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DETERMINATES OF AGRICULTURAL EXPORT TRADE: A CASE OF SESAME EXPORT FROM ETHIOPIA

A THESIS SUBMITTED TO THE DEPARTMENT OF OF ACCOUNTING AND FINANCE IN PARTIAL FULFUILMENT OF THE REQUIREMNT FOR THE DEGREE OF MASTER OF BUSINESS ADMININSTERATION

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Declaration Statement

I declare that this thesis is my original work and has not been presented for any degree and that all sources of materials used for the study has been duly acknowledge.

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This thesis has been submitted for examination with my approval as university thesis advisor of MBA in Finance program.

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This is to certify that the thesis entitled: Determinates of Agricultural Export Trade: A Case of sesame export from Ethiopia is prepared by Noah Alemu. The thesis is submitted in partial fulfillment of the requirements for the degree of Master of Business Administration complies with the regulations of the university and meets the accepted standards with respects to originality and quality.

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Acronyms and Abbreviations

- ARBoA Amhara Regional Bureau of Agriculture
- ADF Augmented Dickey–Fuller
- CSA Central Statistics Authority
- CAGR Cumulative annual Growth Rate
- DFID Department for International Development
- EGTE Ethiopia Grain Trade Enterprise
- ECX Ethiopian Commodity Exchange
- ECM Error Correction Model
- EPRDF Ethiopian Peoples Republic Democratic front
- EPOSPEA Ethiopian Pulses Oilseeds Spices Processors and Exporters Association
- ERCA Ethiopian Revenue and Customs Authority
- FAO Food and Agriculture Organization
- FCU Farmer Cooperative Unions
- FDI Foreign Direct Investment
- GCF Gross Capital Formation
- GDP Gross Domestic Product
- IFPRI International Food Policy Research Institution
- MoANR Ministry of Agriculture and Natural Resources
- OLS Ordinary Least Square
- ORBoA Oromia Regional Bureau of Agriculture
- REER Real Effective Exchange Rate
- RIR Real Interest Rate
- SNNPRBoA Southern Nations and Nationalities People Regional Bureau of Agriculture
- TRBoA Tigray Regional Bureau of Agriculture
- UNCTAD United Nations Conference on Trade and Development
- USAID United States Agency for International Development

Abstract

The purpose of this thesis is to identify key bottlenecks in sesame value-chain and assess the magnitude and effects of key determinants of sesame exports from Ethiopia for the period 1994-2016. Using separate models for volume and value of sesame export, the study identified that volume and value of sesame export from Ethiopia increase with 1.13% with 1% increase in sesame production while decreases by 0.2% with 1% increase in domestic consumption. Value of sesame export, unlike volume, decreases by 0.87% with 1% increase in international price. Using case-studies and qualitative interviews, limited capability of research institutions to produce seed varieties, blanket farming recommendations by the extension system, limited access to key agricultural inputs, inadequate capacity of farmer cooperative unions to supply fertilizer, sesame seeds and limited access to credit for smallholder farmers are identified as key bottlenecks identified in sesame value-chain. From the result, the study concluded that Ethiopia's sesame export performance is encouraged by high international sesame demand, confronted by highly competitive world sesame export industry and inefficient value-chain, and has relatively low power in terms of share on the international sesame market value.

***Keywords**: Value-chain, sesame, case-studies, fertilizer, sesame, sesame value-chain, sesame seed*

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CHAPTER ONE

INTRODUCTION

1.1 Background

Ethiopia's source of foreign currency has been mainly driven by the agricultural sector for the last six decades. According to ERCA two decade data, on average, the agricultural sector has been generating more than 65% on average of the total foreign currency earnings over the past two decades with a declining trend; while the remaining 35% has been generated from industry and service sector from processed goods, mining sub-sectors, and through Ethiopian Airlines for the service sector with an increasing trend. Through this period, coffee, oilseed and hide and skin commodity groups take the larger share of the agricultural sector export: 47.6%, 22% and 8.3 % on average respectively. Among the oilseed commodity groups, the contribution of sesame has been more than 61% on average, the remaining export produce include nigger seed, linseed, groundnuts, rape seed and caster-oil taking up the remaining 40% of oilseed export value. Recently, sesame export brought half a billion dollars into the Ethiopian economy in 2015/16 fiscal year.

Sesame (*Sesamum indicum* L.) is an erect, tropical herbaceous found in Pedaliaceae family that grows to a highest of 0.5-2 m, depending on cultivar and growth condition. Sesame has been a valued oil crop, the seeds storing roughly half their weight as oil, with nearly all the rest protein. Sesame has been an important oilseed crop for Persians, Assyrians, Babylonians and Sumerians. Sesame is believed to have two primary centers of origin namely Abyssinia and India. There are also secondary centers of origin namely China, Turkey and Central Asia. Sesame is a crop of the warmer regions of the tropics and sub tropics. It is mainly distributed between 25^{o} N and 25^{o} S although it is also found up to 35^{o} N and S of the equator (Weiss, 2000). In Ethiopia, sesame is cultivated within altitudes of 500 to 1300 meters above sea level of elevation however, it can also rarely be observed grown up to 1800m in small patches.

Sesame seed is used for confectionery purpose, extracting cooking oils, making margarine, drugs, plaster, and soap preparation. Its oil is colorless with distinctive nutty sweet flavor. Its oil is considered as prime vegetable oil in South East Asian dishes particularly China and Japan (Wijnands et al, 2007). In addition, sesame is used for tahini, halva, sesame flour, sesame seed sprouts and pharmaceutical ingredients. Sesame is cultivated mainly in the North -West part of the Ethiopia specially concentrating in 18 semi-arid agro-ecological districts of the following national regional states; Tigray, Amhara and Benshangul Gumuze and Oromia. These states supply almost 95% of the total national production (Kindie, 2007). Due to its importance as a major export commodity the area coverage and production has increased in the last consecutive years.

According to ERCA, oilseed export product groups represent the second highest dollar value in Ethiopian global shipments during 2016. In this year, Ethiopia has been able to generate $524.3 million (22.2%) of the total export value from oilseed; of these, 97%, which accounts to more than $510 million is from Sesame seed in 2016. This share has been increasing from 60.26% in 1995 to 98% of the total oilseed export in 2016.

Sesame is mostly exported in the form of raw seed. The Ethiopian Commodity Exchange (ECX), according to article 18 (2) of the proclamation to provide for the establishment of the Ethiopian Commodity Exchange Authority reserves the right for any producer to export sesame seed directly, individually or through a cooperative in which he/she is a member. In previous times, sesame was exported by individual processors and exporters. However, as a result of the enforcement of the mandatory trading provisions of the Regulation, nearly all of the country's sesame will be traded through Ethiopian Commodity Exchange (USAID-Ethiopia, Agriculture Sector Activity Audit report, 2010). Since the establishment of ECX in 2005, 95% of sesame is exported through it. The main participants of the exchange include private and public firms as well as cooperative unions.

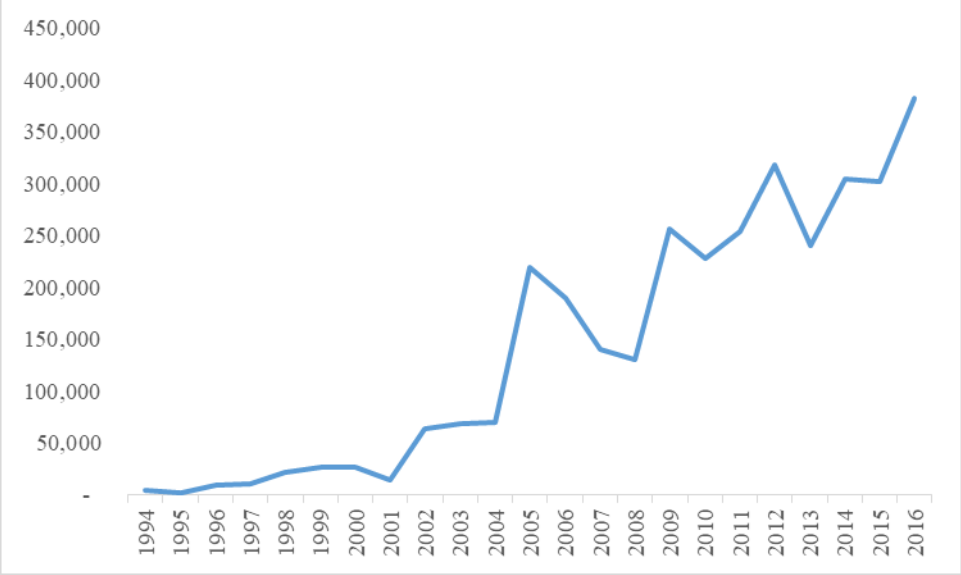
World production of sesame seeds is estimated at 3.3 million tones with world export totaling 802,063 /valued at 650 million USD/ and volume of world imports reaching 903,368 tons /valued at 846 million USD (FAOSTAT, 2012). Ethiopia is one of the major sesame producing countries in the world, ranking 5th in production after Myanmar, India, China and the Sudan until 2010, according to FAO (FAOSTAT, 2015). Ethiopia's sesame yield is more than average of the world average with 6.6 quintal per hectare, but far less compared to China with 15 quintal per hectare (FAOSTAT, 2015). During the year 2007/08, there were about 527,819 sesame growers with an average acreage of 0.3 ha per a producer who produced 18,677.3 tones. Out of these sesame growers, most of them are small holder farmers. Besides small holders there are a limited number of investors or large commercial farmers (having more than 100 ha). The share of the latter is less than 2% (Wijnands et al, 2007). In 2010/2011 production year, about 763, 893 smallholder farmers participate in sesame production; while in year 2011/2012 the number of participants has increased to about 893, 883 (CSA, 2011/12). This figure has reached 1,237,000 number of producers by 2015/2016 (CSA, 2015/16). Long value chain characterizes sesame in Ethiopia, which includes producers, village traders or collectors, brokers/wholesalers, oil millers, exporters, retailers and local consumers. According to different reports, sesame is estimated to employee more than 3 million people working across the value chain from production up to export (Terefe, 2016).

