sector's trade structure and performance have large development and poverty implications, given the high concentration of production by small-holders in poor developing countries. Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries (Ponte 2002; Daviron and Ponte 2008). There is a growing willingness-to-pay for premium, high quality coffee by rich consumers and the demand for specialty and certified coffee is on the rise.1 Moreover, international coffee markets have experienced significant price variation over the last decade prices were five times higher in 2011 than in 2002.

After independence, which occurred in 1962, a public agency named OCIR was created under the Ministry of Agriculture and Livestock. Its mission was to manage all activities related to industrial crops such as coffee, tea and pyrethrum. From 1978, the agency has been restructured. OCIR Café was now a separate agency from the initial organization focusing only on coffee. The following services were performed by the agency: input supply, extension services and coffee pulping. In addition, the Government always fixed the farm gate price at the beginning of each coffee season.

In 1995, the government of Rwanda started the liberalization of the coffee sector. Farmers could now decide whether or not to grow coffee (Schluter et al., 2010). In addition, there was much interest from private investors and donor agencies to invest in coffee processing and marketing. Under the privatization environment, the new role of OCIR Café includes the coordination of coffee functions

performed by stakeholders. More specifically, the new activities of the coffee agency are to:-Monitor the marketing mechanism.

The relationship between coffee export and economic growth is an area that has been given much attention by different authors. According to Jung and Marshal (2011) growth in real coffee exports tends to cause growth in real GNP for three reasons. First, coffee export growth may represent an increase in the demand for the country's output and thus serve to increase real GNP. Secondly, increases in coffee export may loosen a binding foreign exchange constraint and allow increases in productive intermediate imports and hence result in the growth of output. Finally, coffee 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. According to him, the marginal factor productivities are significantly higher in the former than the latter. This arises from inter-sartorial beneficial externalities (capacity utilization, economics of scale incentives provided for technological improvement and efficient management due to competitive pressures from abroad) generated by the coffee export. 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, coffee export growth can expand countries' limited domestic markets, and contribute to the economics of scale necessary for industrial developments. Coffee 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 coffee export growth (Chow, 2009).

2.2.1 Theoretical Review on Coffee Exports

Clearly, since coffee exports are a component of GDP, coffee 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 Strout1988, McKinnon, 1999). Coffee export allows poor countries with narrow domestic markets to benefit from economies of scale (Helpman and Krugman, 1985). In addition, coffee export lead to improved efficiency in resource allocation and, in particular, improved capital utilization owing to competition in world markets (Balassa, 1978).The coffee 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 coffee export sector, and establish links with other sectors of the economy (Meier, 1995).

In 1995, the government of Rwanda started the liberalization of the coffee sector. farmers could now decide whether or not to grow coffee (Schluter et al., 2013). In addition, there was much interest from

private investors and donor agencies to invest in coffee processing and marketing. Under the privatization environment, the new role of OCIR Café includes the coordination of coffee functions performed by stakeholders.

2.2.2 Coffee Export Performance

Considerable attention has been paid to the determinants of coffee export performance of the country over the past decades. At the macro-level, several researchers have examined variables including exchange rate fluctuations, comparative advantage, government policies, and domestic market characteristics.

Factors identified include managerial perceptions towards coffee exporting, coffee' resources, and coffee production 'capabilities (Fung et al, 2007). Coffee production capabilities appear to be important factors influencing its export performance; previous studies have found a positive relationship between economic growth and coffee export performance (Naidu and Prasad, 1994).

Coffee Export performance is a multifaceted concept and several authors have provided its measurement (Shoham, 1998). Even if A lot of studies have been conducted on the area of coffee EP lately, the debate concerning on this concept has still highlighted in different paper reviews (Majocchi and Zucchella, 2010). These reviews confirmed that coffee export measures suffer from serious conceptual, methodological, and practical limitations that hamper the development of international business field theory (Aaby and slater, 1988). The main reasons of these limitations tend to be lack of agreement on how to conceptualize and operationalize the term coffee export (Diamantopoulos, 1998). Secondly, there is still no agreement on which measures to use so as to capture the construct adequately; because coffee export performance is a complex concept which needs to be clearly and critically understood. In this regards, there have been a lot of studies being conducted in recent times investigating and developing a multi-item measures of EEP (styles, 1998).

Generally, given the advantages and the complementary nature of these two measures, majority of the empirical studies in EP added both types of measures (shoham, 1998; styles, 1998). This approach of using more than one measure to conceptualize the construct implies that such a study tends to achieve more accurate results. Therefore, it is preferable to use multiple items to operationalize coffee export performance to eliminate or reduce its measurable inadequacy (Shoham,1998). Furthermore, the use of multiple measures is that it provides an over lapadvantage on short-term and long-term goals by overcoming the systematic or random fluctuations of any given concept (Shoham, 1998). Multiple measures are vital towards realizing the strengths of each indicator and minimize the impact of its shortcomings completely (Evangelista, 1994).

2.2.3 Coffee Export Marketing Strategy

A process by which companies react to circumstances in a competitive market and forces of market, or respond to internal and external forces to enables to succeed its objective in the market which is targeted through the marketing mix like prices, products, promotion, and distribution is called Marketing strategies (Cavusgil and zou, 1994). They described coffee export marketing strategy as " it is the ways by which a firm respond to the interaction of internal and external forces to meet the objective of the export companies. It involves all aspects of marketing plan that including product, promotion, pricing, and distribution.

Coffee Export marketing strategy is one of the key factors that influence EP (Cavusgil, Zou, 1994). If we see most of the studies that were performed with regard to EP, export marketing strategy was not only as a main factor of EP but also it had created a substantial and direct impact or influence on EP (Cavusgil&Zou, 1994; Lages&Lages, 2003). They had found that the majority of exporter companies that obtaining higher coffee export profitability because of their marketing based strategists. There were also evidences that described in this review that the marketing based strategist firms got greater coffee export profitability. In contrast, some researchers concluded that export marketing strategy had no effect on export performance (Julian, 2003). In spite of the fact that a few study mentioned that there was no any relationship, most of the researchers concluded that marketing strategy had significant positive effects on coffee export performance and had been a significant part of studies for the purpose of evaluating coffee export performance.

A very important issue with regard to international marketing is the desirability and feasibility of standardization or adaptation of the coffee export marketing strategy with the aim of maximizing export performance. If a company that adapts its practices appropriately to its own characteristics and to the environment in which it operates, it would outperform the companies which are not concerned with this. Hence, choosing appropriate degree of standardization or adaptation is a must (Dow, 2006). If we see standardization or adaptation from the contingency perspectives view, they suggest that standardization or adaptation should not be seen in isolation but the same continuum with each other; whatever their degree of range can be between them. In addition to this, standardization or adaptation strategy level should also be examined based on its impact on the company's international markets performance (Cavusgil and Zou, 2009).

2.2.4 Coffee Product Adaptation

The correlation between product adaptation and coffee export performance has not yet been reached in a consensus. If we see some of them as examples, a lot of researchers identified that product adaptations- brand name, design, and labeling- are positively correlated with EEP (Leonidas et. al., 2002; Shoham,

1999). Besides, it was also found that a standardized product was a much more significant factor for company's EEP (Zou, et. al., 2010). But, on some other studies, it was showed that there was no any significant association between product adaptation and EEP (Samiee & Roth, 2005). Generally, although product adaptation has been widely studied by researchers and generally positively associated with coffee export performance, other studies found insignificant results or even negative correlations.

2.2.5 Coffee Price Adaptation

Price standardization versus adaptation has received little attention in the literature and the results obtained in relationship with coffee export performance are mixed (Lages, 2000). In this sense, various researchers identified that Price adaptations-determination of pricing strategy, concession of credit, price discount policy-are positively correlated to the coffee export performance (Leonidou et. al., 2002). But some researchers identified a non-significant relationship between price adaptation strategy and coffee export performance (Samiee and Roth, 1992).

2.2.6 Coffee Promotion Adaptation

Regarding to the promotion standardization versus adaptation, several studies reported that Promotion adaptations -advertising idea, media channels for advertising, promotion objectives, budget for promotion, and direct marketing or mailing to the main export market- are strongly positively correlated with EEP (Leonidou et. al., 2002; shoham, 1999). Some findings, on the other hand, revealed that there is a negative relationship between promotion adaptation and EEP. Besides, they came into a conclusion that promotion adaptation is a product of competitive force of the market (Cavusgil and zou, 1994).

2.2.7 Coffee Distribution Adaptation

With regard to international distribution, it is one of the exports marketing mix element that was not much investigated; receiving particularly little attention in the context of standardization versus adaptation controversy (Zou and Stan, 1998). There were inadequate studies were conducted on distribution adaptation focusing mainly on the adjustment of channel design in the coffee export markets (Leonidou, et al., 2002). On their studies, they identified that there was a strong positive relationship between distribution adaptation and export performance; especially it is measured in terms of export profit level and export sales to total sales or export intensity. In addition to this, if we see some of the distribution adaptations strategies like- criteria to select the distribution system, transportation strategy, budget for distribution, and distribution network to the export market- were found a mixed and positive correlation with EP (Zou&stan, 1998). But other studies did not find a significant relation between distribution adaptation and EEP (Samiee and Roth, 2003).

2.3 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 labor 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 Gw = s/v where *Gw*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). However, The limitation of Keynesian approach are Availability of consumer Goods, Maintenance of Investment, No Considerations of Profit Maximization, Multiplier Period,Full Employment Ceiling, Direction of Net Investment etc

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 Trever 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). but, The limitation of Neoclassical growth theories approach are Narrow in Scope, Economic Development is not Continuous Process, Unrealistic Assumptions, No Importance to the Role of Govt, Study of Developed Countries Only.

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 indigenizes 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 short comings 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, labor has been straight forwardly 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 indigenize the investment decision yielding technological progress which consists mainly in the introduction of new intermediate and/or final goods. 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. Empirical Review on Coffee Export

2.4.1 Introduction

The contribution of coffee 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 coffee 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 coffee exports on economic growth. The study suggested that the export promotion policies should be balanced (Dawson, 2005).

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.

Coffee production should be more desired than other production that is 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 coffee export 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 coffee exports in Pakistan. The author examined the effect of both domestic supply side factors and external demand on the performance of coffee exports. The major finding of the study was that coffee export diversification and trade openness contributed more in coffee exports performance. The results of the study suggested that coffee exports performance is more elastic to change in domestic factors.

March 2018 -Kenya’s coffee continues to fetch a premium price in the world market, making it the most valued beverage at the New York Coffee Exchange, the largest auction for the commodity. Kenya’s Arabica, which is highly sought after by roasters for blending with other coffees, fetched $330.70 for a 50-kilogramme bag with Indonesia coming in second at $259 per bag.

Based on the empirical results, the study suggested these options; either transferring labor out of coffee to the industrial or the services sectors, or increasing coffee labor productivity as two alternatives for increasing the rate of economic growth. The contribution of coffee exports to economic growth of 42 selected under developed countries was done using panel co-integration techniques. The results showed that 33 developing countries had positive elasticity for coffee 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 coffee export promotion policies but the rich countries might attain high economic growth from non- agricultural exports (Sanjuan-Lopez and Dawson, 2010). The impact of coffee export on microeconomic performance of Pakistan was analyzed by using secondary data from the period 1972-2008.

The causal relationship between economic growth and coffee 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 coffee 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 coffee export (Ruba*et al.* 2014).

Coffee export has a positive and significant relationship with economic growth. Basing the empirical result, the study recommended that, implementation of policies aimed at increasing the productivity and quality of coffee beans before exporting to increase the growth of economic growth in Cameroon.
Impulse response only traces out the time path of the effects of shocks of other variables contained in the VAR model on a specific variable (Belay Tilahun, 2016). On the other hand, this method is designed to determine how each variable responds over time to an earlier shock in that variable and to shocks in other variables (Shin, 2006).
Boansi*etal*.(2014) examined economic and policy foundations of coffee exports from Ghana by using co-integration analysis. The study undertaken to help bridge information gap and inform l trade policy prescriptions on how growth observed in Ghana's coffee 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 coffee export growth for Ghana. Based on the result found, the study recommended, sustenance and scaling up of the Ghanaian agricultural coffee export requires addressing

of existing structural weaknesses and inefficiencies in production, trade and marketing, increased diversification of exports, increased openness to trade, attraction of export enhancing foreign direct investments, and increased domestic production. Bidirectional causality exists between economic growth and total coffee export in countries, bidirectional causality exists between economic growth and coffee exports in a country.

The study estimated the relationship between Gross domestic product (GDP) and coffee and non-agricultural exports as dependent and independent variables respectively by employing Johansen co-integration technique. The main findings of the study depict that coffee 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 coffee exports by converting its value added products (Syed *et al.*2015) Noula*et al.* (2014) studied the impact of export on economic growth of Cameroon specifically with reference to coffee using co- integration test. Results found mixed effects on economic growth in Cameroon.

The above literature reviewed has employed the vector auto regressive models to analyze the relationship between coffee 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 perdition. 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.

Total crop production in 2017 amounted to 221.8 million quintals. This exceeds the production level of 2009/10 of 202.46 million quintals by 19.36 million quintals (or by 9.6%). In 2017, cereals production amounted to about 191.81 million quintals, accounting for 86.5% of total crop production. In the same period the volume of pulses produced was 20.66 million quintal accounting for 9.3% of total crop production, while oilseeds production amounted to about 9.36 million quintals accounting for 4.2% of the total crop production in 2017. This rapid growth in agricultural production has a direct and positive

bearing on the overall economic growth of the country. In addition, the increase in crop production is crucial for the country's endeavor to attain food security and increase export earnings.

Like in the long run, total exports of goods and service is not significant in the short run though with positive coefficient, which shows the positive relationship between export and Ethiopian economic growth during the period of investigation. This result also confirmed by Central Statistical Agency (CSA) particularly during 2016 and 2017 despite it was expected to play an important role in accelerating the economic growth during the GTP period. Furthermore, this finding is consistent with the study conducted in Ethiopia by Gezehegn (2012), and Gebru (2011), they found that, total exports of goods and service was insignificant on Ethiopian economic growth even though there is positive impact, while there is an inverse relationship between economic growth and export volatility TedrosGebru (2011).

2.4.2 Summary

The main objective of this study was to empirically determine the contribution and impact of coffee export on economic growth of Ethiopia using annual data for the period 1973 to 2017. Descriptive and time series techniques were used to determine the trends of coffee exports and to evaluate the impact of coffee 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 coffee exports.

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. Coffee 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 coffee export and economic growth in Ethiopia and a positive relationship.

The empirical results pose a challenge among researchers on absence of consensus about what are the factors that determine coffee export. In most cases, it has been assumed there is a positive correlation between coffee export and economic growth. The different mixtures of empirical results suggest that related researches need to be conducted in developing countries for the purpose of contributing to the theoretical puzzle. This study, therefore, aims at filling up the gap by examining the factors that effect on coffee exporter which is found in Ethiopia.