Sesame, generating the largest foreign currency second to coffee, its export performance has been fluctuating due to varying reasons. Most farmers grow sesame as a cash crop commodity irrespective of

subsistence farming. The export of sesame goes back to the Imperial Majesty time, with one exporter, Mr. Markos Saunders, during late 1950's and early 1960 (MoA, 2013) through the port of Massawa. Since then, sesame export has gone through different fluctuation both in terms of volume and value. During the 1970's and 1980's, when sesame was produced and exported by the Ministry of State Farms, sesame export was lower in volume and value due declined production and deteriorated quality. The export started getting momentum after the economic liberalization and private ownership permit. Over the past two decades, Ethiopia registered the highest export volume of sesame in 2012 with total export of 317,652,611 kg of sesame to more than 34 countries whereas the lowest volume of export in this period was registered in 1999 and 2014 with 24,666.724 and 32,762,410 kg export. On the other hand, Ethiopia registered the highest per quintal earning in 2014; 4566 ETB and the lowest in 2002; 386 ETB per quintal (refer to appendix 8).

Africa is the 2nd largest sesame exporter from the word of which Ethiopia's volume and value of export was 4.7% and 4.3% respectively of the total sesame to the world in 1999. This figure was reduced to 0.11% on average for both value and volume of export by 2004 (Kindie, 2007). The major sesame exporters in Africa are Ethiopia and Sudan with a combined 15.64% of world total sesame production in 2010 (MoA, 2013). This being the case, Ethiopia's sesame export shows a consistent increase over the past two decades with large moments of trend fluctuations (refer to Table 1).

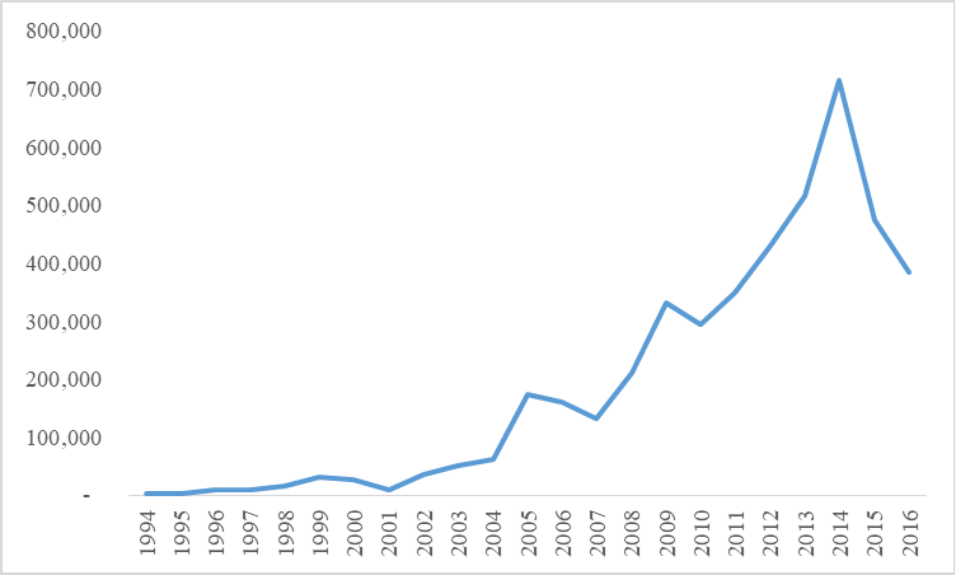
Figure 1: Sesame export volume:



Source: FAOSTAT: 1994-2010 Sesame volume of export in tones
**Raw data is presented on appendix 8*

Similarly, sesame export value, over the past two decades, has experienced an augmentation. The increase in volume can be attributed to different factors but mainly the increase in area of production has a significant contribution. In recent years however, the trend in volume and in value is decreasing. According to recent reports, some exporters have warehouses full of unsold sesame, despite offering a rate of 1,100 dollars per tonne (1,700 ETB per quintal). This decline is attributed to an increase in global sesame supply, decrease in production of sesame and systemic issues associated with the administration of sesame export.

Figure 2: Sesame export value in USD:



Source: FAOSTAT: 1994-2010 Sesame value of export in 1000 US$
**Raw data is presented on appendix 8*

1.2 Statement of the problem

The performance of Ethiopian economic history has been less than satisfactory for the most part. Agriculture, a sector still employing more than 83% of the population, has been performing at the subsistence level. Put in perspective, Ethiopia's key agricultural sector has grown at an annual rate of about 10% over the past decade; much lower than population growth. Industry, an infant sector, hardly contributes to the GDP and to the country's' overall performance with 15.6%. The service sector, opposite to the industry, has marginal contribution to the GDP: 43% and Agriculture 41.4% (The World Fact book, 2016). Performance of all sectors has even been under more stress due to political instability, draught, famine, inflation, and unemployment.

For the past two decades, the agricultural export performance has gone through fluctuations. From 1991 to 1995, the agricultural export growth rate was very minimal. Shift in government system, institutional reforms, political instabilities, formation of legal frameworks, etc. contributed for the slow growth of agricultural export in this period. After the overthrow of the Dergu regime and after the formalization of the EPRDF government, liberalization of trade opened up new possibilities for producers, traders, and exporters. However, from 1995– 2001, the growth rate of agricultural commodities export declined with annual increment of only 4.6%. This decline was mainly due to Ethio-Ertirai conflict that sustained for two years draining resources away from the sector. Making matters worse, the drought of 2001 and 2002 had a significant impact on the performance of agricultural sector overall but the export commodities were not impacted significantly: the volume of export during 2002 and 2003 were 2,452,744 and 2,565,186 quintals for these commodities. Nevertheless, compared to 2000, the export has declined by average of 18.6%. This is due to external pressure: plummeting international prices on important agricultural commodities such as coffee (World Bank, 2001).

Oilseed commodities, the second largest export commodity had experienced a similar fluctuation in terms of volume as well as value of export. From 1994 to 2000, oil seeds volume of export increased by an average of 62%. Though their share was the highest during the pre-revolution period (which was about 25.4 percent), it declined significantly to 6.6 percent by 1998 (Debel, 2002) from the total volume of export. From 2001 to 2009, oilseed volume of export was increasing at a declining rate: with an average growth of 38% on average with a significant decline from 62%. For the consecutive years, 2009 – 2014, the average increment was 3%: 296,973 tons to 300,905 tones. Though the volume of export has been increasing, the trend has been decreasing from 62% to 3% in less than 15 years. This is due to internal factors associated mostly inefficient quality management system from production to export, lack of proper marketing system and infrastructure, other macroeconomic factors contributed to the decline of oilseed export.

Although affected by declining world market prices, oilseed exports surged in years 2000 until 2012. The most rapid growth has been sesame seeds, where production has increased fivefold during the last five years, from practically zero during the early 1990s (Debel, 2002). Sesame exports have increased from 33,031MT in 1998 to 96,788MT in 2004/2005. Similarly, the fob price has shown improvement in 1990s and early 2000s with the highest record of ETB 754/qt, (ECA, 2005). According to ECA, the export quantity showed significant increase and reached its peak of 1,968,966 quintals during 2005 due to the increase in world demand, favorable production condition and good market supply at the domestic market. International prices and the government an incentive (with its limitations) has contributed to the involvement of producers and traders as well. Though the volume has increased, according to Mbwika, 2003, Ethiopia was not able to benefit from the expansion and its share dropped from 36.62% to 28.15%.

According to the information obtained from FAO database and the country's custom agency (ERCA), sesame volume and value of export has been fluctuating tremendously. Ethiopia's sesame seeds export in the world market has generally increased in volume, but decline in percentage in volume and value due to the world volume and value increase after 2005. According to customs data, sesame export has shown a peculiar export trend. After more than double increment in the volume of export from 2004 to 2005 from 60,661,994 kg to 196,579,970 kg, it consistently declined in 2006, 2007 and 2008 to 153,661,180, 139,653,640, and 131,688,734 kg's respectively. In 2009, the export volume revamped and grown to over 250 million kg's but then again it reduced to 200 million kgs in 2013 in less than five years difference and then immediately in 2014, the volume of export was at 254 million kg. Similarly, the value of sesame per quintal has shown fluctuation. Per quintal value of sesame was 109 USD/quintal in 1994, increased to 203 USD/quintal in 1996 and reduced to 88 USD/quintal by year 2000. Again the value plummeted to 65 USD/ quintal and increased to 170 USD/ quintal in 2014.

Multiple factors contribute for the fluctuation of sesame export in terms of volume and value. Surplus production in the international context has caused an accelerated devaluation of the crop, bringing the price down from its comfortable perch at 2,500 dollars for every metric tonne, to 1,300 dollars. Lack of efficient sesame tractability system also contributes to the reduction in the value of sesame value on the international market. Low level of productivity, and underdeveloped market infrastructure among others also contribute to the fluctuation of sesame export performance. The absence of adequate road network, market information, and credit facilities are still major challenges which need to be addressed to improve the quantity and quality of sesame production and marketing In addition to the balance between demand and supply, fluctuations in currency, price decreases, economic crises, wars or unrest, whether conditions, trader mentality, consumption patterns, and stock in destinations all affect sesame export performance. 'If there is one stylized fact that tends to be applicable to commodity prices in general, it is that of general volatility rather than predictable trend movements' (Newbold et al, 2005: 493). This variability in prices is the principal cause of instability of export earnings and acts as a disincentive to investment, in this particular case to produce and process sesame for export.