In this research I used the neoclassical theory of economic growth, because the variable I am using labor force, capital information, export (coffee), Therefore, the neoclassical growth theory in available for this thesis

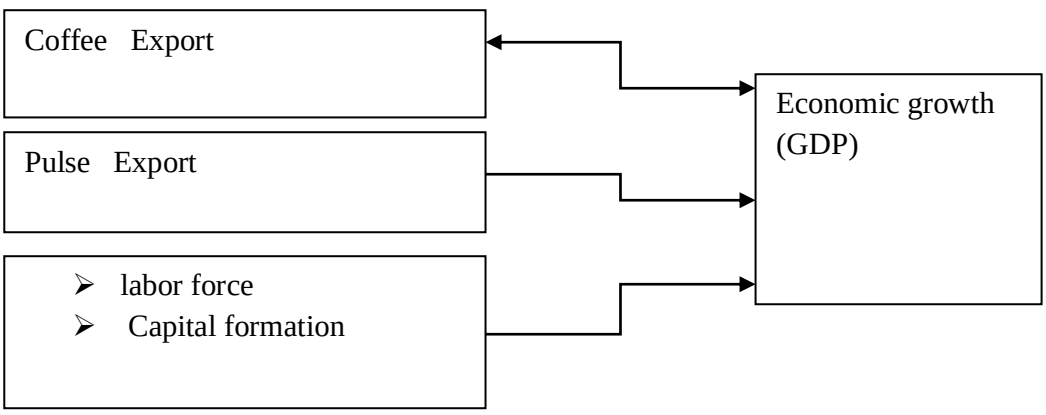
2.5. Conceptual Framework

Under this sub section, the study gives some conceptual framework and this conceptual framework give some insights about the relationship between coffee export and economic growth.

The conceptual framework guiding the systemization and formalization of coffee export is one, which seeks to use coffee export to increase economic growth. At the same time, it should contribute to level of infrastructure development, availability of financial source etc.

The relationship between the export of coffee and economic growth, is that the coffee export increase the economy also increase. The coffee export can be affected by government policy, level of infrastructure development, availability of financial source and weather condition among others. If the volume and quality of the coffee product is improved; the competitiveness in international market and the share of the international market will increase and the foreign earning generated from coffee export will also increase which have high contribution for capital formation and positive impact on economic growth (GDP). The contribution of coffee export and economic growth has forward and backward relationship. As the economy grows, it can supply improved coffee inputs, which incentive coffee productivity and in turn increase volume and contribution of coffee product export. In Ethiopia there is excess and cheap labor force as compared to capital. Due to this, the cost of coffee 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. The following figure show the relationship between economic growth and coffee export, pulse export, labor force and capital.

Figure 1: the relationship between economic growth and coffee export, pulse export, labor force and capital.



Source : own drawing (2019)

CHAPTER THREE

Methodology and Data Description

3.1 Description of the Study Area

This study would have 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 102.4 million which makes her the tenth largest in the world and the second most populous state in Africa after Nigeria (CSA, 2007) and (United Nations Population Division). The country has 9 regional states divided according to the main ethnic lines such as Oromiya regional state, Amhara 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 production are mainly from Oromiya, SNNP and Amahararegion. Coffee is produced in; OromiyaregionsandSNNPregions. The export standard coffee from Oromiya region is mainly from four areas such as Jimma,Nekemte,Harar and Bebeka. There are three areas in SNNP such as Kefa,Sidamo and Yirgacheffeeproduction in the country (CSA, 2013).

3.2 Methods of Data Collection

This study is mainly based on secondary data yearly export data 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) covering the period from 1974/1975 to 2016/2017.

3.3 Definitions of the Variables

The variables that this study uses are described as the following:

***Growth in Real GDP (RGDP[1])*:** Real Gross Product (real GDP) is a macroeconomic measure of the value of economic output adjusted for price changes (i.e., inflation or deflation). This adjustment transforms the money-value measure, nominal GDP, into an index for quantity of total output. GDP is the sum of consumer spending, Investment made by industry, Excess of Exports over Imports and Government Spending. Due to inflation GDP increases and does not actually reflect the true growth in economy. That is why inflation rate must be subtracted from the GDP to get the real growth percentage

called the real GDP. Most of the studies conducted on the relationship of economicgrowth with any variables (Colombage, 2009, Koch et al., 2005) used the Gross Domestic Product (GDP) as the measurement of economic growth. Hence, this study was used the growth form of real GDP as a proxy to represent economic growth.

Total Labor Force (TLF): 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 Capital Formation (GCF): it is the gross fixed capital formation and in line with many researchers, in the absence of capital stock for all African countries, gross capital formation has been used as proxy for the stock of physical capital. However, getting such a readymade time series data in Ethiopia is difficult. The capital stock series is constructed from real gross capital formation using the perpetual inventory assumption with depreciation rate set equal to 5 percent (Wang and Yao, 2003). As a result, in this study, gross investment was used as proxy of physical capital accumulation and have been expected a positive impact on 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. (ECTA)

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. (ECX)

3.4. Methods of Data Analysis

To analyze whether the selected coffee exports has short run and long run impact on economic growth of Ethiopia, different time series data techniques are used. To determine the impact of coffee exports on economic growth, co-integration and error correction model are used. Before the analysis, the stationary of time series data was tested. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test is using to test the stationary of the variables then co-integration analysis is doing to see if there is long-run relationship between the coffee and the economic growth of the country.

3.4.1 Model Specification

The VAR methodology was set up in Sims (1980) as a method of avoiding the "incredible identification" that was required in simultaneous equation methodology. Most time series books contain an account of the VAR methodology.

To investigate the empirical relationship between export use and output growth we use the modern economic growth theory based on the conventional neo-classical one sector aggregate production technology where we treat capital, labor, and exports as separate inputs. That is

$$RGDP_t = F(K_t, L_t, X_t) \text{ ---------- (1)}$$

Where RGDPt is a real aggregate output, K is gross capital formation, L is the total labor force, X is export and the subscript t denotes the time period.

All variables are transformed into their natural logarithm so that their first differences approximate their growth rates. On the other hand, to eliminate the impact of heteroscedasticity for economic variable time series data, all variables are in natural logarithm. The empirical model was designed to model the three variables after logarithmic transformation for the linear model, is easy to verify, so the transformed model:

$$\ln RGDP_t = F(\ln K_t, \ln L_t, \ln X_t) \text{ ---------- (2)}$$

The growth rate of a variable refers to its proportional rate of change. That is, the growth of rate of X refers to the quantity $\frac{\dot{X}_t}{X_t}$. A key fact about growth rates is that the growth rate of a variable equals the rate of change of its natural log. That is, $\frac{\dot{X}_t}{X_t}$ equals $\frac{d \ln X(t)}{dt}$

By using Euler's theorem implies that a function that is homogenous degree of one can be decomposed as:

$$F(K_t, L_t, X_t) = F_K K_t + F_L L_t + + F_X X_t \text{ ---------- (3)}$$

Taking the total derivative of equation 1, we get:

$$\frac{dY_t}{dt} = F_K \frac{dK_t}{dt} + F_L \frac{dL_t}{dt} + F_X \frac{dX_t}{dt}$$

$$\dot{Y}_t = F_K \dot{K}_t + F_L \dot{L}_t + F_X \dot{X}_t$$

$$= F_K K_t \frac{\dot{K}_t}{K_t} + F_L L_t \frac{\dot{L}_t}{L_t} + F_X X_t \frac{\dot{X}_t}{X_t} \text{ ---------- (4)}$$

Divide through equ.(4) by Y to get growth equation and rearranging the resulting expression, we get the following growth equation.

$$\frac{\dot{Y}_t}{Y_t} = F_K \frac{K_t}{Y_t}\frac{\dot{K}_t}{K_t} + F_L \frac{L_t}{Y_t}\frac{\dot{L}_t}{L_t} + F_X \frac{X_t}{Y_t}\frac{\dot{X}_t}{X_t} \text{ ---------- (5)}$$

$$\dot{y}_t = \mu\dot{k}_t + \phi\dot{l}_t + \gamma\dot{e}_t \text{ ---------- (6)}$$

$$\dot{y}_t = \mu\dot{k}_t + \phi\dot{l}_t + \gamma\dot{e}_t + \pi\dot{x}_t$$

Where a dot on the top of a variable means that the variable is now in a growth rate form. The constant parameters μ, ϕ, γ, π are the elasticity's of output with respect to capital, labor and export respectively.

The relationship between output and capital, labor, and coffee exports described by the production function in equation (2) suggests that their long-run movements may be related.

3.5 Econometrics Analysis

Additionally, if we allow for short-run dynamics in factor-input behavior, the analysis above would also imply that past changes in capital, labor, and exports will be containing useful information for predicting the future changes of output, keeping other being constant. These implications can be easily investigated using tests for multivariate co-integration and Granger-causality.

When two or more entirely unrelated variables are trending over time, they will appear to be correlated simply due to shared directionality. Correlation does not necessarily imply causation in any meaningful sense of that word. The econometric graveyard is full of magnificent correlations, which are simply spurious or meaningless. Thus, traditional linear regression or correlation methods cannot be used to establish casual relations among a group of variables. Two methods for testing for causality among time-series variables are Granger causality tests (Granger, C.W.J. 1969) and co-integration analysis (Engle, R.E. & C.W.J. Granger., 1987). Hendry and Juselius discuss the application of these methods to energy economics where they have been applied extensively to test for causality and co-integration between export, GDP, and other variables from the late 1970s on as cited in Mehari, 2010. This study used the Granger causality test and co-integration analysis to investigate the causal relationship between coffee exports and economic growth in the case of Ethiopia.

The standard Granger[2] (1969) test was employed in the relevant literature test the causal relationship between two variables. This test states that, if past values of a variable Y significantly contribute to forecast the value of another variable X_{t+1} then Y is said to Granger Cause X and vice versa. The test is based on the following regressions.

$$Y_t = \beta_0 + \sum_{q=1}^{N} \beta_1 Y_{t-q} + \sum_{q=1}^{N} \beta 2 K_{t-q} + \sum_{q=1}^{N} \beta 3 L_{t-q} + \sum_{q=1}^{N} \beta 4 CX_{t-q} + \varepsilon_{1t} \quad \text{----------(7)}$$

$$K_t = \mu_0 + \sum_{q=1}^{O} \mu_1 Y_{t-q} + \sum_{q=1}^{O} \mu_3 K_{t-q} + \sum_{q=1}^{O} \mu_4 L_{t-q} + \sum_{q=1}^{O} \mu_5 CX_{t-q} + \varepsilon_{2t} \quad \text{----------(8)}$$

$$L_t = \varphi_0 + \sum_{q=1}^{P} \varphi_1 Y_{t-q} + \sum_{q=1}^{P} \varphi_3 K_{t-q} + \sum_{q=1}^{P} \varphi_4 L_{t-q} + \sum_{q=1}^{P} \varphi_5 CX_{t-q} + \varepsilon_{3t} \quad \text{----------(9)}$$

$$CX_t = \theta_0 + \sum_{q=1}^{C} \theta_1 Y_{t-q} + \sum_{q=1}^{C} \theta_3 K_{t-q} + \sum_{q=1}^{C} \theta_4 L_{t-q} + \sum_{q=1}^{C} \theta_5 CX_{t-q} + \varepsilon_{4t} \quad \text{----------(10)}$$

Where Yt, Kt, Lt and Xt(COFEX,PUEX) are the variables to be tested, and ε_{1t}, ε_{2t}, ε_{3t} and ε_{4t} are mutually uncorrelated white noise errors, and t denotes the time period and "q" is number of lags.

Similarly, the Granger Causality for RGDP and components of exports is as follows:

$$RGDP_t = \psi_0 + \sum_{q=1}^{B} \psi_1 RGDP_{t-q} + \sum_{q=1}^{B} \psi_2 CX_{t-q} + \sum_{q=1}^{B} \psi_3 PX_{t-q} + \eta_{1t}$$

$$CX_t = \varpi_0 + \sum_{q=1}^{F} \varpi_1 RGDP_{t-q} + \sum_{q=1}^{F} \varpi_2 CX_{t-q} + \sum_{q=1}^{F} \varpi_3 PX_{t-q} + \eta_{2t}$$

$$PX_t = \wp_0 + \sum_{q=1}^{D} \wp_1 RGDP_{t-q} + \sum_{q=1}^{D} \wp_2 CX_{t-q} + \sum_{q=1}^{D} \wp_3 PX_{t-q} + \eta_{3t}$$

Where η_1, η_2 and η_3 are mutually uncorrelated white noise errors; B, F and Dare lag periods.

The all variables were measured by their natural logarithm so that their first difference approximates their growth rates.

Hypothesis we use standard Granger is that: -

The null hypothesis

The null hypothesis is $\beta_{i=}\alpha_{i=}\mu_{i=}\phi_i=0$ for all i's versus the alternative hypothesis that $\beta_i \neq \alpha_i \neq \mu_i \neq \phi_i \neq 0$ for at

Least some i's. For instance, if the coefficient of β_2 statistically significant but $\alpha_{2\ is}$ not, then coffee

Export cause output growth and vice versa. But if β_2 and $\alpha_2$aresignificant then causality runs both ways.

Recent developments in the time series analysis have suggested some improvements in the standard Granger test. The first step is to check for the stationary of the original variables and then test co-integration between them. According to Granger (1986), the test is valid if the variables are not Co-integrated. Second, the results of Granger causality are very sensitive to the selection of lag length. If the

chosen lag length is less than the true lag length, the omission of relevant lags can cause bias. If the chosen lag length is more, the irrelevant lags in the equation cause the estimates to be inefficient.

Finally, both the co integration technique a Granger causality tests, was employed to determine the causal relationship between RGDP and coffee export, RGDP and various components of exportspulseand finally between RGDP and labor and capital. The basic model relates economic growth to exports is the model that shown in equation (2), that is, $\ln RGDP_t = F(\ln K_t, \ln L_t, \ln X_t)$. The procedures to estimate the model are discussed below.

3.5.1 Unit Root Test

The classical time series regression model is based on the assumption that the data generating processes are stationary, i.e., the moments of the variables under consideration are time invariant. However, as the economy grows and evolves over time, most macroeconomic variables are likely to grow over time rendering them non-stationary (Granger and Newbold, 1974). Regression using non-stationary variables will only reveal a relationship that is not real, and accordingly such regression is termed as "spurious regression."

In case of spurious regression, as the sample size increases, the coefficient of variance doesn't tend to be constant and the consistency property of OLS estimators is not hold. The sampling distribution of the estimators will be non-standard and the usual statistics (t and F) based on normal become invalid (Maddala, 1992). Nelson and Plosser (1982) distinguish between two types of stationary series: trend stationary processes (TSP) and difference stationary processes (DSP). These two distinctions derive from the two widely used techniques of converting non-stationary series into stationary series.

The first one is trend stationary; in this case the mean trend is deterministic. Once the trend is estimated and removed from the data, the residual series is a stationary stochastic process. Trending mean is a common violation of stationary. There are two popular models for non-stationary series with a trending mean.The Second one is difference stationary; in this case the mean trend is stochastic. Differencing the series *d* times yields a stationary stochastic process.

Though both techniques may lead to stationary series, caution is needed in choosing between the two as de-trending a DSP series or differencing a TSP series may lead to spurious autocorrelation. Nelson and Plosser (1982) indicate that in most economic time series DSP is more appropriate and the -TSP should be applied only if we assume the residuals exhibit strong autocorrelation.

Time series that can be made stationary by differencing are called integrated processes. Specifically, when *d* differences are required to make a series stationary, that series is said to be integrated of order *d*, denoted I (*d)*. Processes with $d \geq 1$ are often said to have a unit root.