Different factors have been determining the sesame export performance. A closer look at the key variables guiding sesame export trend helps in informing future trade policy prescriptions on how the sesame export dimension of the subsector can be revitalized through identification and assessment of the magnitude and effects of key determinants of sesame export from Ethiopia.

1.1 Research questions

- Who are the actors/stakeholders involved in the in the sesame value chain? And what are their characteristics, functions/roles, linkages, attitude, habits and practices?
- What are the institutional arrangements and enabling environments affecting the functioning of sesame value chain and what are the key challenges?
- What are the factors influencing the performance of sesame export particularly its value and volume?
- How do different factors influence the performance of sesame export from Ethiopia both in terms of volume and value?

1.4 Objective of the study

The objective of this paper is to identify the significant determinants of agricultural export performance with a focus on sesame of Ethiopia with the aim of establishing the relationship between volume and value of export and its determinant factors: production, domestic demand, domestic price, international export price, terms of trade, real effective exchange rate, interest rate, real gross domestic product (GDP), gross capital formation (GCF) and net foreign direct investment (FDI).

Specific objectives of the study are:

- Identify systemic and operational bottlenecks of sesame value-chain.
- Identify key determinates of the performance level of sesame volume and value of export.
- Suggest a possible recommendation for decision makers to further capitalize on sesame export growth gains.

1.5 Scope of the study

The study focuses on determinants of export volume and value of sesame covering the period 1994-2016. This period is chosen because Ethiopia's economic liberalization was initiated after the EPDRF took over power from the nationalist Derge in 1991, the transition government developed the liberalization frame work for two years until 1993, and a proper form of government was established by 1994 with the introduction of the Constitution of the Federal Democratic Republic of Ethiopia. In this period, the country has been led by open economy with proper policy frame work backing. Examining the export performance of the country would be feasible to do so after 1994.

1.6 Limitations of the study

The study is limited to the performance of sesame export, amongst other agricultural commodities. Due to time and financial resource unavailability, the study is limited in its depth and coverage to fully address the aforementioned objectives of the study. Furthermore, Since Ethiopia has wide range of diverse agro-ecologies, institutional capacities, organizations and environmental conditions, the result of the study may have limitations to make generalizations and make them applicable to the overall country.

1.7 Significance of the study

Primary importance of the study is to expand the existing body of knowledge in areas of agricultural export determinates in Ethiopia. In particular, the study will provide an understanding on how sesame export has been behaving and the rationale behind for interested stakeholders. Following, the study aims to provide the government on what the key focus areas of sesame export might be, and to be able to design proper interventions if the focus areas require policy revisions. The study will also help actors and institutions engaged in sesame export to prioritize problem solving efforts to boost sesame export performance so that Ethiopia would be able to secure the maximum possible benefit from the export of sesame.

1.8 Organization of the paper

This study is organized as follows: The first chapter is introduction of the study, statements of problem and objective of the study. The second deals with theoretical and empirical literatures followed by the third chapter that discuss Ethiopia's sesame sub-sector structure. Chapter four discuss the methodological aspect of the study which includes: model speciation, estimation procedure and variable definition. Chapter five discuss empirical results and findings followed by chapter six that deal with conclusion and recommendation.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviews both theoretical foundation and empirical work that has been undertaken on the factors determining the performance of exports in general and agricultural export in particular with a focus on traditional commodities including Sesame. The theoretical review will provide the fundamentals for export trade performance of a country with a focus on the agricultural sector. It will indicate the variables affecting countries export trade and how this variables can shape countries performance. The empirical work will further help to identify specific variables determining the performance of agricultural export of different countries. It will provide practical experience of agricultural export performance determinates, relationship with volume and value of agricultural commodities export, and the respective magnitude. These reviews will dictate the construction of the study methodology, identify key variables to consider, guide the type of data construction, the relevant analysis and the fundamental tests to consider.

2.2 Theoretical review

2.2.1 Resource endowment

With capitalists pioneering the theory of free trade, division of labor provided the bases of lowering labor cost which ensured effective competition across countries facilitating export and promoting countries to practice open economy. Ricardo, immediate promoter of free trade after Smith, propagated the theory of comparative advantage not absolute advantage in labor hours per unit of output as a necessity to ensure mutually gainful trade across countries. According to Heckscher-Ohlin theory, resource endowment of nations is prominent for trade between countries. These theoretical underpinnings, collectively called traditional theory of trade, laid the foundation for theorizing free trade across countries (Sen, 2010). Continuing on Heckscher-Ohlin-Samuelson, in a perfect competition with no opportunity cost, factor of production prices can come closer by trade or by mobility of factors of production. In retrospect, price differences across factors of production facilitate trade flow among countries opening up export and import.

New trade theories tried to introduce economies of scale in production as a determinant for facilitating trade between countries. Increasing returns to scale will shape the pattern of international trade for countries (Graham, 1982). Based on Johnson 1956 and Bhagwati 1958, terms of trade determines the rate of trade and trade growth between countries. A much elaborated review of trade and development particularly for developing countries is discussed by Singer 1950 and Nurkse 1959, that foreign investment to developing

countries indirectly promote export-oriented primary commodities production, in this particular case agricultural produces for developing countries.

2.2.2 Macroeconomic policy

A more detail theoretical review on factors determining trade performance is set forth after the Second World War. To discuss some, during the cold war period, according to Vernon 1970, Posner 1961; and Hufbauer 1966, innovation, driven by foreign direct investment, promotes trade flows across countries by introducing, promoting products to own country, and propagating export in what is called product-life-cycle theory particularly for trade among economically well-off countries as well as with developing countries. Not only innovation, but also open economy without import restriction will promote export and export performance by limiting price distortion for export activities that require imported factors of production (Rodrick, 1999). This evidence suggests that import policies have either direct or indirect effect on export performance of a country. For primary commodities in particular, access to input, and technology determine level of production which yet again determines production for export even with improved price incentive (McKay et al, 1997).

Developing countries heavily depend on the production and export of primary commodities. According to (Filipe, 2014), most of these primary commodities are used as intermediate inputs. Importing countries, most being economically well-off countries produce synthetic substitute goods putting pressure on the value and volume of export of primary commodities, which again limits the production and export performance of these commodities from developing countries. For developing countries, value of export is largely determined by world prices, (Morrissey, 2005), with less response to boost production in response to improved world price incentives (Mckay et al, 1997).

Africa's export performance has been undergoing a remarkable growth particularly in terms of the volume of export. Based on UNCTA, 1999 report, Africa's volume of export has grown by more than 130% for non-oil exporting countries from 1990 to 2002. Different theoretical propositions have tried to provide explanation for this growth. According to Rodrick 1999, after analyzing the determinates of 37 Sub-Saharan countries volume of export performance by regressing a range of variables, the study found out that the role of trade policies often administered through tax and duty manipulation have a profound impact on country's export performance. This tax based policy reforms either administered to control import or export, influence country's exports.

Although policy reforms have significant influence on the performance of countries international trade, supplemental reforms in mainstream export value-chain is fundamental to boost its performance. Based on

Morrissey and Rudaheranwa 2005, policy reforms that include export tax abolishment, exchange market liberalization and allowing exporters to retain export earnings, have increased incentives to export. However, export earnings has not improved as planned due to the lack of export diversification, low infrastructure on export marketing promotion and limited institutional support.

Flow and availability of currency affects international trade flows in different form and magnitude. Study conducted by the Barkoulas et al, 2006, investigate how exchange rate affects the volume and variability of trade flows. The study underlines that trade movements, both import and export, are affected by the source of foreign exchange uncertainty. These sources include general microstructure shocks, fundamentals driving the exchange rate process or policy interventions. Accordingly, the study found out that the general microstructure shocks, and fundamental factors reduce volume of trade flow and policy interventions affecting exchange rate increases variability of trade flow.

2.2.3 Microeconomic factors

So far, the review tried to highlight the overall international trade determinates of countries and how each determinates manipulate countries export performance. Now, we look at theoretical reviews of firm based export performance characteristics and what determines it. Based on studies from Cavusgil and Zou's 1994, from 2000, firms export size of operation has a strong impact on the volume of export sales. However, a negative relationship is also observed in terms of firm size and export performance Cavusgil and Kirpalani, 1993 cited from 2000 firms. Other contradicting studies by Ursic and Czinkota 1984 and Kaynak and Kuan's 1993, the latter's stipulate that younger firms have better sales profitability due to better ability of adapting to changes while the preceding scholars stipulate that there is a strong and positive relation between firm age and its export performance.

Other perspectives elaborate how management characteristics determine export performance. Kammath et al 1987 highlighted that there is strong correlation between export performance of firms and quality of top management. Pilling on management perspective, management attitude towards fewer risk and export barriers tend to boost firms export performance. Also product characteristics expressed in terms of performance, quality and durability, positively influence export performance of firms (Beamish, Craig, and McLelan's, 1993). Narrowing down the summary to our case, firms' years of operation, size, and management characteristics collectively though supporting evidences might be absent, will have a strong magnitude to affect sub-sector, sector, and countries export performance.

The above theories explain the different factors that can influence countries decisions to produce and export commodities. This factors includes resource endowment, cost of resource mobility, comparative advantage

and cost of factors of production. There are also empirical studies which have been undertaken to investigate the determinants of export supply.

2.3 Empirical review

In this section, we will review empirical studies conducted for different countries and commodities. The review will look into the main objectives of studies, discuss the research question, identify the variables including the dependent and independent variables, methodologies of the study, and the summary of finding. This section is imperative for designing the methodology, particularly, the reviews will guide what variables to include and to omit, and it will define the model specification.

2.3.1 Price

Rice is an important commodity for African countries. This commodity, by and large, is a significant agricultural produce for West African countries. A study conducted by Molua (2010), assess the responsiveness of rice yields and maize in Cameroon using data from 1961 to 2006. The dependent variable of the study is assumed to be yield of rice and maize. The independent variables include producer price for local rice, global price of rice that has indirect effect to local producers, the exchange rate of Cameroon currency to foreign currency, weather condition expressed using rainfall, and government expenditure on agriculture. All of variables employ a time series data set collected from international and national institutions in Cameroon. In analyzing the variables, the study employs time series regression of Ordinary Least Square (OLS) using parsimonious supply function. For the necessary testes, given that the variables employed are time series data, it uses time series techniques that include Engle Granger and Augmented Dickey-Fuller (ADF) testes to conduct the analysis's and run the necessary testes.

Based on the analysis, the study found out that rice yield may increase by 1.2% for a 10% increase in relative world price to producer price of rice. In the short-run, a 10% increase in government expenditure for agriculture and regulation increases rice yields by1.08% and 0.53% respectively. Based on the Engle Granger and ADF testes indicate non-stationarity property random-walk behavior and the possibility of long-run equilibrium relationship in their difference form. Accordingly, the estimates infer that the rice sector responds to increase in price to some degree with the complementarity of better weather and irrigation. Hence, the study concludes that enhanced policy reform towards promoting irrigation technology, developing market-supporting infrastructure, input incentive package and reduction of production risk will boost rice yields.

Developing countries export often depends on the export of primary commodities. In Africa, particularly SSA, agricultural production is still subsistence most and heavily dependent on rainfall. Better rainfall

promotes improved production and enhanced performance of the product value chain. A study conducted by Abolagba et al (2010) illustrates: through a secondary data collected from 1961 to 2005, the study examines the factors that influence the agricultural export performance of Nigerian Cocoa and Rubber. The dependent variable is the quantity of natural rubber and cocoa export measured in tones. The independent variables include average producer price, average world market price of the commodity, exchange rate, volume of domestic consumption, average total rainfall in major producing states and interest rate.

These variables are analyzed using Ordinary Least Square (OLS) method regressed as linear function. The findings reveal that rubber export is influenced significantly ($P<0.05$) by domestic rubber production, rainfall and interest rate where by volume of rubber export will increase by 68124.857 mt, and 10741. 503 mt respectively with 1 percent increase. Other variables that are significant ($P<0.05$) include exchange rate and domestic consumption, reducing volume of export by 17078 mt and 27094 mt respectively with F value (30.085; $P<0.05$) implying that the model was significant. This study is evidence that illustrates rainfall is a significant factor directly influencing export as farmers' expectation of good rainfall triggers improved production of rubber and cocoa.

Different sectors contribute to a country foreign currency flow. Exports of goods and services represent one of the most important sources of foreign currency earnings. Depending on the type of the commodity and the magnitude of impact on the market, both internal and external, different factors determine the trade movement. A study conducted in Egypt by (Mohamed et al 2014), investigates the factors affecting Egypt's export flow with main trading partners using gravity model where value of export flowing from Egypt to another country is the dependent variable and the independent variables excluding the dummies are all expressed in natural logarithms that include Egypt's' Gross Domestic Product (GDP), trading partners GDP, trading partner's population, trading partner's real openness to trade, distance between Cairo and trading partner's capital city, dummy variable that is 1 when Egypt and its trading partner speak Arabic language and 0 otherwise and another dummy variable that takes 1 when Egypt and it's trading partner share common boarder and 0 otherwise.

The study used secondary time series collected from different institutions covering the period from 2000 to 2013 for 42 main trading partners. The fixed effect model explained 84 percent of the fluctuations in Egypt's export. The result show that Egypt's GDP, importer's GDP, importers population, regional trading agreement which is captured by trade openness, and boarder between Egypt and its trading partners are the main factors that are positive and significantly affecting Egypt's exports value. The transportation costs that is used to capture the distance between Cairo and trading partner capital city has a negative effect on Egypt's export but it's insignificant.

Depending on the sector and the product, industry, foreign and domestic market characteristics determine export performance of individual firms as well. Based on Austrian firms, a study by Kasper and Holzmüller, 1991, they found out that there is a positive relationship between the manufacturing complexity of the industry and the export performance. The more complex an industry is in terms of technology requirements the better firms perform who have the capacity as the complexity creates entry barrier for new firms or for firms with limited technological capability. Similarly, different studies suggest that foreign market characteristics, domestic market characteristics, marketing strategies such as price, distribution, and promotion have strong effect on the export performance of firms, hence a nation's export performance when measured collectively.

2.3.2 Exchange rate

Muhammad et al (2012), demonstrate further how tax, income and exchange rate affect export performance of Pakistan. The study tries to explain the factors affecting the export performance of Pakistan using time series secondary data from 1981 to 2011. The study incorporated all possible factors in the export function that can potentially affect export performance. The dependent variable of the study measures Pakistan export in terms of volume. The independent variables include world income measured by global increase in demand for various goods, GDP, FDI, nominal exchange rate, indirect tax, industry value added measured by adding all outputs and subtracting intermediate input and Gross National Savings (GNS). Both dependent and independent variables are presented in log form.

The study used OLS estimation technique to run the regression and used ADF test to validate for stationarity. Accordingly, the study finding showed that foreign direct investment and gross national saving are insignificant in affecting the performance of Pakistan export performance. While industry value added, indirect tax, world income, GDP and nominal exchange rate are all significant affecting export positively.

Palm oil, a major agricultural export commodity for Ghana, has gone through performance fluctuations that are explained by different studies. One of the studies include a study conducted by Jhon et al 2006, that examines palm oil quantity export trend and magnitude of the different determining factors from 1987 to 2006. This study has two main objectives that are i) identifying the growth trend and ii) determining the magnitude of factors affecting export trend. To determine the factors of export demand, the study employ OLS estimation of multiple linear regression. The independent variables are international and domestic market prices, real exchange rate, per-capital income, and population of importing countries, the previous year's quantity demand of Ghana's palm oil, and taste and preferences of the importing countries. The study employed a semi-log or log-linear model.

Based on the finding, the model explained 94.2 percent of the total Ghana palm oil demand variation. The Jarque-Bera test with $p = 0.75$ showed that the error term is normally distributed, and the Breusch-Pagan test statistics of 13.3 with $p = 0.7$ showed the null hypothesis of homoscedasticity in the error term. Real domestic price and one-year lagged real domestic price significantly affect export demand. A one-percent fall in real domestic price brought an 11.94 percent increase in the quantity exported and a one-percent while the lagged one year real price increase brought a 4.2 percent increase in the quantity exported. The other variables that are significant include real exchange rate, and international price or in this case the Malaysia's real export price. The other independent variables that include per-capital income and population of importing countries, the previous year's quantity demand of Ghana's palm oil, and taste and preferences of the importing countries are insignificant.

Other variables have been identified that affect Ghana's agricultural commodity export performance. According to a study conducted by Boanis, 2013, on competitiveness and determinates of cocoa export from Ghana, productivity enhancing innovations, trade liberalization, exchange rate and government continues support can improve the performance of cocoa export. In specifying the export performance modeling, the study identified the following independent variables: production of cocoa beans, real domestic producer price, real world price of cocoa to real domestic producers price, real producer price of cocoa in Cote d'Ivoire, domestic consumption of cocoa, exchange rate, nominal rate of assistance, and FDI. The study uses Ordinary Least Squares estimator to determine the relationship between these variables and export performance of Ghana cocoa measured as quantity of coca beans exported.

Before determining the estimation technique and running regression, Philips-Peron unit root test of variables was conducted. The model is also tested for serial correlation, normality, homoscedastic and all tests failed to reject the null hypothesis and the model found to be free of the potential model specification problems. The study identified that the export of cocoa beans is significantly driven by lagged coca bean production, lagged domestic demand, real producer price, real world price to real producer price ratio, real producer price of neighboring Cote d'Ivoire, prevailing exchange rate and lagged export. The intercept is also significant implying that the Ghana would continue to export significant quantities of cocoa beans should all things remain constant.

Different studies have been conducted on performance and competitiveness of agricultural produce for export. On of this reviews include a study by Nalini et al 2007, on Indian tomato. The objective of the study to analyze the production and export performance of tomato export from India, analyzing the impact of trade liberalization on tomato export and to identify the determinants of Indian tomato export. The study uses secondary time-series data from 1985 to 2004 using OLS techniques to analyze the determining

factors. These factors which can be interpreted as the independent factors include tomato production, volume of international trade in tomato, ratio of Indian export price and non-Indian international prices of tomato, and exchange rate. Based on the finding, the model is found to be helpful in which the identified factors helped in explaining 98% of tomato export variation. Accordingly, all variables except for the exchange rate are significant in determining tomato export under the specified time period.

2.3.3 International market

Let us deep-dive into analyzing the role of Foreign Direct Investment on the performance of export growth. According to a study conducted by Kishor (2000), it explores how Foreign Direct Investment influence the performance of Indian export trade. Based on data for 1970 – 98, the study investigates the determinants of export performance using a simultaneous equation framework. It tries to capture the relationship of export and real exchange rate. The study employee two models where in one of the models the dependent variable is export demand measured as total export volume and in the second model it is export supply. Under the first equation, the independent variables include the real effective exchange rate, relative price of export, world income, and lagged export demand. In the second equation, the independent variables include the Indian export price relative to domestic prices, domestic demand pressure, foreign direct investment; infrastructure facilities measured as infrastructure investment percentage of GDP, and lagged export supply.