The precondition of co-integration test is the stationary of each individual time series over the sample period. From the time when the seminal paper by Engle and Granger (1987), co integration analysis has increasingly become the favored methodological approach for analyzing time series data containing stochastic trends. Thus, before turning to the analysis of the long run relationships between the variables we check for the unit root properties of the single series, as non-stationary behavior is a precondition for including them in the co integration analysis.

There are several tests of stationary. These tests are Dickey-Fuller unit root tests, Augmented Dickey-Fuller (ADF) unit root tests. This study used a test which became popular over the past years. Thus, unit root tests for stationary was examined on the levels and first differences for all variables using the most common unit root tests, which is the Augmented Dickey-Fuller (ADF). In some situation, lack of power in both the ADF and PP tests is widely acknowledged, then the NG-Perron (NP) test must be done (Ng-Perron, 2001). Usually ADF yields superior results than PP test, if the data set has no missing observations and structural breaks whilst PP test also yields superior results than ADF test, if the dataset some missing observations and have structural breaks (Green, 2003). We assume that the data has no missing observation and structural breaks; ADF unit root test was used in this study.

The technique of co-integration involves three steps. The first step requires a determination of the order of integration of the variables of interest. The two popular tests: namely Dickey Fuller (DF) and Augmented Dickey Fuller (ADF) test based on H0: Xt is not I (0). The regression model of the ADF unit root test is given by the following equations.

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \varepsilon_t \text{ ---------- (11)}$$

Where Yt denotes the variables RGDP, labor, capital, export. All variables are in logarithm form. Δ is the difference operator; β_0 and β_1 are parameters to be estimated; ε_t is white noise.

The regression models of the ADF unit root test below:

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^{q} \zeta_i \Delta Y_{t-1} + \varepsilon_t \text{ ---------- (12)}$$

The hypotheses of the above equation form are:

$H_0 : \delta = 0$; there is a unit root, i.e., the time series is non stationary

$H_1 : \delta \neq 0$; there is no unit root, i.e., the time series is stationary (level stationary)

The Null hypothesis (Ho): Yt is not I(0), if the calculated ADF statistics are less than their critical values from Fuller's table, then the null hypothesis (Ho) is rejected and the series are stationary or integrated

or order one i.e, I(1). If the coefficient of the lag of Y_{t-1}, δ is significantly different from zero, then the null hypothesis is rejected.

To allow for the various possibilities, the ADF test is estimated in three different forms, that is, under three different null hypotheses.

1st possibility: Yt is a random walk without drift: $\Delta Y_t = \delta Y_{t-1} + \sum_{i=1}^{q} \zeta_i \Delta Y_{t-1} + \varepsilon_t$

2nd possibility: Yt is a random walk with drift: $\Delta Y_t = \beta_0 + \delta Y_{t-1} + \sum_{i=1}^{q} \zeta_i \Delta Y_{t-1} + \varepsilon_t$

3rd possibility: Yt is a random walk with drift around a stochastic trend: $\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^{q} \zeta_i \Delta Y_{t-1} + \varepsilon_t$

β_0 is intercept, t is linear time trend, q is the number of lagged first differences, and (i=1,2,3,…q) is q is the number of lagged terms chosen by Akaike Information Criterion (AIC) to ensure that ε_t is white noise.

3.6 Optimal Lag Length Selection

The determination of autoregressive lag length for a time series is especially important in economics studies. Various lag length selection criteria such as the Aikaike's information criterion (AIC), Schwarz information criterion (SIC), Hannan-Quinn criterion (HQC), Final prediction error (FPE) and Bayesian information criterion (BIC) have been employed. As the outcomes of these criteria may influence the ultimate findings of a study, a throughout understanding on the empirical performance of these criteria is necessary.

Akaike Information Criterion (AIC) developed by HirotuguAkaike in 1971; Greene (2003), has been found to be nearly unbiased estimator of selecting lag order and also it's a large sample size measure of thirty and more items, while the Schwarz Information Criterion (SIC) is a small sample measure of less than thirty observations. Moreover, Liew and Venus; KhimSen (2004) as cited in Biruk (2014) provide useful insights for empirical researchers. First, these criteria managed to pick up the correct lag length at least half of the time in small sample. Second, this performance increases substantially as sample size grows. Third, with relatively large sample, HQC is found to outdo the rest in correctly identifying the true lag length. In contrast, AIC and FPE should be a better choice for smaller sample. Fourth, AIC and FPE are found to produce the least probability of under estimation among all criteria under study. Finally, the problem of over estimation, however, is negligible in all cases. As many econometric testing procedures such as unit root tests, causality tests, co-integration tests and linearity tests involved the determination of autoregressive lag lengths, the findings in this simulation study may be taken as useful guidelines for future economic researches.

Thus, the ability to correctly locating the true lag order depends on IC the ordinary least Squares regression model is run starting with lag zero upwards, since according to Engle *et al* (1995) it is the mostly used and recommended methodology was used to determine the lag length. Accordingly, lag that provides the minimum value is chosen as the optimal lag length, in other words, among the IC that provides majority lag is chosen as optimal lag length. On the basis of one or more of these criteria this paper was used a model that is the highest $\bar{R}^2$ or the lowest value of AIC or SIC or BIC.

3.7 Co-Integration Test

Granger causality tests are sensitive to the stationarity of the series. This is why we first study the stationarity properties of the variables. Having, discuss a variety of unit root tests, in order to proceed with co-integration and VEC analyses one needs to be confident as to the order of integration of the series used.

In the second step we estimate co-integration regression using variables having the same order of integration. Co-integration among the variables means that two or more variables are said to be co-integrated if they share common trends that is they have long run equilibrium relationships. More, co-integration is the necessary criteria for stationary among non-stationary variables. The series are linked by some long-run equilibrium relationship from which they can deviate in the short run but they must return to in the long-run that is they exhibit the same stochastic trend. Co-integration can be considered as an exception to the general rule which establishes that, if two series are both I (1), then any linear combination of them will yield a series which is also I (1). The exception is when a linear combination of two or more series is integrated of a lower order: In this case, in fact, the common stochastic trend is cancelled out, leading to something that is not spurious but that has some significance in economic terms (Amirat and Bourimun dated).

If a group of variables are individually integrated of the same order and there is at least one linear combination of these variables that is stationary, then the variables are said to be co-integrated. The co-integrated variables will never move far apart, and will be attracted to their long-run relationship. Testing for co-integration implies testing for the existence of such a long-run relationship between economic variables.

If the series are integrated of the same order one can proceed with the co-integration tests. This initial formulation by Granger used levels of variables as shown in equations (7), (8), (9), (10), (11) and (12). But, following the development of unit root testing and co-integration, for non-stationary variables, integrated of order one or I (1), equations (7) to (12) are replaced by

$$\Delta Y_t = \beta_0 + \sum_{q=1}^{N} \beta_1 \Delta Y_{t-q} + \sum_{q=1}^{N} \beta_3 \Delta K_{t-q} + \sum_{q=1}^{N} \beta_4 \Delta L_{t-q} + \sum_{q=1}^{N} \beta_5 \Delta C_{t-q} + \sum_{q=1}^{N} \beta_6 \Delta P_{t-q} + \varepsilon_{1t} \quad ---(13)$$

$$\Delta P_t = \alpha_0 + \sum_{q=1}^{M} \alpha_1 \Delta Y_{t-q} + \sum_{q=1}^{M} \alpha_3 \Delta K_{t-q} + \sum_{q=1}^{M} \alpha_4 \Delta L_{t-q} + \sum_{q=1}^{M} \alpha_5 \Delta CX_{t-q} + \sum_{q=1}^{M} \alpha_6 \Delta P_{t-q} + \varepsilon_{2t} \quad ---(14)$$

$$\Delta K_t = \mu_0 + \sum_{q=1}^{o} \mu_1 \Delta Y_{t-q} + \sum_{q=1}^{o} \mu_3 \Delta K_{t-q} + \sum_{q=1}^{o} \mu_4 \Delta L_{t-q} + \sum_{q=1}^{o} \mu_5 \Delta CX_{t-q} + \sum_{q=1}^{o} \mu_6 \Delta P_{t-q} + \varepsilon_{3t} \quad ---(15)$$

$$\Delta L_t = \varphi_0 + \sum_{q=1}^{P} \varphi_1 \Delta Y_{t-q} + \sum_{q=1}^{P} \varphi_3 \Delta K_{t-q} + \sum_{q=1}^{P} \varphi_4 \Delta L_{t-q} + \sum_{q=1}^{P} \varphi_5 \Delta CX_{t-q} + \sum_{q=1}^{P} \varphi_6 \Delta P_{t-q} + \varepsilon_{4t} \quad ---(16)$$

$$\Delta CX_t = \theta_0 + \sum_{q=1}^{C} \theta_1 \Delta Y_{t-q} + \sum_{q=1}^{C} \theta_3 \Delta K_{t-q} + \sum_{q=1}^{C} \theta_4 \Delta L_{t-q} + \sum_{q=1}^{C} \theta_5 \Delta CX_{t-q} + \sum_{q=1}^{C} \theta_6 \Delta P_{t-q} + \varepsilon_{5t} \quad ----(17)$$

Where Δ is the first difference operator, so that the terms are introduced in differences to ensure that they are stationary or I(0). Here the concept of causality is formulated in terms of changes to the variables and the presence of Granger-causality depends on the significance of the ΔY_{t-q} terms and ΔX_{t-q} terms in equations (13) to (17) respectively.

This study considers a number of co-integration tests, namely the Engle-Granger method commonly known as the two-step estimation procedure, the Phillips-Ouliaris methods and the Johansen's procedure.

3.7.1 Engle Granger Method

The Engle-Granger, EG has two steps, first create the whole association equation of log (C), log (L), log (CX), log (P) and log (K) on log(RGDP) by Eviews version 9.0, and then test the residual series from which estimated equation parameters co-integration is stable or not. As we have stated, the regression of non-stationary series on other series may produce spurious regression. If each variable of the time series data is subjected to unit root analysis and it is found that all the variables are integrated of order one, I(1), then they contain a unit root. There is a possibility that the regression can still be meaningful (i.e. not spurious) provided that the variables co-integrate.

In order to find out whether the variables co-integrate, the least squares regression equation was estimated and the residuals (the error term) of the regression equation are subjected to unit root analysis. If the residuals are stationary, that is I (0), it means that the variables under study co-integrate and have a long-term or equilibrium relationship.

In the two-step estimation procedure, Engle-Granger considered the problem of testing the null hypothesis of no co-integration between a set of variables by estimating the coefficient of a statistic relationship between economic variables using the OLS and applying well-known unit root tests to the

residuals to test for stationary. Rejecting the null hypothesis of a unit root is evidence in favor of co-integration.

In the first step we estimate co-integration regression using variables having the same order of integration. The co-integration equation estimated by the OLS method was given as:

$$Y_t = \gamma_0 + \gamma_1 X_{ti} + \xi_t \quad \text{---------- (18)}$$

Where Yt is real GDP and Xt is the i^{th} either exports, capital or labor.

Second step residuals (ξ_t) from the co integration regression are subjected to the stationary test based on the following equations.

Dickey – Fuller (DF)

$$\Delta\xi_t = \alpha + \beta\xi_{t-1} + \nu_t \quad \text{---------- (19)}$$

Augmented Dickey Fuller (ADF) test

$$\Delta\xi_t = \alpha + \beta\xi_{t-1} + \sum_{i=1}^{q} \phi\Delta\xi_{t-i} + \nu_t \quad \text{---------- (20)}$$

Where, ξ_t is the residual from equation (a). The null hypothesis of non-stationarity is rejected if β is negative and the calculated DF or ADF statistics is less than the critical value from Fuller's table, i.e., there is a long run stable relationship between the two variables and causality between them is tested by the error correlation model (ECM). Alternatively, if the null hypothesis of non-stationarity is rejected and the variables are not co-integrated then the standard Granger causality test is appropriate.

3.7.2 Phillips Ouliaris Method

Phillips-Ouliaris introduced two residual-based tests namely: the variance ratio test and the multivariate trace statistics. These residual-based tests are used in the same way as the unit root tests, but the data are the residuals from the co-integrating regression. These tests seek to test a null hypothesis of no co-integration against the alternative of the presence of co-integration using scalar unit root tests applied to the residuals. Phillips-Ouliaris methods are based on residuals (differences between the observed and expected values) of the first order auto regression, AR (1), equation. The multivariate trace statistics has the advantage over the variance ratio test in that it is invariant to normalization, that is, whichever variable is taken to be the dependent variable, and this test will yield the same result (Buruk, 2014).

In the literature, there are no studies directly linked to the application of the Phillips-Ouliaris co-integration test only. However, there are a few studies in which co-integration have been tested using other techniques including the Phillips-Ouliaris methods. The results showed that the null distributions of residual-based co-integration tests differed from those derived from the use of the Phillips-Ouliaris methods. The practical implication of these results is that we need to test not only for the presence of a unit root for individual series, but also for the presence of co-integrating vectors for the repressors prior to performing residual-based tests for co-integration. Thus, Johnsen's procedure resolves these issues.

3.7.3 Johansen's Method

Johansen (1988) and Johansen and Juselius (hereafter, JJ) (1990) maximum likelihood (ML) procedure is a very popular co-integration test and useful method to determine the long-run relationship among non-stationary variables.

Since the influential work of Granger and Newbold (1974); and Engle and Granger (1987) on the treatment of integrated time series data, many studies have been conducted using the co-integration methodology in order to yield consistent results and avoid the spurious regression problems, particularly in causality testing. The purpose of co-integration test in this study is to examine whether economic growth andcoffee export hare a common stochastic trend, that is, whether they move on thesame wave-length in the long-run though there might be some disequilibrium in the short-run. In macroeconomics variable, two variables are said to be co-integration when they have long term, or equilibrium relationship between them (Engle and Granger, 1987). Thus, this study used Johansen (1988) co-integration analysis has been performed to investigate long term relationship between coffee export and real economic growth in Ethiopia. This research was employed Johansen's (1988) approach to determine whether any combinations of the variables are co-integrated. Johansen and Juselius (1990) recommend the trace test and the maximum Eigen-value t-statistics in making the inference of the number of co-integrating vectors.

The aim of the co-integration test is to determine whether a group of non-stationary series is co-integrated or not. The Johansen's methods take its starting points in the Vector autoregressive (VAR) model as:

$$Y_t = \varphi + a_1 Y_{t-1} + a_2 Y_{t-2} + \ldots + a_q Y_{t-q} + AXt + \varepsilon_t \quad (21)$$

Where Yt is a n- vector of non-stationary I(1) endogenous variables that are integrated of order one-commonly denoted I (1) and Xt is a m vector of exoegenous deterministic variables; $a_1,\ldots,a_q$ and A are matrices of coefficients to be estimated and ε_t is white noise residuals; that is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and

uncorrelated with all of the right hand side variables. Because most economic time series are non-stationary, the above stated VAR model is generally estimated in its difference form as:

$\Delta Yt = \varphi + \delta Yt + \sum_{k=1}^{q-1} \Delta Yt - 1 + AXt + \varepsilon t, \Theta = \sum_{k=1}^{q} ai$ and $\varphi = \sum_{j=k+i}^{n}$ aj----------(22)

Granger's representation theorem that states if the coefficient matrix θ has reduced rank r<n, then there exist nxr matrices α and β each with rank r such that the method state that if θ matrix has reduced rank r<n, then there exist nxr matrices of α and β each with rank r such that $\theta = \alpha\beta'$ and $\beta' Y_t$ is I(0); r is the number of co integration relations (the co-integrated rank) and each column of β' is the co-integrating vector and α is the matrix of error correlation parameters that measures the speed of adjustments in ΔY_t.On the other hand, model is based on the error correction representation given by the following equation

Where Yt is an (nx1) column vector of q variables, is an (nx1) vector of constant terms, θ and ϖ represent coefficient matrices, Δ is a difference operator, k denotes the lag length, and ε_t is p dimensional Gaussian error with mean zero and variance matrix (white noise disturbance term). The coefficient matrix θ is known as the impact matrix and it contains information about the long-run relationships. This Equation resembles a vector autoregressive (hereafter, VAR) model in first differences, except for the inclusion of the lagged level of Y_{t-1}, an error correction term (hereafter, ECT), which will contain information about the long run among variables in the vector Y_t. The vector error correction (hereafter, VEC) method equation above allows for three model specifications:

(a) If θ is of full rank, then Yt is stationary in levels and a VAR in levels is an appropriate model.
(b) If θ has zero rank, then it contains no long run information, and the appropriate model is a VAR in first differences.
(c) If the rank of θ is a positive number, r and is less than p (where p is the number of variables in the system), there exists matrices α and β, with dimensions (p x r), such that $\beta\alpha' = \theta$. In this representation β contains the coefficients of the r distinct long run co-integrating vectors that render β'Xt stationary, even though Xt is itself non-stationary, and α contains the short-run speed of adjustment coefficients for the equations in the system (Awokuse, 2003).

The Johansen approach to co-integration test is based on two test statistics: the trace test statistic, and the maximum eigenvalue test statistic, as suggested by Johansen (1988) and OseterwaldLenum (1992).

Trace Test Statistic: The likelihood ratio statistic (LR) for the trace test (λ_{trace}) as suggested by Johanse (1988) can be specified as:

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{k}\ln(1-\hat{\lambda}_i)$$

where $\hat{\lambda}$i is the ith largest eigen value of matrix θ and T is the number of observations. In the trace test, the null hyphothesis is that the number of
distnict cointegrating vector (s) is less than or equal to the number of cointegration relations (r).
In this ststistic λ_{trace} will be small when the values of the charactersitc roots are closer to zero.

Maximum Eigen value Test: The second test statistic is known as the maximal eigen value test which computes the null hypothesis that there are exactly r co-integrating vectors in Yt. The maximum eigen value test as suggested by Johansen (1988) examines the null hypothesis of exactly r co-integrating relations against the alternative of r+1 co-integrating relations with the test statistic and is given by:

$$\lambda_{\max}(r, r+1) = -T\ln(1-\hat{\lambda}_{r+1})$$

where $\hat{\lambda}_{r+1}$ is the (r+1)th largest squared eigen value. In the trace test,
the null hyphothesis of r=0 is tested against the alternative of r+1 cointegrating vectors.
If the estimated value of the characteristic root is close to zero, then the λ_{trace} will be small.

The distributions for these tests are not given by the usual chi-squared distributions. The asymptotic critical values for these likelihood ratio tests are calculated via numerical simulations (Johansen and Juselius, 1990; and Osterwald-Lenum, 1992).

3.8 Vector Error Correction Model

According to Engle-Granger (1987) iftwo-time series are co-integrated then theVECM will represent them most efficiently. If co-integration has been detected between series, we know that there exists a long-term equilibrium relationship between them so we apply VECM in order to evaluate the short run properties of the co-integrated series. In case of no co-integration VECM is no longer required and we directly precede to Granger causality tests to establish causal links between variables.

An error correction model is defined as a dynamic model in which the movement of a variable in any period is related to the previous period's gap from the long-run equilibrium. Although it may be possible to estimate the long-run or co-integrating relationship, $Y_t = \beta X_t + \varepsilon_t$ economic systems are rarely in equilibrium, as they are affected by institutional and/or structural changes that might be temporary or permanent.

A simple dynamic model of a short-run adjustment model is given by:

$$Y_t = \varphi_0 + \varpi_0 X_t + \varpi_1 X_{t-1} + \varphi_1 Y_{t-1} + \varepsilon_t \quad \text{----------} \quad (23)$$

Where,

Yt is dependent variable, and Y_{t-1} are lagged values; X_t is independent variable, and X_{t-1} are lagged values; $\varphi_0, \varpi_0, \varphi_1$ and ϖ_1, are parameters; ε_t is the error term assumed to be $\varepsilon_t \sim IID(0, \sigma^2)$

The problems associated with the use of the short-run model are multicollinearity, and spurious correlation. The problems are solved by estimating the first difference of equation (23) to get

$$\Delta Y_t = \varphi_0 + \varpi_0 \Delta X_t + \varpi_1 \Delta X_{t-1} + \varphi_1 \Delta Y_{t-1} + \varepsilon_t \quad \text{----------} \quad (23i)$$

This, however, introduces problems of loss of information about the long-run equilibrium and the economic theory is differenced away. Thus, the possible solution is to adopt the error-correction mechanism (ECM) formulation of the dynamic structure. The setup is as follows.

$$\Delta Y_t = \varpi_0 \Delta X_t - (1-\varphi_1)[Y_{t-1} - \beta_0 - \beta_1 X_{t-1}] + \varepsilon_t \quad \text{----------} \quad (23ii)$$

The above equation (23ii) shows the ECM model. Error correction mechanism satisfies the assumptions of classical normal linear regression model. Among others the assumption includes, a linear regression model, residuals are normally distributed, there is no serial correlation among residuals, and there is no perfect multi-co linearity. Where,

$-(1-\varphi_1)$ is the speed of adjustment; $\varepsilon_{t-1} = Y_{t-1} - \beta_0 - \beta_1 X_{t-1}$ as error-correction mechanism which measures the distance of the system away from equilibrium. Therefore, the coefficient of ε_{t-1} should be negative in sign in order for the system to converge to equilibrium. The size of the coefficient $-(1-\varphi_1)$ is an indication of the speed of adjustment towards equilibrium in that; Small values of $-(1-\varphi_1)$ tending to -1, indicate that economic agents remove a large percentage of disequilibrium in each period; Larger values, tending to 0, indicate that adjustment is slow; Extremely small values, less than -2, indicate an overshooting of economic equilibrium; Positive values would imply that the system diverges from the long-run equilibrium path.

Given from the above reality that, the variable will be subjected to Johansen co-integration test and if it is found that the variables are co-integrate. Followed by using the Granger causality theorem, we will posit the following testing relationships that constitute a vector error correction (VEC) model for output growth.

$$Y_t = \beta_0 + \sum_{k}^{r} \phi_1 u_{t-k} + \sum_{q=1}^{N} \beta_1 Y_{t-q} + \sum_{q=1}^{N} \beta_3 K_{t-q} + \sum_{q=1}^{N} \beta_4 L_{t-q} + \sum_{q=1}^{N} \beta_5 CX_{t-q} + \sum_{q=1}^{N} \beta_6 P_{t-q} + \varepsilon_{1t} \quad ---(24)$$

$$P_t = \alpha_0 + \sum_{k}^{r} \phi_2 u_{t-k} + \sum_{q=1}^{M} \alpha_1 Y_{t-q} + \sum_{q=1}^{M} \alpha_3 K_{t-q} + \sum_{q=1}^{M} \alpha_4 L_{t-q} + \sum_{q=1}^{M} \alpha_5 CX_{t-q} + \sum_{q=1}^{M} \alpha_6 P_{t-q} + \varepsilon_{2t} \quad --(25)$$

$$K_t = \mu_0 + \sum_{k}^{r} \phi_3 u_{t-k} + \sum_{q=1}^{O} \mu_1 Y_{t-q} + \sum_{q=1}^{O} \mu_3 K_{t-q} + \sum_{q=1}^{O} \mu_4 L_{t-q} + \sum_{q=1}^{O} \mu_5 CX_{t-q} + \sum_{q=1}^{O} \mu_6 P_{t-q} + \varepsilon_{3t} \quad --(26)$$

$$L_t = \varphi_0 + \sum_{k}^{r} \phi_4 u_{t-k} + \sum_{q=1}^{P} \varphi_1 Y_{t-q} + \sum_{q=1}^{P} \varphi_3 K_{t-q} + \sum_{q=1}^{P} \varphi_4 L_{t-q} + \sum_{q=1}^{P} \varphi_5 CX_{t-q} + \sum_{q=1}^{P} \varphi_6 P_{t-q} + \varepsilon_{4t} \quad --(27)$$

$$CX_t = \theta_0 + \sum_{k}^{r} \phi_5 u_{t-k} + \sum_{q=1}^{C} \theta_1 Y_{t-q} + \sum_{q=1}^{C} \theta_3 K_{t-q} + \sum_{q=1}^{C} \theta_4 L_{t-q} + \sum_{q=1}^{C} \theta_5 X_{t-q} + \sum_{q=1}^{C} \theta_6 P_{t-q} + \varepsilon_{5t} \quad ---(28)$$

The existence of co-integration implies Granger causality; however, does not show the direction of causality. To assess the direction, the study was employed a vector error correction (VEC) modeling. If the variables under study are co-integrated, a vector error correction model should be estimated rather than a VAR as in a standard Granger causality test (Granger, 1988). Thus, following Granger (1988), and Engle and Granger (1987), we were estimated a VEC model for the Granger causality test. The vector error correction model is given by the following equation as:

Where, ui (i= 1,2,3,…) refer to error correction terms whose coefficients measure speeds of adjustment, $\phi_1, \phi_2, \phi_3, \phi_4, \phi_5,$ and $\phi_6,$ are intercepts, and N, M,O,P,C, and H are lag lengths. The ui (i=1,2,3) are derived from long-run co-integrating relationships that is Y= K+L+Cf+P.

Once the equilibrium conditions represented by the co-integrating relations are imposed, the VEC model describes how, in each time period, output growth is adjusting towards its long-run equilibrium state. Since the variables are supposed to be co-integrated, then in the short term, deviation of output from its long-run equilibrium path will feed back on its future changes in order to force its movement towards the long-run equilibrium state. The co integrating vectors from which the error-correction terms are derived are each indicating an independent direction where a stable, meaningful long-run equilibrium state exists. The coefficients of the error-correction terms, however, represent the proportion by which the long-run disequilibrium in the dependent variables is corrected in each short-term period (Ghali and El-Sakka, 2004).

Since our aim is on causality between economic growth and coffee eport, hence on the basis of regression Equations 24 and 28, unidirectional causality from CXt-s to Yt is implied if not only the estimated coefficients on the lagged CXt-s variables in Equation 28 are statistically different from zero as a group (based on standard F-statistic) but also the coefficient on the error-correction term in Equation 28 is significant, and if the set of estimated coefficients on the lagged Yt variables in Equation 28 are not statistically different from zero. On the other hand, Yt-s causes CXt if the estimated

coefficients on the lagged Yt-s variable in Equation 24 are statistically different from zero as a group, the coefficient on the error-correction term in Equation 28 is significant, and if the set of estimated coefficients on the lagged CXt variables in Equation 28 are not statistically different from zero. Bidirectional causality or feedback between Yt and Et would exist if the set of estimated coefficients on the lagged CXt-s variables in Equation 24 were statistically significant as a group and the set of estimated coefficients on the lagged Yts variables in Equation 28 were also statistically significant as a group and also the coefficient of error-correction terms in both Equations are significant (Chang, Tsangyao, 2002).

3.9 Granger Causality Test

Depending on the theoretical facts we have discussed, the reported F-statistics of the Wald statistics for the joint hypothesis for each equation was undertaken. The null hypothesis is that Y does not Granger-cause Coffee Export in the first regression and that Coffee Export does not Granger-cause Y in the second regression.

Before testing the causality of the VECM, first Granger causality test between real GDP and total coffee export was examined to determine the long run causality in VAR context, and then short run causality has been estimated using VECM. The Granger causality test or well knownas 'joint F-test' between totalcoffee export and economic growth was used in order to check the direction of causality between two variables in Ethiopia. The Granger procedure is selected because it consists more powerful but simpler way of testing causal relationship Granger (1986). Using this test, the following null and alternative hypotheses are estimated.

In testing long-run causality, four hypotheses were tested using VAR. First, 'growth hypothesis', which asserts that coffee, export because economic growth as complement to other inputs in the production functions. The growth hypothesis is supported if there is unidirectional Granger-causality from coffee export to real output. For the U.S., Akraca and Long (1979), Stern (1993, 2000), and Soytas and Sari (2006) give empirical support for the growth hypothesis.

$$C_t = \alpha_0 + \sum_{k}^{r} a1u_{t-k} + \sum_{q=1}^{M} \alpha 2Y_{t-q} + \sum_{q=1}^{M} \alpha_3 K_{t-q} + \sum_{q=1}^{M} \alpha_4 L_{t-q} + \sum_{q=1}^{M} \alpha_5 CX_{t-q} + \sum_{q=1}^{M} \alpha_6 P_{t-q} + \varepsilon_{2t} \quad --(29)$$

Equation (29) postulates that total export is related to its past values, growth in RGDP, capita, labor and a certain proportion of equilibrating error.

The null and alternate hypotheses in this case are;

H_0: Economic growth doesn't granger cause coffee export.

H_1: Economic growth granger causes coffee exports.

Second, conservation hypothesis' which suggests that policy on coffee export have no effect on the economic growth. It may be due to little share of coffee export in the production function. That means economic growth Granger cause coffee export growth. The hypothesis implies that coffee export policies designed to increasing coffee export. Unidirectional Granger-causality from real output to coffee export would lend support for the conservation hypothesis. Studies by Kraft (1978), Erol and Yu (1989), Abosedra and Baghestani (1991), Murry and Nan (1992), Thoma (2004), and Sari *et al*. (2008) support the conservation hypothesis in the case of the U.S. In this case VAR has the following form;

$$Y_t = \beta_0 + \sum_{k}^{r} \phi_1 u_{t-k} + \sum_{q=1}^{N} \beta_1 Y_{t-q} + \sum_{q=1}^{N} \beta_3 K_{t-q} + \sum_{q=1}^{N} \beta_4 L_{t-q} + \sum_{q=1}^{N} \beta_5 CX_{t-q} + \sum_{q=1}^{N} \beta_6 P_{t-q} + \varepsilon_{1t} \quad --(30)$$ Equation (34)

postulates that growth in RGDP is related to past values of itself, total nexport, capital and labor and a certain proportion of equilibrating error.

The null and alternate hypotheses in this case are;

*H_0:*Coffee export doesn't granger cause economic growth.

*H_1:*Coffee export granger cause economic growth.

Third, feedback hypothesis suggest that coffee exports and economic growth are interdependent. Bidirectional causality between coffee exports and economic growth show such behavior. Third, the feedback hypothesis asserts that coffee exports and real output are interdependent and act as complements to each other. The existence of bidirectional Granger-causality between coffee exports and real output substantiates the feedback hypothesis. Research by Glasure and Lee (1995, 1996), Zarnikau (1997), Lee (2006), and Mahadevan and Asafu-Adjaye (2007) lend support to the feedback hypo-thesis for the U.S.