Based on the study finding, both models explain 98% and 99% variability in the export demand and export supply. The findings suggest that demand for Indian export increases when its export prices fall in relation to world price. Real appreciation of rupee adversely affects India's export: negative association between real exchange rate and export growth for India. On the other hand, export supply is positively related to domestic relative price of exports and higher domestic demand reduces export supply. Upon this outcome, the study appropriately inferred that a fall in domestic prices due to exchange rate depreciation makes exports cheaper in the global market, and this consequent stimulates demand. In affirming the discovery by the study, it found out a positive association between depreciation in real exchange rate and export growth. Although the main objective of the study was to point out the impact and magnitude of foreign investment on export, the study found out that FDI has no significant impact on export performance in India.

A study conducted by Nwachukwu et al., 2010, provides addition perspective on the determinants of agricultural commodities export and their competitiveness on international market. Nigerian cocoa export stands 4th in the world export market. This study investigates Nigeria cocoa competitiveness on the international cocoa market by looking into the export performance in the past using Revealed Comparative Analysis and investigates the determinants of cocoa export using multiple regression OLS estimation techniques based on time-series data from 1990 to 2005.

To determine the volume of cocoa export, the study identified world total export of cocoa, total coca output from Nigeria, exchange rate and elasticity of respective variables as independent variables. The outcome of the analyses showed that Nigeria coco export volume volatility is significantly determined by the world supply of cocoa, exchange rate and cocoa production. This study recommends that Nigeria coca, being the 4th largest supplier of cocoa, should prioritize the rehabilitation of coca farms and establish new farms to secure the maximum possible export gain.

Another study on Nigeria emphasize that world supply has a significant influence on the export performance of agricultural commodities. Yusuf (2007), tried to identify the determinates of export crops in Nigeria. The focus of the study is on three major export crops that include cocoa, rubber and palm kernel on their export performance from the 1970s to 2002. After conducting stationarity test for preliminary selected variables, the study narrowed down to six variables. This variables include the price ratio of the commodities which is calculated as the ratio of the export unit value against its domestic unit value, the net export value which invariably is the balance of trade, real gross domestic product, the quantity of domestic production of the three commodities, the exchange rate in terms of units of foreign currencies, and the extra amount added to the official real exchange rate by the parallel market operators.

The analysis used Error Correction Model (ECM) to avoid spurious result. The results of the error correction model showed that previous year's output and the net value of world trade negatively affect cocoa export at 1 percent level while previous year GDP positively contributes to cocoa export at 5 percent. The lagged price ratio reduces rubber exports significantly at 5 percent but the real exchange rate significantly increases the export performance of rubber at 10 percent level. The previous year's exports of palm kernel and the real GDP contributed positively to palm-kernel exports at 5 percent level while the lagged premium and palm kernel output negatively contributed to its export at 5 percent and 10 percent respectively.

2.3.4 National policy and economy

Other studies also show how GDP is an important determinates of countries export performance. Joel (2009), tried to determine Namibian export using gravity model approach. Gravity model is important in analyzing bilateral trade flows and trade or export potential of a country. Based on the analysis, the study identified that the an increase in imports GDP and the general GDP causes Namibia export to increase while distance and importer's GDP per capital decrease export. The study also identified that GDP per capital and real exchange rates do not influence export.

Other empirical researches also demonstrate the profound role that real exchange rate has on export. A study by Maureen et al, (2002), examines the factors that have influenced Kenya's traditional agricultural

export (tea and coffee) and other exports of goods and services. Using error correction standard trade model was specified that incorporates real exchange rate which is used as a proxy for relative prices, real foreign income of major trading partners, and investment as a proportion of GDP. Based on the result, real exchange rate has a significant influence on export of traditional agricultural commodities. Supply response to price incentive captured by real exchange rate depreciation is found to significantly affect export of goods and services.

Morrissey 2002, provides an overview of what factors influence the export performance of 48 Sub-Saharan and North African countries for over fifteen years. Using OLS analysis, the study regressed ten variables to determine what has been the most influential determinate affecting these countries. According to the finding, countries with higher GDP per capital and FDI have higher export volume performance. Surprisingly, two variables that includes unit price of export, gross fixed capital formation, and investment growth (e.g., utilities and public infrastructure investment) and that are traditionally known to affect export positively, influence volume of trade for these countries negatively and are statistically significant. On a separate model where Morrissey 2002, identifies factors that affect value of export, diversification of export items has a positive and significant influence on export value. This signifies that more value adding activities as well as product differentiation positively influence value of countries' export while FDI and GDP are no longer significant in influencing the value of export.

Different empirical policy reform works provide perspective on how liberalization on trade activities can boost trade earnings. A study by Sofia et al 2010, shows the effect of liberalization on Pakistan cotton lint. Using OLS regression technique and time series data from 1971 to 2008, the finding suggested that world demand increment measured through weighted-average index of world export price for cotton, export competiveness measured through the ratio of country's export of cotton in its relevant sector at national level and then the world, and increase in trade openness measured through the ratio of agricultural exports to agricultural sector GDP, positively affected the export of cotton lint of Pakistan and are significant.

Kingu 2014, examines the determinates of cotton lint export in Tanzania using secondary data from 1970 to 2010. To establish the short run and long run relationship amongst variables, the study employed co-integration technique. The dependent variable for the study is cotton lint export earnings and the independent variables include real exchange rate and agricultural earnings. Agricultural earning is included in the analysis in order to determine the effect of agricultural production capacity on export. Based on the finding, both independent variables are statistically significant in that real exchange rate and agricultural productivity contribute positively to Tanzanian cotton lint export earnings.

Under a different objective, Kingu 2014, investigates cloves export response in Tanzania before and after trade liberalization using co-integration analysis. By means of secondary data from 1970 to 2010, the study employed econometric and nonparametric techniques. Under the earlier method, co-integration, error correction modeling and trend analysis was conducted. The variables under consideration include cloves export earning as an independent variable include world prices, real exchange rate, and dummy. Based on the error correction modeling, the finding revealed a long term equilibrium relationship amongst cloves export earnings, world price and real exchange rate. From the error correction modeling, the study found out that world price in the short run has also a statistically significant effect on cloves export supply while real exchange rate represented by dummy variable to capture the before and after effect of trade liberalization, found to be statistically insignificant. This shows that real exchange rate has insignificant impact in the short before and after trade liberalization. Contrary, world price has a significant effect before and after trade liberalization in the short run and long run.

Another study by Musibau 2009, provides additional description on how policy reform can influence export performance. The study examines the response of merchandise export to real exchange rate based trade liberalization in Sub-Saharan Africa between 1980 and 2005. The panel least squares estimation technique was adopted for this study. Heterogeneous panels for the four sub-regions (West, East, Central and Southern Africa) of SSA are estimated using time/series cross-section technique. The variables that are regressed using fixed and random effect model include real effective exchange rate, relative price of export measured by real effective exchange rate, production capacity of countries, average nominal tariff rate, import of raw materials and real exchange rate overvaluation. For resource rich countries, given that the analysis wouldn't reflect the best of the merchandise export due to policy reform, cure oil and natural minerals are excluded from the analysis.

According to the finding, the fixed effect regression result suggested that countries productivity capacity or economies of scale is insignificant to affect export performance but effective exchange rate is significant but with a positive effect than expected. This means the exchange rate overvaluation is significant and affects export negatively. There is also a negative but significant relationship between average tariff rate and merchandise exports. Nevertheless, the import of raw materials variable is positive and statistically significant. The random effect regression result confirms the fixed effect regression. It showed that tariff rate is negative and insignificant showing that trade liberalization in tariff form has only marginal impact on export. Also import of raw material variable is still positive and statistically significant. However, as the fixed effect model, overvaluation is negative and significant. Based on this study result, trade liberalization through reforms that create increase access to imported inputs and through stable real exchange rate, SSA countries can positively stimulate export.

Developing countries often experience export earnings volatility. One notable explanation given by different policy reform works is limited export product diversification. Most African countries are known for their primary commodity export. There are also other explanations for limited export earnings. Jayant 2006, commodity price fluctuation causing export earnings volatility can be in response to good or poor harvests due to weather condition variations. Price of primary commodities is inelastic to demand and supply in the short period. Several primary commodities are tree based in which their production cannot be adjusted overnight nor their supply can be curtailed overnight. To mention some, coffee, tea and cocoa are primary commodities in which the supply is difficult to adjust in short period of time. Fluctuation in US inflation and monetary policies affect export earnings given that most export transactions are dollar base (Mundell 2002).

Other variables also tend to affect export competitiveness of a country. A study conducted by Lawrence 2004, tries to measure South Africa's international cost competitiveness and export in manufacturing. According to the finding, South African relative unit labor costs declined in the 1990s, but high relative to other developing countries having a strong effect of relative unit labor costs on exports and hence on the value of export commodities from the manufacturing sector. Although the study is focusing on the effect that relative unit labor cost has on manufacturing sector, an inference can be made for further studies on the agricultural sector.

2.4 Research gap and conceptual framework

Based on the well-informed assessment of different empirical literatures, this study identified the gap that there are limited empirical reviews on sesame export performance in Ethiopia. There are very limited researches on the performance of sesame sub-sector that take a full view by considering regional and federal agriculture sector administrative structure of Ethiopia. Albite, there are researches on the performance of agriculture export and the fact that coffee, one of the major export commodity of Ethiopia, are where most of the studies focus on whereas oil seed and sesame in particular have been overlooked. There are little to few researches on the export performance of sesame from the view point of business and mangement, as most studies on sesame are agriculture focused researches and are often cross-sectional.