Fourth, Neutrality hypothesis suggest that coffee exports and economic growth are independent. That is coffee exports and economic growth decisions are taken independently. Furthermore, the neutrality hypothesis views coffee exports as a relatively minor factor in the production of real output in which case coffee export policies may not adversely impact real output. The absence of Granger-causality between coffee export and real output is supportive of the neutrality hypothesis. Studies by Akraca and Long (1980), Yu and Hwang (1984), Yu and Choi (1985), Erol and Yu (1987), Yu *et al*. (1988), Yu and Jin (1992), Cheng (1996), Murry and Nan (1996), Soytas and Sari (2003), Chontanawat*et al*. (2006,

2008), Soytas*et al*. (2007), Chiou-wei*et al*. (2008), Narayan and Pra-sad (2008), Payne (2009), and Payne and Taylor (forth-coming) are supportive of the neutrality hypothesis in the U.S.

Otherwise, independence will happen. This is to mean that coffee export and economic growth decisions are taken independently.

The short-run causality between export and economic growth is examined using the difference of the variables in the above models are estimated in anticipation of yielding four distinct cases. That is,

$$\Delta Y_t = \beta_0 + \sum_{k}^{r} \phi_1 u_{t-k} + \sum_{q=1}^{N} \beta_1 \Delta Y_{t-q} + \sum_{q=1}^{N} \beta_3 \Delta K_{t-q} + \sum_{q=1}^{N} \beta_4 \Delta L_{t-q} + \sum_{q=1}^{N} \beta_5 \Delta CX_{t-q} + \sum_{q=1}^{N} \beta_6 \Delta P_{t-q} + \varepsilon_{1t} \quad --(31)$$

$$\Delta P_t = \alpha_0 + \sum_{k}^{r} \phi_2 u_{t-k} + \sum_{q=1}^{M} \alpha_1 \Delta Y_{t-q} + \sum_{q=1}^{M} \alpha_3 \Delta K_{t-q} + \sum_{q=1}^{M} \alpha_4 \Delta L_{t-q} + \sum_{q=1}^{M} \alpha_5 \Delta CX_{t-q} + \sum_{q=1}^{M} \alpha_6 \Delta P_{t-q} + \varepsilon_{2t} \quad --(32)$$

$$\Delta K_t = \mu_0 + \sum_{k}^{r} \phi_3 u_{t-k} + \sum_{q=1}^{O} \mu_1 \Delta Y_{t-q} + \sum_{q=1}^{O} \mu_3 \Delta K_{t-q} + \sum_{q=1}^{O} \mu_4 \Delta L_{t-q} + \sum_{q=1}^{O} \mu_5 \Delta CX_{t-q} + \sum_{q=1}^{O} \mu_6 \Delta P_{t-q} + \varepsilon_{3t} \quad ---(33)$$

$$\Delta L_t = \varphi_0 + \sum_{k}^{r} \phi_4 u_{t-k} + \sum_{q=1}^{P} \varphi_1 \Delta Y_{t-q} + \sum_{q=1}^{P} \varphi_3 \Delta K_{t-q} + \sum_{q=1}^{P} \varphi_4 \Delta L_{t-q} + \sum_{q=1}^{P} \varphi_5 \Delta CX_{t-q} + \sum_{q=1}^{P} \varphi_6 \Delta P_{t-q} + \varepsilon_{4t} \quad --(34)$$

$$\Delta CX_t = \theta_0 + \sum_{k}^{r} \phi_5 u_{t-k} + \sum_{q=1}^{C} \theta_1 \Delta Y_{t-q} + \sum_{q=1}^{C} \theta_3 \Delta K_{t-q} + \sum_{q=1}^{C} \theta_4 \Delta L_{t-q} + \sum_{q=1}^{C} \theta_5 \Delta CX_{t-q} + \sum_{q=1}^{C} \theta_6 \Delta P_{t-q} + \varepsilon_{5t} \quad ---(35)$$

First, unidirectional causality from Coffee exports to RGDP indicated if the estimated coefficients on the lagged E in equation (35) are statistically different from zero as a group $\alpha_1 \neq 0$ and the set of estimated coefficients on the lagged RGDP in (31) is not statistically different from zero, that is $\beta_1 = 0$.

Second, conversely, unidirectional causality from RGDP to coffee export use exists if the set of lagged coefficient in (35) is not statistically different from zero, that is $\alpha_1 = 0$ and the set of the lagged RGDP coefficients in (31) is statistically different from zero, that is $\beta_1 \neq 0$.

Third, feedback, or bilateral causality is suggested when the set of coffee export use and RGDP coefficients are statistically significantly different from zero in both regressions.

3.10 Test of Volatility

There are two approaches, impulse response function and variance (forecast error) decomposition, for characterizing the dynamic behavior of the VAR model.

The impulse response functions and variance decomposition technique suggested by Sims (1980) are useful devices in the VAR framework for testing the sources of variability. The impulse response function can trace the response of the endogenous variables to a shock in another variable. The variance

decomposition breaks down the variance of the forecast error for each variable into components that can be attributed to each of the endogenous variables.

Following Sims' (1980) seminal paper, dynamic analysis of VAR model is routinely carried out using the "orthogonalized" impulse responses, where the underlying shocks to the VAR model are orthogonalized using the Cholesky decomposition method. This method assumes the system is recursive and the estimations of impulse response function and variance decomposition are orthogonalized so that the covariance matrix of the resulting innovations is lower triangular (Chen and Patel, 1998). As a result, the Choleski decomposition method is criticized as an arbitrary method in attributing a common effect and changing the order of the equation may dramatically change the impulses. Recently, Pesaran and Shin (1998/2001) proposed an alternative approach, the generalized impulse response analysis, which is invariant to the ordering of the variables in the VAR. Unlike the Choleski decomposition method, the generalized impulse response functions are unique (Ibid).

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1Trend in Coffee Exports in Ethiopia

Ethiopia's coffee production is focused on East African, which Accounts for around one thirds of country's total output. Ethiopia is the key producer coffee, accounting 53.82% of Ethiopian output. (show appendix B) 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 the means animal product, cereal crop, oilseed and pulse which increased by 59.33% in the decade from 1999-2017G.C. The country provides between 1999 and 2017. There is 30.32 million quintal of coffee annually exported and coffee covers 56.82 percent of all exports of the country (based of NBE). According to Ethiopian revenue and customs authority, the country exported 30.32 million quintal of coffee, valued at about US dollars 917965.6 million US Dollar in 2017 which shows an increasing trend. 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 43 years. Two observations can be made: first, there were low growth rates in the values of coffee exported and the real value at the end of 2016/17 was three to four times higher than it was at the beginning of 1974/75. Second, there was a significant drop in the real value of exports from the trend line in 2017. This was because of reduction in volume of production, low international price and disturbance to coffee export licenses by government.

At the end of 2017, about 841.8 billion US dollar from coffee. Compared to the performance in 2016, foreign exchange obtained from the export of coffee in2017 increased by 59.3.

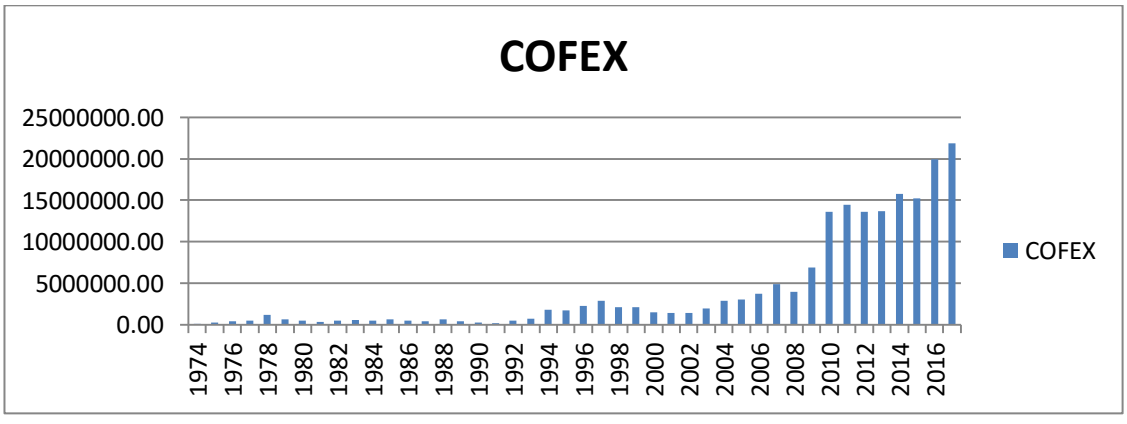


Figure 2: Trend in coffee exports in Ethiopia in USD from 1974/75-2016/17

Source: Author's calculation based on data from NBE (2018)

4.2Trend 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, 2017). 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 5.03 percent to total export of the country (ERCA, 2017). In 2017,3.93 million quintals worth US$ 279.9 million were exported.

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 below show depicts the trend in pulses exports. To show the following graph. In 1974 there was a high export value. Starting from 1974 to 1990 there was not change at all. But in 1991 there is decreasing the pulse export. Because of these fluctuation as a result of periodic falls in output, politically unstable. Starting from 1992 up to 2017 the pulse export is increasing. Figure 3 indicates the trend of coffee exports in US dollar over the last 43 years.

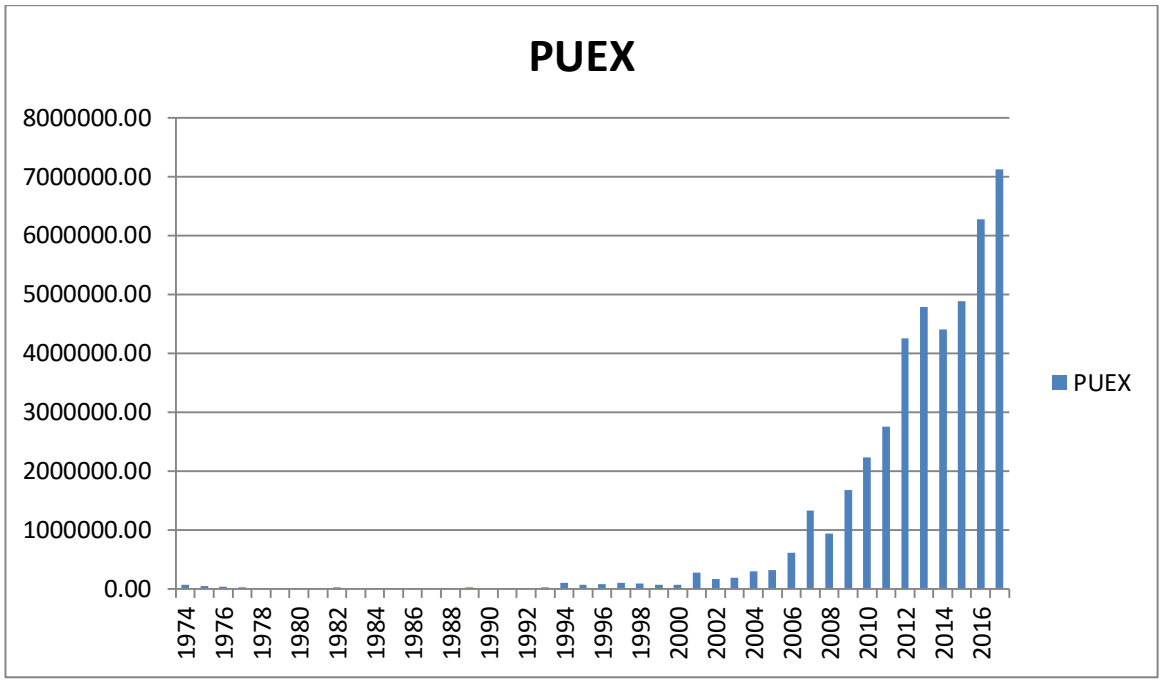


Figure 3: Trend in pulse exports in Ethiopia in USD from 1974/75-2016/17

Source: Author's calculation based on data from NBE (2018)

4.3. Descriptive Analysis of the Data

Before going to provide a comprehensive econometric analysis, the study gives the brief interpretation of statistical analysis. Table 1reports the descriptive statistics and interprets that the average real GDP at market prices is 12.32%. The average fixed capital formation was 4.72%. The mean value of labor force is 24.05653 million people. On the average pulse export is 5.08%. After this period pulse exported from Ethiopia stood high from its mean value. The average coffee export is 6.2%. In Ethiopia, coffee export stood below its average from 1974 to 2017, where it witnessed an increase a year later. After that year coffee has been exported above its mean export. This could be attributed to many reform programs that have been put in place by the government.

Table 4. 1: Descriptive Statistics

	LNRGDP	LNPUEX	LNLF	LNCOFE	LNCAP
Mean	12.32418	5.084985	24.05653	6.204438	4.718318
Median	12.07567	4.895479	22.05527	6.166824	4.621458
Maximum	14.42205	6.852740	44.93300	7.340315	5.954946
Minimum	11.53671	2.586587	11.02650	5.070064	4.149712
Std. Dev.	0.795856	0.990868	10.09371	0.607386	0.468848

Sourec : own computation (2019)

4.4 Econometrics Analysis

4.4 .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, pulse exports,) by using the Augmented Dickey-Fuller (1978) tests. The ADF test is a parametric test (pre-determined parameters) the above variables are not fulfilling the stationary condition.

Table 4.2: Unit Root Test (ADF)

Variables	Stationary at level I(0)		Decision remark	Stationary at first difference I(1)		Decision remark
	Test-statistic	p-value		Test-statistic	p-value	Stationary
LRGDP	4.403468	1.0000	Not Stationary	-5.073030	0.0001	Stationary
LCOFEX	-0.930761	0.7688	Not Stationary	-6.536047	0.0000	Stationary
LCAP	2.513133	1.0000	Not Stationary	-7.459623	0.0000	Stationary
LLAF	4.364019	1.0000	Not Stationary	-10.35050	0.0000	Stationary
LPUEX	-0.591721	0.8618	Not Stationary	-4.091577	0.0026	Stationary

Values of Mackinnon test for ADF and PP: 1% = -3.596616

5% = -2.933158

10% = -2.604867

Sourec : own computation (2019)

The results of Augmented Dickey fuller test were not 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 with differencing and first difference I (1) will apply which means testing the existence of unit root of once differenced data are presented in Table 4.1, respectively. Then I (0) not stationary, we proceed the next stapes.

The result reported in table 4.1 above indicates stationary test of the variables at level form I(1).The null hypothesis of non-stationary cannot be rejected even at 10% level for any of the variables because the critical values of Mackinnon test for ADF is (-3.5966) at 1%; (-2.933) at 5%and (-2.605) at 10%. To reject the null hypothesis, ADF 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 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 stationary at first difference for all variables.

4.4.2 LagLength Selection Criteria

The order of integration which inters 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 coffee 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), Akaikeinformation 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 4.3: Results of lag length selection criteria

VAR Lag Order Selection Criteria

Endogenous variables: LNRGDP LAF LNCAP LNCOFEX LNPUEX

Lag	LogL	LR	FPE	AIC	SC	HQ
1	122.5914	NA	5.26e-09*	-4.879570*	-3.824020*	4.497917*
2	137.4656	22.31125	9.16e-09	-4.373278	-2.262179	-3.609971
3	166.2705	36.00615	8.69e-09	-4.563524	-1.396875	-3.418564
4	194.8642	28.59370	9.81e-09	-4.743209	-0.521011	-3.216596

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

4.4.3 Johansen Co-Integration Test

Table 4.3 indicates that while LR, SC, FPE, HQ, AIC and HQ information criteria choose 1 lag order, this data fit the required model. Therefore, the information criteria provide 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 4.4 shows the co-integration test results for the economic growth model based on maximum Eigen values.

Table 4.4

Series: LNREALGDP LNCOFEX LNPUEX LNCAP LAF

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.560700	78.37701	69.81889	0.0089
At most 1	0.456950	43.82894	47.85613	0.1136
At most 2	0.186501	18.18564	29.79707	0.5524
At most 3	0.150785	9.516389	15.49471	0.3198
At most 4	0.061186	2.651807	3.841466	0.1034

Trace test indicates 1 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.560700	34.54807	33.87687	0.0416
At most 1	0.456950	25.64329	27.58434	0.0868
At most 2	0.186501	8.669253	21.13162	0.8581
At most 3	0.150785	6.864581	14.26460	0.5053
At most 4	0.061186	2.651807	3.841466	0.1034

Max-Eigen value test indicates 1 co-integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

4.5 DiagnosticTests

The Diagnostics test was also employed for VECM to detect model misspecification and as a guide for model improvement. These tests include serial correlation, heteroscedasticity and normality tests. The serial correlation test can be done using Breusch-Godfrey Serial Correlation LM Test to investigate serial correlation, which helps to identify the relationship that may exist between the current value of the regression residuals and lagged values. The null-hypothesis of the LM test that the residuals are not serially correlated is accepted at 5% level of significance

4.5.1 Serial Correlation

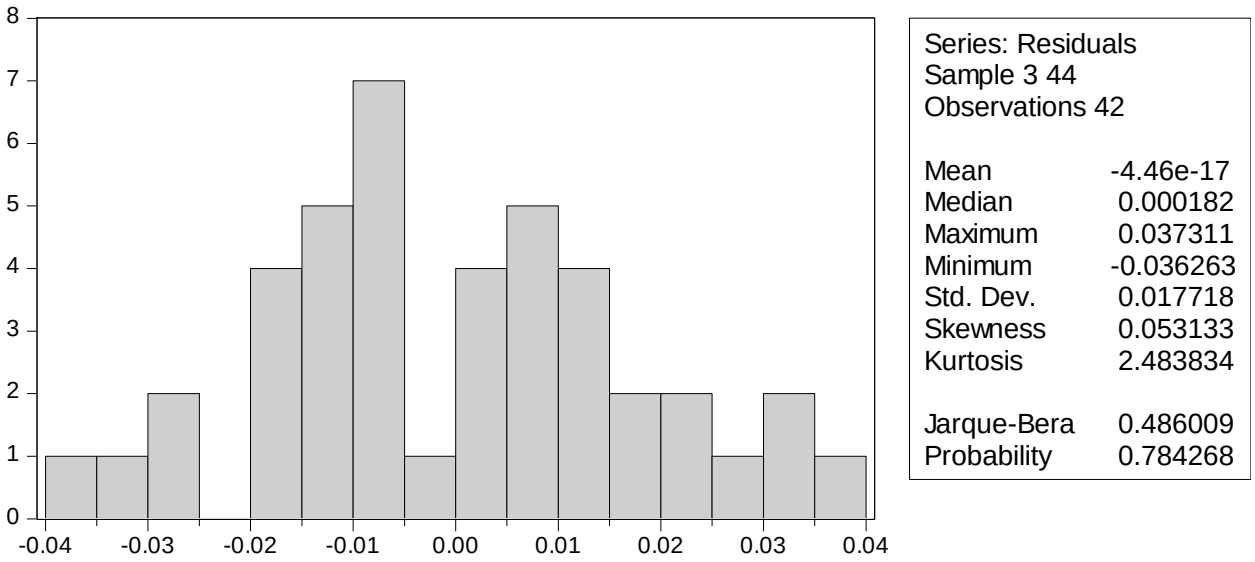
Table 4.5 Serial Correlation

	Lm stat		**prob.**
F-statistic	1.001452	Prob. F(2,33)	0.3782
Obs*R-squared	2.403286	Prob. Chi-Square(2)	0.3007

4.5.2 Normality Test

The Jarque-Bera normality test is used to see whether the regression errors are normally distributed. The null-hypothesis that the residuals are normal is accepted.

Figure 4



4.5.3 Hetroscedasticity

The hetreroscedasticity test, which helps to identify whether the variance of the errors in the model are constant or not. The null-hypothesis of the test is that the errors are homoscedastic was accepted and independent of the repressors' and that there is no problem of misspecification. The null-hypothesis that the residuals are homoscedasticity is accepted at 5% significance level. This indeed is not surprising, since heteroskedasticity is not much problem in time series (Green14, 1997).

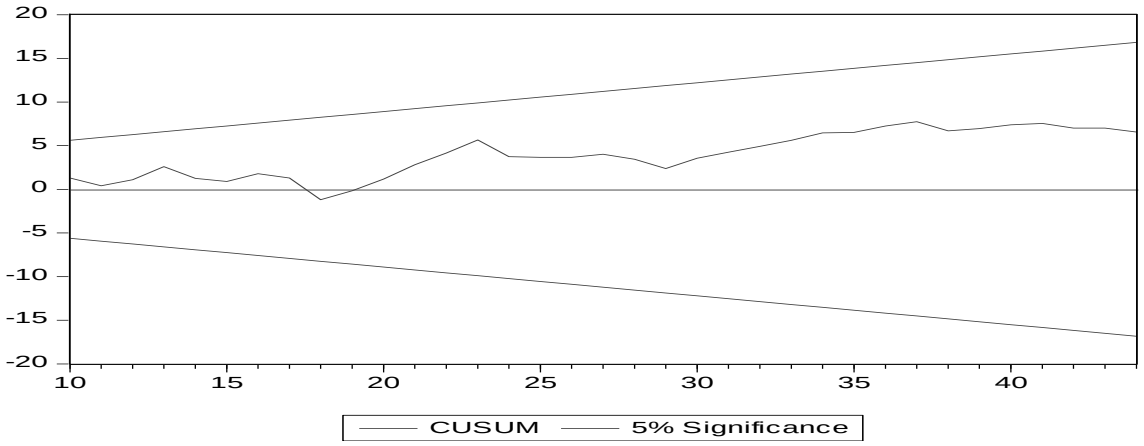
Table 4.6 Heteroskedasticity Test: Breusch-Pagan-Godfrey Prob.

F-statistic	0.955247	Prob. F(10,31)	0.4996
Obs*R-squared	0.989345	Prob. Chi-Square(10)	0.4499
Scaled explained SS	5.097305	Prob. Chi-Square(10)	0.8846

4.5.4 Test Stability

Also, in order to strength our analysis, the stability of the estimated parameters in the model is examined using stability test of Recursive residuals. The stability of the model is checked using CUMSUM methods and the graphs that show the results are presented as follows. The following figure affirms that the coefficients of the model are stable over a sample interval.

Figure 5: **Stability test**



Source : own drawing (2019)

4.6 Vector Error Correction Model

If two series are integrated of order one, i.e., I (1) we could model their relationship by taking first difference of each series and including the difference in VAR. From the Johansen test of co-integration test, we know that there exists a long-term equilibrium relationship between our variables with real GDP, so after identifying the existence of long-run relationship among the relevant variables, the vector error correction model is estimated in order to evaluate the short run properties of co-integrated series. The VEC has co-integration relations built into the specification so that it restricts the long run behavior of the endogenous variables to converge to their co-integrating relationships while allowing for short-run adjustment dynamics (Harris, 1995). The co-integration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The error correction terms lagged one period is shown in table 8.

First estimating the short run impact of LNCOFEX, LNPUEX, LNCPA, and LNLAF on growth in real GDP is done. In the estimation of the dynamic short-run model, Table 4.7 shows the parameters coefficient estimation of ECM (i.e, dynamic short run model).

The result from the following table 8 shows that, in the short run only the one year lagged value of LNCOFEX and LNCAP is significant in affecting current growth in real GDP whereas LNPUEX, and LNLAF are not statistical significance in affecting growth in real GDP.

The capital is insignificant in both short run and long run, result may be due to the fact that benefits from capital accumulations (both private and public) are not ensured in the short period of time and may have crowding out effect on growth, and it may also due to small capital accumulation in the country. The additional justification may be due to the macro economic instability like inflation and thus no one is willing to invest and thus accumulate the capital as in lined with Belay Tilahun (2015).

In spite of the insignificant effect of saving in economic growth of Ethiopia both in the short run and long run, labor has a strong positive impact on economic growth in the long-run in Ethiopia as in lined with Bencivenga and Smith (1991), and Roman (2015).

Table 4.7: Vector Error Correction Estimates

CointegratingEq: CointEq1

LNREALGDP(-1)	1.000000
LNCOFEX(-1)	-0.074819
	(0.00799)
	[-3.93549]

LNPUEX(-1)	-0.106920
	(0.03851)
	[-2.77619]
LNCAP(-1)	-0.043143
	(0.13686)
	[-0.31522]
LAF(-1)	-0.023782
	(0.00552)
	[-4.30974]
C	-3.550833

Error Correction:	D(LNREALGDP)	D(LNCOFEX)	D(LNPUEX)	D(LNCAP)	D(LAF)
CointEq1	-0.191874	-0.078524	0.978088	-0.319893	-1.840701
	(0.04004)	(0.36740)	(0.78983)	(0.17342)	(1.00568)
	[-4.79159]	[-0.21373]	[1.23835]	[-1.84464]	[-1.83030]
D(LNREALGDP(-1))	0.113599	-0.221199	4.479968	1.541699	5.065762
	(0.16054)	(1.47296)	(3.16655)	(0.69525)	(4.03191)
	[0.70759]	[-0.15017]	[1.41478]	[2.21746]	[1.25642]
D(LNCOFEX(-1))	0.027125	0.092445	0.314833	0.092735	0.393610
	(0.01915)	(0.17567)	(0.37766)	(0.08292)	(0.48087)
	[1.41669]	[0.52623]	[0.83365]	[1.11837]	[0.81855]
D(LNPUEX(-1))	-0.031348	-0.082720	-0.132788	-0.113968	0.167363
	(0.00936)	(0.08584)	(0.18453)	(0.04052)	(0.23496)
	[-3.35065]	[-0.96368]	[-0.71959]	[-2.81288]	[0.71230]
D(LNCAP(-1))	0.020701	0.082085	0.445881	-0.274490	-0.598341
	(0.03930)	(0.36061)	(0.77524)	(0.17021)	(0.98710)
	[0.52669]	[0.22763]	[0.57515]	[-1.61262]	[-0.60616]
D(LAF(-1))	-0.022903	-0.032322	0.078271	-0.059808	0.110631
	(0.00727)	(0.06668)	(0.14335)	(0.03148)	(0.18253)
	[-3.15117]	[-0.48471]	[0.54600]	[-1.90016]	[0.60610]
C	0.037444	0.070235	-0.136829	0.063855	0.592703
	(0.00719)	(0.06593)	(0.14174)	(0.03112)	(0.18048)

	[5.21056]	[1.06525]	[-0.96534]	[2.05182]	[3.28409]
R-squared	0.497755	0.033987	0.153739	0.351513	0.387469
Adj. R-squared	0.411656	-0.131615	0.008666	0.240344	0.282464
Sum sq. resids	0.012871	1.083474	5.007344	0.241391	8.118142
S.E. equation	0.019177	0.175944	0.378242	0.083048	0.481609
F-statistic	5.781183	0.205232	1.059734	3.161961	3.689994
Log likelihood	110.3040	17.21203	-14.93337	48.74369	-25.08048
Akaike AIC	-4.919238	-0.486287	1.044446	-1.987795	1.527642
Schwarz SC	-4.629626	-0.196675	1.334058	-1.698183	1.817254
Mean dependent	0.023057	0.044442	0.050713	0.041773	0.798057
S.D. dependent	0.025001	0.165396	0.379892	0.095284	0.568555

Determinant resid covariance (dof adj.)	9.81E-10
Determinant resid covariance	3.94E-10
Log likelihood	156.7634
Akaike information criterion	-5.560163
Schwarz criterion	-3.905240

Source: Own computation (2017)

The long run relationship is derived by normalizing growth in real GDP from table 4.7 the normalized co-integration equation can be written as:

4.6.1 long Run Vector Error Correction Equation

$$LNRGDP = 0.074819\,LNCOFEX + 0.106920\,PUEX + 0.043143\,LNCAP + 0.023782\,LNAF + 3.550833$$

The numbers in parenthesis under the estimated coefficients are the asymptotic standard errors. For the coefficients that are normalized to 1. The trend exerts a positive effect on growth in RGDP. This implies that holding all other factors constant in the long run.

From the above equation it can be observed that LNCOFEX, LNPUEX, LNCAP and LNLAF have positive and statistically significant relationship with real GDP in the long run. LNLAF has positive and statistically insignificant relationship with real GDP in the long run. A 1% change in LNCOFEX, LNPUEX, LNCAP and LNLAF will result in 0.0748%, 0.106%, 0.043%, and 0.024% increase in LNRGDP respectively.

Thus, we can conclude that, in the long run improving capital, labor force, and export are contributing

for economic growth in Ethiopia. To examine the impact of variables used in the study on economic growth, we can run VAR model.

4.6.2 Short Run Vector Error Correction equation

$\Delta LNGDPt=0.192ECT_{t-1}+0.114\Delta LnRGDP_{t-1}+0.027\Delta LnCOFEX_{t-1}-0.0313\Delta LNPUEX_{t-1}+0.021\Delta LNCAP_{t-1}-0.0234\Delta LAF_{t-1}+0.0374$

Since Durbin-Watson stat is greater than R-squared we accept the model. Speed of adjustment towards long run equilibrium but it must be significant and the sign must be negative. The coefficient of error correction model depicts that there is long run causality running from independent variables to LNRGDP.

The speed of adjustment or the error correction term (ECT) from the above model is represented by C (1) and we interpret in the following manor.

The previous period /year/ deviation from long run equilibrium corrected at speed of adjustments is 0.192.A percentage change in a 1% lag LNCOFEX associated with 0.027 increasing LNREALGDPon average at aceteris paribus effect. A percentage change in a 1% lag LNPUEX associated with 0.031 decreasing LNREALGDP on average at a ceteris paribus effect A percentage change in a 1% lag LNCAP associated with 0.020 increasing LNREALGDP on average at a ceteris paribus effect A percentage change in a 1% lag LNLAF associated with 0.023 decreasing LNREALGDP on average at a ceteris paribus effect

Bannerjee*et al*. (2003) as cited in Kidanemarim (2014), the highly significant error correction term further confirms the existence of a stable long-run relationship. Moreover, the coefficient of the error term (ECM-1) implies that the deviation from long run equilibrium level of real GDP in the current period is corrected by 19.2 % .in the next period to bring back equilibrium when there is a shock to a steady state relationship.

R^2 is 49.78% which indicate that the fitted value explains the model well, indicates 49.78% of the growth in real GDP is explained by the variables included in the regression. The F test which shows the jointly significant indicate that the variables are jointly significant at 5 percent level of significance. Moreover, the overall significance of (F-test) established all variables are jointly significant.

4.7 Granger Causality Test

The finding of this study, the unidirectional causality from economic growth to coffee export may be justified by the fact that:

The insinuation of the unidirectional causality running from economic growth to coffee export result is that, the result may statistically and empirically suggest that coffee export measures may be taken without endangering /hindering economic development.