Conceptually, this study primarily focus on the sesame export in terms of quantity and value of sesame export over the period of 22 years and the commodity sub-sector. Policies and implementation will be viewed both from regional and federal agricultural bureaus point of view including smallholder farmers, input distributors and sesame exporters. This then is a call for improvement not only of agriculture export sector structures but also deeper structures of sesame sub-sector export actors and practices intrinsic to the sesame export sub-sector role as well as commitment of its value-chain actors.

More specifically, the conceptual framework consists dependent Variables: - the dependent variables of the study are volume and value of sesame export. The measure of these two dependent variables is described in chapter 4 section 4.4. Independent variables included in the study are gross domestic consumption, gross capital formation, terms of trade index, foreign direct investment, real exchange rate, real interest rate, domestic consumption, domestic price, production, and export prices. Other variables are captured by the model as discussed under chapter 4 section 4.4.

CHAPTER THREE

THE STRUCTURE OF ETHIOPIA'S SESAME SUB-SECTOR

3.1 Export sector in general and commodity trend

Ethiopia's economy is primarily traditional, agriculture accounting for half of the GDP, 60% of exports, and 80% of total employment GDP From Agriculture in Ethiopia averaged 197.68 ETB Billion from 1999 until 2016, reaching an all-time high of 573.10 ETB Billion in 2016 and a record low of 98.30 ETB Billion in 2002 (NBE, 2015/16). Ethiopia's agricultural sector is the main driver of the annual 10% GDP growth rate that the country has been recording on average continuously for the past ten years on average (refer to table 3.1). The main items of Ethiopia export come from the agricultural produce, animal products and minerals (refer to table 3.2). Some of these commodities include, coffee, oilseed (largely sesame seed), hides and skins, pulses, meat products, fruits and vegetables, sugar, flower, live animals, chat, petroleum products, bee's wax, gold and others. The estimated export for Ethiopia was USD 2,879,453,368 based on the F.O.B price of export commodities in 2014/ 2015 (ERCA, 2015)

Table 3.1: Sectoral contributions to GDP

Sector	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Agriculture	170.3	181.2	195	212.5	222.9	238.8	251.8	267.9	573
Industry	35.4	38.8	43	49.8	59.6	73.9	86.5	105.2	404
Services	143.1	163.2	184.7	216.6	237.4	258.8	292.5	353.2	620

Source: NBE annual reports: Contribution of sectors to the GDP in billion birr.

As it can been seen from the table, the services sector has been getting momentum in taking the larger share of GDP contribution which is not the case in relation to export contribution. The export sector is still dominated by agricultural commodities. The primary agricultural export commodities include coffee, oilseeds and pulses in which sesame accounts more than 90%, and hide and skins. These export commodities have been the primary commodities of export from the Imperial regime in the 1960's until the current EPRDF government. A major commodity that has been part of the export item after the EPRDF government is flower.

Ethiopia's export commodity structure and the main economic drivers are highly correlated. The nation's output production and export are mainly concentrated in agricultural commodities, while the share of non-agricultural products in total merchandise export have been almost insignificant for most part showing some promising result in recent years. For the past three decades, primary agricultural products accounted for 80-90 percent of the commodity export earnings of Ethiopia on average (refer table 3.2).

Table 3.2: Commodity export earning structure (% of total)

Commodity	1974/75 – 1990/91	1991/92 – 2000/01	2001/02 – 2010/11	2012/13 – 2014/2015	Summary of all year's total average
Coffee	61.6	59.1	42.0	50.53	53
Oilseeds and Pulses	6.6	7.2	32.0	30.7	19
Hides and Skin	12.7	11.3	1.0	1.0	6.5
Chat	2.2	9.4	5.0	-	4.0
Gold	1.2	4.9	4.0	10.3	5.1
Petroleum	5.0	1.4	-	-	1.3
Fruits and Vegetables	1.0	0.8	7.0	1.0	2.4
Live animals	1.8	0.2	3.0	1.9	1.6
Sugar	1.6	0.5	2.0	0.3	1.1
Textile	0.4	0.5	0.9	1.5	0.6
Meat products	0.7	0.6	1.0	0.6	0.7
Spice	0.4	0.6	0.2	0.3	0.3
Natural Gum	0.3	0.4	0.2	0.2	0.2
Cotton	1.0	0.5	-	3.5	1.25
Other	3.5	2.8	2.5	-	2.1
Total	100	100	100	100	100

Source: Author's calculation using data from NBE and Revenue and Customs Authority

Among the major export products, as shown in Table 3.2 above, coffee accounts for the lion's share of primary export and of total commodity exports as well. From 19774/75 – 2010/11 coffee alone accounted for 47.6 percent of the total export proceeds and the second largest commodities are oilseeds and pulses. The average percentage of coffee was 61.6, 59.1, 42 and 50.5 while oilseeds and pulses was 6, 7, 32 and 30 in total commodity export for the past three decades. As can be seen from the table coffee export commands the largest FoB USD value while oilseeds and pulses almost took more than 25% of the export share. While oilseed and pulses have increased due to an increase in oilseed and pulses demand in the international market and increased production of oilseeds and pulses in the country.

During the Derge regime, oilseed and pulses have a very small share from the total commodity export. Their export contribution from the total commodity was less than 10%. This is mainly due to a declining world market prices, and government inefficiencies. In 1990 (Ibid.) Ethiopia ranked 84th oilseed exporter from the world. Inefficiencies state based agriculture production and marketing of oilseeds was the main rational for the decline. Even though Ethiopia has the capacity to improve its export income from oilseed, the government failed to work on addressing systemic and farm level challenges (Kindie, 2010). This trend changed starting from the change in the government system. In 1999 Ethiopia ranked 25th among the top oilseed exporters. The most rapid growth has been sesame seeds, where production for export has increased fivefold from 1994 to 1999 from practically zero during the early 1990s (Ibid.). Since 1999 growth of sesame production and export has increase significantly. Basing on this promising outcomes, export prospects are reasonably good and the country can benefit a lot by increasing production of the commodity in response to demand and price.

Looking into the other major export commodity that has shown a significant change is hides and skins which accounted for 11% during the first two decades on average. Its share during the Derge regime has been somewhat constant ranging between 13% maximum and minimum 10% (Debele, 2002). During this period Ethiopia has been a major exporter of hides and skins because of its large livestock population. However during the last decade, the export share has decreased dramatically. This is mainly due to the loss of Ethiopia market share from the internal market in both hides and skins and finished leather products. The country ranked 70th among the top leather and leather manufacturers exporters, down from 49th and 48th place in 1980 and 2005, respectively (Ibid).

3.2 Ethiopia's sesame sub-sector

Sesame has been Ethiopia's important cash crop for over half a decade. It accounted for 41% of the total export earnings with 1,145,567,000 USD in 2015 fiscal year (ERCA 2014/15). Sesame, called *selit* in many local languages of the country, is one of 15 cultivated oil crops in Ethiopia (Seegeler, 1983). It's categorized as a lowland oil crop requiring long, dry and sunny growing conditions (Hiruy, 1991). Both exotic and indigenous cultivars are cultivated in Ethiopia that have evolved under wide-ranging conditions that include poor soil-fertility management, variable soil moisture and growing periods and biotic and abiotic stresses (Adefris, Tadele, and Tesfaye 2011). In many sesame growing-growing areas, farmers describe seven cultivars, 'Hirehir', the most widely grown, is white seeded, is uniform in maturity and has dehiscent capsules. 'kefit', matures early when there is shortage of rainfall and has physiological plasticity. 'Tegil' and 'China' are late-maturing types grown over small grown in few production areas (Bedigian and Harlan, 1983).'Abuneab', tall, indeterminate and susceptible to disease. "Tejareb' and 'Gojjam Azene' are the

remaining cultivars where 'Tejareb' is tall, bears many capsules, has wide adaptability with white seed coat and is late maturing while 'Gojjam Azene' or 'Japan', is a low-input-requiring type with a white seed coat, matures late and has low yield.

Ethiopia is composed of nine ethnic-based regional states and two city administrations. Based on the agricultural censuses of 2003, sesame is produced in all administrative regions except in the two city administrations, although nearly all sesame is grown in four regional states: Tigray, Amahara, Oromia, and Benishangule-Gumuz. From these states, sesame production is concentrated in the Humera (western Tigray), Metemma (northwestern Amahara), Belles Valley (Benishangule-Gumuz), and East Wellega (Oromia): these production areas are viewed as Ethiopia's sesame belt. Sesame flourish in warm area in which its best ecological requirement is met in Humera and Metemma. These areas exhibit hot climatic conditions with a mean maximum temperature of 35^0 C, a mean minimum of 19^0 C and mean average of 27^0 C. Humera is drier than Metemma with mean annual rainfall of about 668 mm and Metemma receives 918 mm annual rainfall booth areas exhibiting heavy-textured soil (Adefris, Tadele, and Tesfaye 2011).

Sesame planting date varies according to location depending the moisture content of the soil. It requires sufficient moisture for germination and seedling growth. Sesame is cultivated either as monoculture or by intercropping in which farmers follow tillage requirement of the primary crop during intercropping (Demelash 2004). Farmers sow sesame by broadcasting both on small-and large scale farmers. Commercial sesame cultivation relies mostly on hired labor, while smallholder farmers, that are the dominate cultivators, use household labor. The whole family takes part in the production in which adult males conduct land preparation, sowing, harvesting, and threshing operations and females and males of all ages do weeding (Maikil, 2001).