The results further show that there is: unidirectional causality running from Economic growth to coffee export both in the short run and long run; unidirectional Granger-causality flowing from Economic growth to Total export in the long run; unidirectional causality running from Economic growth to Gross domestic production in long run; unidirectional causality running from Gross capital formation to coffee export in long run; unidirectional causality running from Gross capital formation to Export in long run bidirectional causality between Gross capital formation and Gross domestic production in the long run; unidirectional causality from export to coffee export in the long run;

Table 4. 8: **Granger Causality Tests**

Null Hypothesis:	Obs	F-Statistic	Prob.
LNCOFEX does not Granger CauseLNREALGDP	43	8.66350	0.0054
LNREALGDP does not Granger Cause LNCOFEX	43	0.67750	0.4153

Source: own computation (2019)

4.8 Test of Volatility: Impulse Response and Variance Decomposition

Impulse response is a method of assessing the interaction among the variables in the VAR. it can be used either to assess the dynamic behavior of the VAR or to investigate the policy impact of the variables that constitute the VAR (Alemayehu, 2009).

The coefficients of VAR or VEC models only show the direct or ceteris paribus effect. They do not consider the lagged explanatory variables in each equation are interred linked. That is both with the lag and contemporaneously and thus does not reflect the full impact of one variable on the other. Due to this, the analysis relies to a great extent on impulse response functions to estimate the total short and long run an increase in energy consumption on economic growth.

In sum, impulse response shows how one variable, say economic growth responds over time to a shock in another variable (say energy consumption) and compares this response to shocks from other variables. Impulse response only traces out the time path of the effects of shocks of other variables contained in the VAR model on a specific variable (Belay Tilahun, 2016). On the other hand, this method is designed to determine how each variable responds over time to an earlier shock in that variable and to shocks in other variables (Shin, 2006).

The variance decomposition helps in identifying the degree to which one variable influences the other. In this study variance decomposition was used to break down and ascertain the degree to which energy consumption influence other variable in the system and vice versa.

To make it clear, variance decompositions show the portion (or relative importance) of variance in the prediction for each variable in the system that is attributable to its own innovations and to shocks to other variables in the system.

Enders in Shan *et al.* (2006) as cited in Belay (**2006**) proposed that the forecast-error variance decomposition permits inferences to be drawn concerning the proportion of the movements in a particular time-series due to its own earlier shocks vis-a-vis shocks arising from other variables in a VAR model. The technique breaks down the variance of the forecast error for each variance following a shock to a particular variable, and thus, it identifies which variables are strongly affected and those that are not.

4.8.1 Impulse Response of VEM

Impulse response function helps us to trace the effect of a one standard deviation shock to one of the innovations on current and future values of the endogenous variables. We can identify the positive or negative impact of the variables and determine how long it would take for that effect to work. It is a method of assessing the interaction among the variables in the VAR. This study used the generalized impulse response function; the reason is it does not require orthogonalization of innovations and is invariant of the ordering of the variables in VAR.

In response to a one standard deviation disturbance output (LNRGDP) itself future output increase by 0.019258in the first year and it declines in second year and consequently in third year and it continue increase but it never dies out in the long run and reaches 0.011228 at the 10^{th}year. (Appendix D)

A one standard deviation disturbance originating from capital results in an approximately 0.026729 percent increase in output in first year and it further increase to 0.010356in the 3^{rd} year and it did not die out in the time horizon and consequently it reaches 0.024802at the 10^{th} year. A one standard deviation disturbance originating from labor results in an approximately 0.028889 increase in output in first year and it never dies out in the long run and consequently it reaches 0.288914 at the 10^{th} year. The result shows the impact of capital and labor is permanent.

A one standard deviation disturbance originating from LNCOFEX produces a 0.070637 increase in LNRGDP in the first year. Its effect continues to fall as the forecast horizon is extended and reaches -0.018106 at the 10^{th}yearIn other words, coffee export has a long- run impact on economic growth.

4.8.2 Variance Decomposition of VEM

The impulse response functions trace the effect of a shock to one endogenous variable on the other variables in the VAR whereas variance decomposition separates the variation in an endogenous variable into the component shocks to the VAR. The relative importance of each random innovation in affecting the variables in the VAR can be seen by the variance decomposition results. It highlights the proportion of the movements in the dependent variables that are results of their own shocks, against shocks from the other variables.

Appendix Reports the results of the variance decomposition of output growth in Ethiopia within a 10^{th}period horizon. We limited our discussion on the relative importance of endogenous variables in explaining the variation in LNRGDP and LNCOFEX; thus, we only decompose the forecast error variance on LNRGDP and LNCOFEX. In appendix-E the variance estimates indicate that a greater proportion of the variation in LNRGDP is due to its own innovations. The variation due to the other variables is bigger. The other three variables together explain approximately 56% of the future variation in GDP growth in Ethiopia. When we look the partial effect of factor inputs, LNCOFEX (17.6%) as percent of LNGDP has the effect on GDP growth. LNLAF (48%) and LNPUEX (8%). 17.6% of future changes in GDP are due to changes in LNCOFEX, showing it has important impact on future growth rate of output in Ethiopia. LAF has highest important compared to LNPUEXS, LNCOFEX and LNCAP. As it can be seen from the appendix D the response of output growth to shocks coming from coffee export input is slow during the first periods and its full effect on output continues to over time horizon and it has permanent effect. LNCAP and LNCAP have permanent effects over all period.

The finding evidence shows that LNPUEXS and LNCOFEX may be relatively more important input than both labor and Capital in Ethiopia in the long run. This may be due to the fact that in Ethiopia, labor tends to be abundant and relatively cheaper, our results suggest that in order to sustain high economic growth rates in the long run, the country need to expand its Gross Domestic product capacity to encourage investment and thus, economic growth, and Export to generate foreign currency.

on the other hand, shows the variance decomposition result for LNCOFEX. The variance estimate result shows that high variation in LNCOFEX is due to RGDP changes. Hence, economic growth is significantly important as it explains 17.6% of future changes in coffee export. This finding is consistent with our previous result. The variation due to the other variables, when compared to GDP is higher. (Appendix E)

CHAPTER FIVE

CONCLUSION 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 coffee exports efficiency level. A section for suggestions for further study is also given.

5.1 Summary

In this study we have the following summary this data is homoscedasticity rather than Heteroskedasticity test. The nexus between coffee export and RGDP are a positive relationship. The data also normally distribute; it is stable, generally coffee export increasing above 7% in the RGDP. Between the real gross domestic product and coffee export generally are positive relationships. the data Granger causality of coffee exports and economic growth is ui-directional running in both directions.

The main objective of this study was to empirically determine the contribution and nexus of coffee export on economic growth of Ethiopia using annual data for the period 1974 to 2017. The causal relationship between coffee exports and economic growth of the country was analyzed with the application of Granger (1969) causality test. Descriptive and time series techniques were used to determine the trends of coffee exports and to evaluate the nexus of coffee exports on economic growth (GDP) respectively. These are Unit root tests (ADF tests), a co-integration test (Johansen's procedure and Engle and Granger) to know the existence of long-run relationships between economic growth and coffee exports, Error correction method and Granger-causality tests the Breusch-Pagan-Godfrey Heteroskedasticity test, the Breusch-Godfrey Serial Correlation LM Test 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 coffee exports.

5.2 Conclusions

The co-integration tests results showed that the long-run relationships exist between the GDP and coffee exports and in its set up, error correction method estimates the long-run relationship between economic growth and coffee export as well as fluctuation in the short-run.

Coffee 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 Coffee export and economic growth in Ethiopia and a positive and significant 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 capital formation has a positive and significant effect on real GDP. Where a positive and significant relation between pulse export and economic growth was observed. This is a little bit speed of adjustment could be related to the emphasis given to the export growth and expansion policies by government and other favorable conditions.

Finally, according to the data Granger causality of coffee exports and economic growth is ui-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 coffee export expansion policies in order to achieve high economic growth.

5.3 Recommendations

It 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. It should emphasize towards value addition than exporting raw coffee since the relationship with economic growth is positive.

The results show that there is: unidirectional causality running from Economic growth to coffee export both in the short run and long run; unidirectional Granger-causality flowing from Economic growth to coffee export in the long run. Unidirectional causality running from unidirectional causality from to coffee export RGDP in the long run; A 1% change in LNCOFEX, LNPUEX and LNLAF will result in 0.0748%, 0.106%, and 0.024% increase in LNRGDP respectively in the long run. In an empirical sense, it implies 19.2% of the disturbance in the short run is corrected each year or it adjusts any disequilibrium towards long run equilibrium state path or it indicates that 19.2 % of the disequilibrium from the long run path will be correcting in one year.

Generally, it should be improving resources and development investment in coffee export research and extension services in order to improve the use of quality of coffee and purchase inputs and to protect deforestation because coffee by nature shadow live tree.

5.3 Areas for Further Research

This study could not exhaust all aspects of coffee export, in relation to the national and the regional level in Ethiopia. For example, looking at the contribution of other coffee exports other than to examine in this study. Furthermore, issues on the effect of coffee to economic growth are not discussed. Since it is clear from this study that coffee 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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Appendix

Appendix-AThe value of real gross domestic product and Coffee and pulse exports from 1974-2017 in USD

Year	RGDP	COFEX	PUEX
1974	97,651.1	117507.00	73529.00
1975	98,835.0	297688.00	52820.00
1976	99,589.4	408850.00	48506.00
1977	99,233.1	514525.00	30442.00
1978	102,858.6	1176626.00	17907.00
1979	108,023.1	631651.00	25851.00
1980	108,920.1	524325.00	23693.00
1981	109,170.3	377245.00	20822.00
1982	120,201.8	497650.00	28372.00
1983	111,615.5	590444.00	20274.00
1984	101,802.6	466,269.00	16,875.00
1985	111,910.2	664,790.00	12,635.00
1986	126,610.9	524,348.00	8,481.00
1987	125,935.9	439,181.00	16,093.00
1988	126,867.8	626,448.00	16,317.00
1989	132,336.2	405,103.00	35,961.00
1990	128,347.2	268,451.00	15,716.00
1991	125,406.3	168,324.00	386.00
1992	139,411.5	536,982.00	4,050.00
1993	139,480.2	718,019.00	27,704.00
1994	147,454.5	1,799,033.71	103,287.42
1995	162,373.1	1,724,008.09	77,224.11
1996	169,246.9	2,307,393.56	87,854.07
1997	167,917.5	2,889,530.58	102,952.83
1998	178,512.7	2,112,712.75	101,657.63
1999	184,880.7	2,133,645.55	80,021.17
2000	198,595.2	1,520,100.60	72,799.62
2001	201,840.0	1,393,809.27	281,409.10
2002	197,604.4	1,418,323.93	171,243.68

Year	RGDP	COFEX	PUEX
2003	220,782.1	1,926,678.82	194,678.54
2004	248,698.3	2,901,327.29	306,609.32
2005	277,396.5	3,076,493.99	320,969.14
2006	310,115.1	3,741,744.77	619,559.70
2007	344,775.5	4,897,344.10	1,333,631.14
2008	379,362.4	3,932,229.39	946,826.06
2009	419,217.8	6,913,379.56	1,677,731.48
2010	475,647.5	13,617,880.48	2,232,691.58
2011	517,026.5	14,424,847.58	2,762,646.37
2012	568,432.3	13,597,849.74	4,251,495.82
2013	626,977.1	13,708,114.36	4,790,442.64
2014	692,221.7	15,734,933.34	4,409,211.94
2015	1,449,397.5	15,267,166.66	4,886,962.93
2016	1,596,481.6	19,897,558.87	6,276,562.90
2017	1,596,481.6	21,893,480.41	7,124,264.40

Appendix-BThe value of animal fodder , animal product , meat and meat product , cereals , oilseed and Coffee and pulse exports from 1991-2009 in thousand quantity(kg) and USD

		animal fodder	animal product	meat and meat product	cereals	coffee	oilseed	pulse	total
1991	**Volume (in million Kg)**	1.89	0.00	2.06	2.84	101.23	51.31	32.66	**192.00**
	Value (in million USD)	0.18	0.00	4.06	2.13	268.18	34.76	14.14	**323.44**
1992	**Volume (in million Kg)**	1.85	0.01	1.98	3.82	116.56	42.86	26.33	**193.40**
	Value (in million USD)	0.19	0.04	3.98	2.92	258.47	30.74	10.78	**307.12**
1993	**Volume (in million Kg)**	2.93	0.02	0.87	6.98	99.18	56.97	29.87	**196.83**
	Value (in million USD)	0.30	0.01	1.70	14.94	180.53	33.01	9.89	**240.39**
1994	**Volume (in million Kg)**	3.18	0.02	0.84	22.30	122.89	97.59	126.73	**373.56**
	Value (in million USD)	0.59	0.02	1.42	12.52	182.05	42.55	39.78	**278.94**
1995	**Volume (in million Kg)**	4.44	0.21	2.10	29.48	138.19	117.01	0.00	**291.42**
	Value (in million USD)	0.31	0.08	3.10	14.27	183.46	62.95	0.00	**264.16**
1996	**Volume (in million Kg)**	3.48	12.51	4.12	24.54	155.56	105.93	76.84	**382.98**

		animal fodder	animal product	meat and meat product	cereals	coffee	oilseed	pulse	total
	Value (in million USD)	0.31	0.25	7.84	11.52	221.54	82.62	25.70	**349.78**
1997	**Volume (in million Kg)**	5.70	0.63	6.26	13.94	136.44	158.99	103.12	**425.08**
	Value (in million USD)	0.73	0.35	12.52	6.32	296.47	116.43	30.43	**463.25**
1998	**Volume (in million Kg)**	4.21	1.18	7.85	37.71	146.24	261.79	108.26	**567.25**
	Value (in million USD)	0.47	0.42	18.32	13.80	353.16	209.44	36.97	**632.59**
1999	**Volume (in million Kg)**	28.71	0.53	5.85	5.77	176.43	234.98	158.75	**611.02**
	Value (in million USD)	2.31	0.43	15.47	1.62	424.17	187.42	70.30	**701.71**
2000	**Volume (in million Kg)**	40.83	1.27	6.48	3.01	170.69	152.09	232.66	**607.03**
	Value (in million USD)	2.84	0.60	20.89	0.88	524.29	218.76	142.79	**911.05**
2001	**Volume (in million Kg)**	0.14	1.08	7.47	0.03	133.99	287.99	137.96	**568.66**
	Value (in million USD)	0.02	0.53	26.58	0.03	375.84	356.35	90.69	**850.05**
2002	**Volume (in million Kg)**	26.95	2.50	10.18	13.67	172.21	299.20	225.45	**750.15**
	Value (in million USD)	4.72	0.89	34.00	4.80	528.40	358.57	129.86	**1,061.24**
2003	**Volume (in million Kg)**	0.29	2.63	16.88	121.82	196.12	254.19	224.48	**816.41**
	Value (in million USD)	0.03	0.72	63.29	32.76	841.65	326.65	137.85	**1,402.96**
2004	**Volume (in million Kg)**	0.05	2.21	17.67	11.36	169.39	367.44	226.16	**794.27**
	Value (in million USD)	0.00	0.89	78.81	3.93	832.91	472.31	159.69	**1,548.55**
2005	**Volume (in million Kg)**	0.04	2.43	15.47	4.49	199.10	283.85	357.52	**862.91**
	Value (in million USD)	0.01	0.70	74.26	2.12	746.42	443.45	233.35	**1,500.30**
2006	**Volume (in million Kg)**	0.00	2.34	9.97	18.72	189.66	313.53	353.02	**887.24**
	Value (in million USD)	0.00	0.51	49.29	9.83	714.30	651.89	250.70	**1,676.52**
2007	**Volume (in million Kg)**	0.04	2.27	18.42	35.40	183.84	319.45	340.75	**900.17**
	Value (in million USD)	0.01	0.94	91.95	13.77	780.23	510.07	219.87	**1,616.84**
2008	**Volume (in million Kg)**	0.00	2.94	18.97	9.31	198.62	436.57	375.43	**1,041.83**
	Value (in million USD)	0.00	1.64	96.41	6.80	722.43	477.20	232.38	**1,536.85**
2009	**Volume (in million Kg)**	0.00	3.03	19.56	70.87	225.67	333.51	392.74	**1,045.39**
	Value (in million USD)	0.00	2.03	98.66	26.75	882.47	351.03	279.90	**1,640.85**
		13.02	11.05	702.55	181.72	9,316.96	4,966.20	2,115.08	17,306.59

coffee export = 53.834

pulse export = 12.221

Appendix C Result of Testing Granger Causality between Economic growth and all independent variables

Null Hypothesis:	Obs	F-Statistic	Prob.
LNCOFEX does not Granger Cause LNREALGDP	43	8.66350	0.0054
LNREALGDP does not Granger Cause LNCOFEX		0.67750	0.4153
LNPUEX does not Granger Cause LNREALGDP	43	0.54658	0.4640
LNREALGDP does not Granger Cause LNPUEX		12.7903	0.0009
LNCAP does not Granger Cause LNREALGDP	43	1.52218	0.2245
LNREALGDP does not Granger Cause LNCAP		10.5790	0.0023
LAF does not Granger Cause LNREALGDP	43	4.46376	0.0409
LNREALGDP does not Granger Cause LAF		1.48340	0.2304
LNPUEX does not Granger Cause LNCOFEX	43	1.58638	0.2151
LNCOFEX does not Granger Cause LNPUEX		10.7497	0.0022
LNCAP does not Granger Cause LNCOFEX	43	4.41772	0.0419
LNCOFEX does not Granger Cause LNCAP		2.15963	0.1495
LAF does not Granger Cause LNCOFEX	43	7.05461	0.0113
LNCOFEX does not Granger Cause LAF		2.41312	0.1282
LNCAP does not Granger Cause LNPUEX	43	11.5440	0.0015
LNPUEX does not Granger Cause LNCAP		0.66749	0.4188
LAF does not Granger Cause LNPUEX	43	10.0643	0.0029
LNPUEX does not Granger Cause LAF		3.33546	0.0753
LAF does not Granger Cause LNCAP	43	5.27351	0.0270
LNCAP does not Granger Cause LAF		2.20217	0.1457

APENDIX-D Impulse Response of VAR model the RGDP and the other independent variables

	Response of LNREALGDP:				
Perid	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.019258	0.000000	0.000000	0.000000	0.000000
	(0.00210)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
2	0.017619	0.003722	-0.004350	-0.001056	-0.007423
	(0.00381)	(0.00359)	(0.00339)	(0.00341)	(0.00334)
3	0.012509	0.004267	-0.001520	-0.000955	-0.005168
	(0.00393)	(0.00465)	(0.00409)	(0.00432)	(0.00410)
4	0.012803	0.006124	0.002556	-0.003257	0.000669
	(0.00358)	(0.00512)	(0.00426)	(0.00530)	(0.00407)
5	0.014101	0.008939	0.004329	-0.003574	0.005003
	(0.00399)	(0.00551)	(0.00459)	(0.00638)	(0.00472)
6	0.014112	0.010424	0.004089	-0.003439	0.007577
	(0.00461)	(0.00586)	(0.00521)	(0.00751)	(0.00566)
7	0.013149	0.010585	0.003619	-0.002700	0.009546
	(0.00500)	(0.00626)	(0.00589)	(0.00862)	(0.00641)
8	0.012271	0.010294	0.003241	-0.001838	0.011322
	(0.00528)	(0.00669)	(0.00649)	(0.00963)	(0.00705)
9	0.011670	0.010117	0.002771	-0.000661	0.012775
	(0.00556)	(0.00703)	(0.00698)	(0.01052)	(0.00768)
10	0.011228	0.010088	0.002066	0.000708	0.013821
	(0.00584)	(0.00725)	(0.00742)	(0.01131)	(0.00825)

Response of LNCOFEX:

Period	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.070637	0.153977	0.000000	0.000000	0.000000
	(0.02498)	(0.01680)	(0.00000)	(0.00000)	(0.00000)
2	0.051193	0.127943	-0.009734	-0.006305	-0.004061
	(0.03314)	(0.03229)	(0.02775)	(0.02823)	(0.02853)
3	0.035380	0.072838	0.000437	-0.023335	0.003237
	(0.02895)	(0.03613)	(0.03067)	(0.03299)	(0.03049)
4	0.032482	0.039662	0.014299	-0.031122	0.013064
	(0.02334)	(0.03771)	(0.03143)	(0.03944)	(0.02912)
5	0.032572	0.025653	0.020611	-0.033223	0.019807
	(0.02157)	(0.03556)	(0.02999)	(0.04259)	(0.03136)
6	0.030006	0.020246	0.021867	-0.030233	0.024641
	(0.02011)	(0.03010)	(0.02910)	(0.04321)	(0.03276)
7	0.026383	0.017813	0.020897	-0.025780	0.029047
	(0.01947)	(0.02484)	(0.02867)	(0.04316)	(0.03236)
8	0.023095	0.016790	0.018837	-0.020241	0.032785
	(0.01941)	(0.02187)	(0.02825)	(0.04247)	(0.03172)
9	0.020412	0.016395	0.015745	-0.014304	0.035246
	(0.01934)	(0.02060)	(0.02752)	(0.04158)	(0.03119)
10	0.018106	0.016162	0.012021	-0.008174	0.036352
	(0.01912)	(0.01978)	(0.02662)	(0.04041)	(0.03047)

Response of LNPUEX:

Period	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.141069	0.142830	0.274125	0.000000	0.000000
	(0.05012)	(0.04508)	(0.02991)	(0.00000)	(0.00000)
2	0.186556	0.182929	0.106517	-0.016079	0.031445
	(0.06497)	(0.06399)	(0.05703)	(0.05683)	(0.05732)
3	0.110982	0.132741	0.003215	-0.005743	-0.016821
	(0.05834)	(0.07186)	(0.06199)	(0.06718)	(0.06163)
4	0.049935	0.060144	-0.006600	-0.017745	-0.015438

	(0.04648)	(0.07401)	(0.06242)	(0.07549)	(0.05828)
5	0.040397	0.028878	0.016403	-0.028750	0.009866
	(0.03809)	(0.06632)	(0.05652)	(0.07786)	(0.05891)
6	0.048077	0.028203	0.027004	-0.031533	0.027269
	(0.03249)	(0.05109)	(0.05154)	(0.07530)	(0.05857)
7	0.048685	0.032423	0.025203	-0.027296	0.034879
	(0.03110)	(0.03653)	(0.04850)	(0.07324)	(0.05572)
8	0.043502	0.032661	0.021161	-0.021665	0.040181
	(0.03133)	(0.02903)	(0.04636)	(0.07071)	(0.05289)
9	0.038605	0.031296	0.018268	-0.015650	0.045604
	(0.03139)	(0.02758)	(0.04430)	(0.06781)	(0.05088)
10	0.035606	0.030591	0.015198	-0.009224	0.049956
	(0.03102)	(0.02788)	(0.04224)	(0.06462)	(0.04905)

Response of LNCAP:

Period	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.026729	0.019682	-0.002517	0.068106	0.000000
	(0.01133)	(0.01073)	(0.01051)	(0.00743)	(0.00000)
2	0.029105	0.017087	-0.037631	0.028467	-0.026219
	(0.01488)	(0.01555)	(0.01436)	(0.01362)	(0.01308)
3	0.010356	0.010671	-0.030547	0.040712	-0.029716
	(0.01508)	(0.01796)	(0.01622)	(0.01641)	(0.01400)
4	0.014533	0.007777	-0.020486	0.020608	-0.020688
	(0.01301)	(0.01878)	(0.01606)	(0.01937)	(0.01531)
5	0.020284	0.013532	-0.010662	0.017712	-0.012797
	(0.01147)	(0.01853)	(0.01543)	(0.02181)	(0.01557)
6	0.024594	0.017560	-0.007612	0.009928	-0.007860
	(0.01093)	(0.01667)	(0.01512)	(0.02287)	(0.01670)
7	0.024850	0.019214	-0.004599	0.006989	-0.003314
	(0.01089)	(0.01442)	(0.01502)	(0.02361)	(0.01737)
8	0.024913	0.019300	-0.001900	0.003106	0.001779
	(0.01082)	(0.01256)	(0.01513)	(0.02350)	(0.01751)
9	0.024872	0.019453	0.000605	0.001216	0.006843

	(0.01091)	(0.01174)	(0.01509)	(0.02316)	(0.01741)
10	0.024802	0.019651	0.002093	1.95E-05	0.011362
	(0.01111)	(0.01164)	(0.01501)	(0.02265)	(0.01725)

Response of LAF:

Period	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.028889	0.112691	-0.058610	0.086906	0.454723
	(0.07414)	(0.07305)	(0.07172)	(0.07080)	(0.04961)
2	0.170717	0.231326	0.012826	0.075598	0.479133
	(0.11251)	(0.11423)	(0.10858)	(0.10932)	(0.09640)
3	0.207228	0.277424	-0.015246	0.164368	0.456800
	(0.13182)	(0.14789)	(0.13219)	(0.13526)	(0.12216)
4	0.207180	0.267626	-0.067523	0.197778	0.419211
	(0.13671)	(0.17799)	(0.15314)	(0.18033)	(0.14341)
5	0.200798	0.253240	-0.093212	0.242977	0.394590
	(0.14244)	(0.19979)	(0.16909)	(0.22348)	(0.16471)
6	0.212260	0.251210	-0.111023	0.268078	0.378938
	(0.15015)	(0.21058)	(0.18400)	(0.26248)	(0.18892)
7	0.229644	0.262122	-0.125592	0.294187	0.365409
	(0.15967)	(0.21420)	(0.19908)	(0.29646)	(0.21194)
8	0.248877	0.277134	-0.139666	0.312400	0.353838
	(0.16990)	(0.21620)	(0.21467)	(0.32606)	(0.23306)
9	0.268171	0.293282	-0.149887	0.326935	0.346247
	(0.18030)	(0.21988)	(0.22932)	(0.35214)	(0.25219)
10	0.288914	0.309920	-0.156490	0.336263	0.343381
	(0.19045)	(0.22550)	(0.24261)	(0.37508)	(0.26936)

Source: Own computation (2019)

Appendix E Variance Decomposition of the VAR model of the economic growth and the independent variables

Variance Decomposition of LNREALGDP:						
Period	S.E.	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.019177	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.028806	89.18033	1.816134	0.731367	0.000761	8.271407
3	0.034989	83.49355	4.521957	0.631321	0.014823	11.33835
4	0.041882	79.15819	9.041737	2.687281	0.176449	8.936342
5	0.050839	73.98939	14.18056	5.262646	0.404226	6.163178
6	0.060901	68.90949	18.77344	7.413114	0.603393	4.300559
7	0.071601	64.20545	22.54606	9.352478	0.774227	3.121793
8	0.082951	60.02474	25.55196	11.10204	0.923025	2.398233
9	0.094889	56.44652	27.93696	12.58654	1.048783	1.981198
10	0.107260	53.42290	29.84831	13.81687	1.153137	1.758792
Variance Decomposition of LNCOFEX:						
Period	S.E.	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.175944	16.83830	83.16170	0.000000	0.000000	0.000000
2	0.250846	14.38153	84.60863	0.698319	0.010742	0.300784
3	0.303685	12.59692	85.94141	0.905828	0.008220	0.547615
4	0.347626	11.69631	86.84367	0.907765	0.006655	0.545594
5	0.386988	11.31525	87.23425	0.924961	0.005529	0.520011
6	0.422587	11.05203	87.44593	0.971307	0.004656	0.526085
7	0.454953	10.81754	87.61149	1.022361	0.004024	0.544584
8	0.484824	10.62414	87.74368	1.068017	0.003572	0.560591
9	0.512750	10.47066	87.83945	1.111934	0.003250	0.574702
10	0.539049	10.34239	87.90846	1.156390	0.003041	0.589717

Variance Decomposition of LNPUEX:

Period	S.E.	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.378242	24.42926	9.238080	66.33266	0.000000	0.000000
2	0.546972	37.63857	10.95898	50.75993	0.436120	0.206403
3	0.653220	42.08611	12.04135	44.90467	0.331988	0.635889
4	0.734985	42.51348	12.52852	43.62340	0.302948	1.031646
5	0.811885	42.71625	12.74643	43.21964	0.287737	1.029947
6	0.885713	43.11042	12.95487	42.67396	0.281692	0.979059
7	0.954183	43.45788	13.15720	42.14614	0.275824	0.962951
8	1.017963	43.65799	13.33022	41.78124	0.271554	0.958996
9	1.078473	43.78295	13.47627	41.52430	0.269124	0.947356
10	1.136401	43.88158	13.60688	41.31240	0.267885	0.931257

Variance Decomposition of LNCAP:

Period	S.E.	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.083048	15.27563	4.729720	2.430514	77.56414	0.000000
2	0.108735	22.51520	5.221268	2.977990	64.58264	4.702904
3	0.129976	19.24289	6.658254	2.095192	62.89578	9.107879
4	0.148716	18.50784	8.743176	2.029722	62.23361	8.485649
5	0.169948	19.26214	11.64303	2.526844	59.56830	6.999693
6	0.192309	20.22049	14.65787	3.125560	56.23922	5.756850
7	0.215222	20.86242	17.48161	3.893059	53.00913	4.753784
8	0.238917	21.34031	20.03669	4.805827	49.90704	3.910133
9	0.263483	21.75130	22.31881	5.755558	46.95030	3.224026
10	0.288732	22.08937	24.33662	6.673916	44.21529	2.684807

Variance Decomposition of LAF:

Period	S.E.	LNREALGDP	LNCOFEX	LNPUEX	LNCAP	LAF
1	0.481609	0.109601	5.396058	0.318430	6.198611	87.97730
2	0.780563	4.776707	12.05898	1.022272	4.016368	78.12567
3	1.051290	7.532265	17.34031	1.858049	3.886264	69.38311
4	1.307462	9.065745	21.31200	2.880624	3.727389	63.01424

5	1.571366	10.02937	24.33376	4.183764	3.652551	57.80055
6	1.846520	10.85679	26.66134	5.469649	3.578919	53.43330
7	2.128728	11.56452	28.55467	6.633180	3.515185	49.73244
8	2.415474	12.13694	30.11479	7.675705	3.459652	46.61291
9	2.706187	12.59867	31.40170	8.614149	3.410786	43.97469
10	3.000243	12.98137	32.47125	9.454566	3.367041	41.72577

Source: Own computation (2019)