Ethiopia is one of the major sesame producing countries in the world, ranking 5^{th} in production after Myanmar, India, China, and the Sudan until 2011 (FAOSTAT, 2015). Recently, some African countries such as Tanzania, Mozambique, and Mali have increased their sesame production aggressively. Consequently, Ethiopia gave way its rank to Tanzania since 2011 mainly with increase area of production. Ethiopia's average yield is above most countries world average, although it's at par with Tanzania and far below China. Most of these production goes to export market the remaining is used for local consumption limited to bakeries, millers and pastries.

Irrespective of subsistence farming prevalence in Ethiopia, sesame is grown as cash crop by most farmers including smallholder farmers. The fact that sesame can be harvested early than other cash crops grown in sesame growing areas such as cotton, it can immediately fulfill farmers' cash requirement, making it a

unique and attractive crop to grow. Based on the market research study conducted by (Maikil, 2001) in Beles Valley, farmers sell 88% of their sesame harvest, although the proportion of marketed surplus varies by location. According to Demelashe, 2004, in Amahara Regional State the marketed surplus is 57.7%, 32.3% is for household consumption, 8% is used as a seed source, 1.2% is paid as in kind wage, and 0.1% is used as animal feed. Overall, 80% of sesame produce come from Amahara Regional State and Tigrai Regional State combined each accounting 41% and 40% of the total production respectively, according to EIAR, Directory of Crop Release, 2012.

In the production of sesame, weeding is the most expensive operation followed by harvesting and third by cost of chemical application for pest control (Mesfin et al, 2004). Delayed weeding is common and very costly taking up 30-40% of yield loss. Though it's sessional and dependent on the location, labor cost is comparably high. A cost-benefit analysis shows that yield/ha, labor requirement, and all other cost of production are almost invariable across years, but the sale price is variable and is the single factor that determines the profitability of sesame production. Unless favored by attractive market, profit from large-scale sesame production is unsatisfactory.

The white- seeded cultivars have high demand in the international market and is considered as high quality by major international importers (Adefris et al 2011), the mixed color types are mostly consumed locally. According to the Ethiopian Export Promotion Agency, this seed is used as a standard grading for international. In addition to the seed coat color, oil content, seed moisture content account for 34% and 11% of the grading requirement. Low acid content, no visible mold or insect damage, and cleanliness from foreign matter or impurities, are also used to qualify seed for export (Mesfin et al 2004). In general, the buying price of sesame for export is largely determines by the evenness of color, taste, dryness and purity. Hulled seeds and bleached hulled seeds have a higher market value than untreated seeds. The purity of the seed is specified in terms of such as 99-1 which means in each 100 grams of sesame see, no more than 1% contains impurity such as dirt, branches, stones, etc. the 1 indicates no more than 1% is black seed.

Globally, sesame seed is chiefly used for oil extraction. The oil is colorless with distinctive sweet flavor. The oils is considered as primary vegetable oil in South East Asia dishes particularly in China and Japan (Wijnands et al 2007). It's also used in confectionery tahini, halva, cosmetics and pharmaceutical industries (Anilakumar et al 2010). Sesame presents several benefits by being the source of; high content of Protein – even dietary protein: Vitamin B-complex which helps to improve nervous system, organs, metabolism, eyes, muscles, skin and hair: Magnesium, Calcium, Iron and Copper – useful for red blood cell production, bone mineralization, enzyme synthesis and hormone production; high fiber content; and high mono-

unsaturated fatty acid, oleic acid- lower bad cholesterol and increase god cholesterol in the blood and prevention of coronary artery disease and strokes.

A long value chain characterizes sesame value chain in Ethiopia that includes producers, village traders or collectors, brokers/ wholesalers, oil millers, exporters, retailers and local consumers. Sesame oilseed processing has gained momentum in recent times. Most of the oil seeds are crushed without refining. The oilseed processing industries produce crude oil for local market. Refined oil producing industries extract and refine the oils for urban consumption. Addis Modjo, and MULAT are among the better oil refining industry in Ethiopia with a potential for European market (Negash, 2015). The smaller crushing and refining plants do not meet the European standard due to limited financial resource, little demand for high quality in the domestic market and expensiveness of quality system, hamper their developments.

3.3 Sesame value- chain and challenges

Sesame value-chain starts from producers that include smallholder farmers and commercial farmers as the primary sesame producers, village collectors or aggregators and aggregators whom are considered as wholesalers that are also engaged in export markets, and retailors whom are engaged in sesame resell for local markets including sesame oil refiners. Total sesame producers are estimated to be more than 1million private peasants. According to CSA, 2014/2015, the number of smallholder farmers and commercial farmers is estimated to reach 1,345, 687 of which more than 90% are smallholders. The average yield is estimated around 0.735 t/ha. Global production of sesame is estimated at 4.8 million tonnes and growing at 5-10% annually. China produces 0.59 million tonnes per year at an average of 530kg per acre (1.31 t/ha). Compared to China, one of the largest competitors to Ethiopia, is almost producing double compared to Ethiopia. This is mainly due to systemic problems that include lack of improved variety and recommendation tailored for all agro-ecologies since most current varieties have sub-optimal yield, limited awareness on best agronomic practices and pest management, inadequate capacity of farmer cooperative Unions to supply inputs and, lack of access to credit for smallholder producers.

Most varieties used by smallholder farmers are sub-optimal agronomic and market attributes. They have low yield potential, color demand, sub-standard oil content, mature late, and are less draught resistant. Some of these varieties include Setit 1, Humera 1, Adi 1, T-85, Hir Hir, Gojam azene and Abunam. To address this, the Ethiopian Institute for Agricultural Research and Regional research institutes are not up to speed to produce and release improved varieties. Only 2 varieties released in the last 33 years for the major growing areas of western Tigray and western Amhara where 80% of the sesame production comes from. In addition, most of the varieties released have not been adopted widely as they do not address the specific constraints of the respective agro-ecology and needs of farmers. Owing to lack of options, farmers are often

forced to grow some of the varieties out of their ecology, leading to low economic returns to farmers. (Wijnands et al., 2009).

Not only seed variety release is low, but also recommendation and clarity is also lagging behind for complementary agronomic practices and pest management. Some of these practices include seedbed preparation, planting time and method, fertilizer application, irrigation practices, pest control, and harvest time. According to the MoA senior expert, there is no consistent recommendation on the integrated sesame package including what type of variety to use and the complementary practices associated with that. It has been found that for a specific variety there could be two or more different package recommendation for an agroecology. For example, single recommendation of plant spacing i.e., 40 cm between rows and 10 cm between seeds, was given irrespective of difference in branching habit of the varieties and diversity of sesame agroecology. Moreover, the fertilizer recommendation (100 kg/ha DAP and 50 kg/ha urea) is uniform across all soil types. There is no research recommendation on sesame cropping systems. Diseases such as bacterial blight and phylody and insect pests such as web worm and sesame seed bug are increasing in importance nowadays (Kindie, 2007)

Smallholder sesame producers procure inputs mainly sesame seed, fertilizer, pesticides, and farm implements from farmer cooperative Unions. This union's lack adequate resource to act as an agricultural input provider for farmers. Unions have limited capacity to directly source chemicals from importers and lack the expertise in selection and quality control of pesticides. Consequently, there is a risk of adulteration, especially when purchasing through intermediaries. One of the top challenges of the sesame sector in Ethiopia is access to finance and the high costs of credits via the informal money sources that charge high interest rates (Negash, 2015).

Sesame farmers suffer from lack of access to finance to purchase inputs and hire daily laborers for planting, weeding and harvesting. The dominant source of credit include informal sources or loan sharks, from cooperatives, from micro-finances and finally a very small amount from banks for selected few farmers. Farmers mentioned that the amount of credit obtained from the cooperatives is not sufficient to cover all the operational costs of sesame production (Amare, 2009). Tefera, 2010 suggested that farm output can increase by 13% if farmers' access to credit increases with 1%.

The next actor in sesame value chain are collectors who do not add value but only act as a middle man. These are small traders, farmer cooperative unions and primary cooperatives who collect in small quantity from producers and resell to brokers/wholesalers, oil millers and exporters. They are also sometimes called

village aggregators. The total number of these is not known but it's estimated that most of them are located in high sesame producing areas. Often these bodies have major role in determining local sesame price and are price makers (Adefris etal, 2011).

The third actors in sesame value chain are large scale aggregators/ wholesalers or brokers. They perform with a better financial and technical capability than village level aggregators. They are engaged in aggregating sesame produce from village collectors, and farmers with the ultimate objective of selling to, oil millers, retailors, processors and exporters. The final actors in sesame value chain are retailors and processors or exports. Retailors are local sesame supplier to oil millers, and the public while exporters or processors are solely engaged in the export of sesame.

The sesame value-chain in Ethiopia is largely underdeveloped. 95% of sesame produced is for export purposes and 100% of it is exported in row. Some of the problems manifested under the value-chain include under standard quality and inadequate volume, loose quality regulation framework and supervision, week marketing system and infrastructure, and lack of coordination among actors. These systemic and operational challenges have prevented Ethiopia's potential to secure commensurate foreign currency from the export of sesame.

Ethiopian sesame is currently unable to penetrate international hyper market destinations ITC, 2011. Compared to international suppliers, Ethiopia sesame is acceptable for the smallest international market niche where the price is set significantly lower than the hyper market. This is mainly due to inadequate quality regulation framework and supervision. Ethiopia export raw sesame mainly Whitish Humera type and Wellega type. Even though these varieties are of high quality, the poor production and improper handling has made Ethiopia export sesame seed to be rated of low grade by end users. Sesame quality attributes include color and moisture content (<7%), oil content (>50%), and purity (>99.5%).

Ethiopian Commodity Exchange (ECX) has set standards which helps to determine the value of sesame. Grade 1 sesame is set not to have moisture content more than 8% and foreign matter of 1%, natural white color, objectionable odor and contrasting color. Even though there is no specific study indicating how much was lost due to low quality, according to the Minister of Trade, most of the country sesame produce fail to meet these requirements and the international market demand. Based on ECX, 2013, grade 1sesame accounts for only 0.41%, and grade 2 for 20.42% of the total sesame exported.

Sesame quality control has three fundamental stages: Pre-production, production, and post-harvest stages Demelashe, 2004. During pre-production, farmers lack the adequate extension, informative farming procedures and protocols, where farmers can follow quality sesame farming. Even though there are extension packages, lack of consistency across regions and lack of resource to demonstrate and aware smallholder farmers indicate that farmers engage in sesame production less informed about the type of quality requirement expected from their produce. These challenges include poor production systems resulting in weeds, mixture of varieties having different colors etc.

Compounded by lack of access to credit for inputs and post-harvest technologies for cultivation, continues to put pressure on the quality of sesame at the farm gate. Sesame production requires massive labor force during weeding and harvesting. The yield of sesame can be reduced by more than half due to improper harvesting. Though there are no researches found by how much the country has lost due to this particular problem, Kinde 2010, Ethiopia has only been able to export 0.33% of its total sesame export to Japan, which is the number one high quality sesame seed importer in the international market.

In addition to quality of cultivation, low quality also occurs due to improper logistics, and lack of well-established quality control system from farm gate to export market. The fact that there are some producing areas with limited all-weather access roads had induced farmers to use local and unhygienic means of transportation to transport there produce such as mules and donkeys MoA 2013. Also because there are very limited quality control enforcing mechanism at the collection centers such as kebeles, and woredas, coupled with low awareness creation effort on quality for the smallholder farmers in particular, adulteration of sesame seed with sand, gravel and soil has become a common practice lowering the quality and hence the country's foreign currency earnings.

Cash crop commodity growers require up-to date information on the international market price of their potential produce, minimum list of quality requirements expected, buyers profile and there demand sink patterns, and other administrative protocols. To this end, in Ethiopia, there is no holistic and transparent market information system for sesame MoA 2013. This not only hammered the full market gain that smallholder farmers could appropriate and enjoy but it also made smallholder farmers to be completely dependent on village brokers as the only market outlets to Addis and International market.

Another chronic bottleneck across sesame value-chain include lack of adequate and standard storage facilities. Almost all smallholder sesame farmers store there produce using traditional storage facilities. This facilities, by exposing the seed to weevils, termites and microbes not only compromise the quality of

sesame but will also put the farmer in a difficult positon to take up whatever price offered by the village broker. This problem seems to be less of an issue when we go up the value chain. Most wholesalers, aggregators, processors and exporters have adequate and standard warehouse facilities even though this might not be true for some MoA 2013.

3.4 Promoting institutions

There are different institution that have significantly contributed to the development of sesame sub-sector. This institutions include research organization that are engaged in developing and promoting improved sesame seed strains, bureaus of agriculture that focus on regulation and communication, cooperative unions and associations that facilitate sesame marketing in general.

Research institutions: Ethiopian research system is made of regional and federal structures. The federal research system is represented by the Ethiopian Agricultural Research Institution and the regional system is represented Amhara, Oromia, Tigray and Southern People Nations and Nationalities research Institutions. In relation to sesame, both systems are engaged in to generating sesame technologies that improve the productivity and quality of sesame through a demand-driven and agro-ecology based approach and with shopping of ready-to- use technologies from countries with similar production system. Specifically, these institutions are engaged in introducing, improving and adopting improved sesame varieties and developing appropriate recommendation packages.

Based on the mandate of these institutions, improved varieties are not consistently developed across time and agro-ecologies. As mentioned above, it has been nearly 35 years since these institutions have released varieties that take into consideration agro-ecology requirements and the changing agro-climatic conditions. The varieties used by smallholder farmers have suboptimal agronomic and market attributes. The main problems associated with this include lack of up-to-date, technology driven adequate breeding infrastructure.

Agricultural Bureaus: similar to the research system, agricultural bureaus are also classified as Regional Bureaus of Agriculture and Natural Resource that are represented by 14 regions of the country and the Ministry of Agriculture and Natural Resource at the federal level as of 2016 which is also the apex body. These institutions have three specific mandates in relation to sesame: 1) is to develop and enforce rules and regulations as well as different initiatives for competitive production and marketing of sesame at the national level, 2) to develop and promote appropriate sesame production packages in coordination with the research system and, 3) oversee and administer the distribution of inputs.

According to these mandates, due to lack of adequate institutional frameworks and structures in remote sesame producing areas, farmers have limited access to extension services. For those in which the extension system is already providing extension service, the service package manuals are incomplete. The recommendation stated in the manuals are applicable to a specific agro-ecologies lacking geographical diversity in relation to sesame producing areas agro-ecological characteristics, and focuses only on production and few agronomic practices lacking comprehensiveness particularly on marketing and complementary agronomic practices such as intercropping instead of mono-cropping system only. Henceforth, farmers in major sesame producing areas use poor, outdated, and suboptimal pre and postharvest production.

Cooperative unions: these are farmers association that include Primary Cooperatives that operate at the woreda level and Farmer Cooperative Unions which are the congregation of Primary Cooperatives representing different Primary Cooperatives at the Zonal level. The primary objective of these bodies is to distribute agricultural inputs such as fertilizers, seed, pesticides and credit for smallholder farmers. The main challenge of unions in relation to sesame is the lack of adequate resources to supply inputs for sesame growers.

Exporters association: there is one exporters association: the Ethiopian Pulses, Oilseeds and Spices Processors and Exporters Association (EPOSPEA) engaged in sesame. The association started operation in 1998, and has been working with different international market operators, brokers and governments. Despite the association limited operational resources, recently the association facilitated an international experience and exposure visit to Turkey, Israel, China, and Japan its' for selected members. The association collaborate with members including processors, exporters, and wholesalers to support the government in monitoring monopolistic marketing activity, work closely with the market and provide market information, capacity building to members and policy advocacy. Providing up-to-date local and foreign market information, trends & analysis of the sector to build competitive position of members.

Ethiopian Commodity Exchange: the establishment of the Ethiopian commodity Exchange in 2008 introduced improved marketing for cash crops. The commodity exchange is an exclusive multi-commodity marketing platform for coffee, sesame, maize, wheat, and beans. The objective of the platform is to secure the better price for the smallholder farmers and the entire value chain by creating market discipline. It focuses on creating international marketing practice by prioritizing key product marketing principles that need to be maintained by producers and sellers: ensure quality of sesame export beginning from downstream sources, proper processing and packing, and timely delivery. On the other hand it brings in

buyers for an open bidding or “open outcry” by electronically accessing remote trading systems in the international market.

Since its establishment, the platform is presumed to have improved the marketing of cash crops from Ethiopia. A significant number of actors in sesame value chain are well aware of the platform and are able to benefit from it. The platform is open for all buyers and sellers of the cash crop commodities. Sells and purchase transactions order is recorded in Order Ticket contract. Sellers will issue the type of there produce and issue the minimum price in the price that they see fit by taking into consideration current prices and anticipating the potential international price. Buyers will bid against the price and will continue to engage in negotiations with sellers. Based on the different form of trading either forward or future, a deal will be struck and a certificate will be issued. ECX will validate the credentials of buyers and sellers using automated reconciliation to giving all market players confidence in the market.

ECX has 16 warehouse on the majority of sesame producing areas. These collection centres are the primary destination for export sesames, or at least presumed to be until they go through rigorous quality inspection. The collection centre evaluate moisture content, foreign matter, colour, and objectionable odour according to established quality parameters. The warehouses will conduct sampling and grading by conducting spot test at loading and unloading and laboratory tests.

ECX face multiple challenges that arise while running the day to day operation of the organization as well as strategical issues that require objective validation. This study is only limited to listing out some of the key challenges to provide indication for future researchers. Some of these challenges include lack of providing uniform grading and fast services across its centres throughout the country. According to the personal communication from ECX, this is mainly due to inconsistent human resource allocation for all collection centres. The quality supervision and grading guideline is uniform for all collection centres, however, due to disaggregated operational skills and capability, and that fact that different technical background of operation staffs have different understanding, inconsistency in operation has been a challenge on quality and timely sesame export. In some centres, it’s been documented that it might take weeks to unload sesame from producers, compromising quality of sesame.

CHAPTER FOUR

METHODOLOGY

4.1 Research Design

The objective of the study is to investigate the determining factors affecting sesame volume and value of export from Ethiopia from 1994 – 2016 and identify key bottlenecks shackling the sesame value-chain. Accordingly, secondary time-series data are collected from intentional data sources and from relevant institutions in Ethiopia. Case-studies were conducted on Ethiopian agricultural policy, including the Growth and Transformation Plan, Agriculture and Rural Development Policy, and legal documents including Cooperative Proclamation. Interviews and consultative workshops were also conducted with subject matter experts, the Federal and Regional Agricultural Bureaus and research institutions, exporters, and input distributors. Further input is also collected from international experts and institutions such as the International Foo Policy Research Institution (IFPRI).

4.2 Data type

Annual time series secondary data are used for Real Effective Exchange Rate (REER), Real Interest Rate (RIR), international price of sesame (Px), quantity of sesame exported (Qs), Gross Domestic Product (GDP) and Gross Capital formation (GCF), value of sesame exported (Qd), domestic production of sesame (DP), domestic consumption of sesame (DC), domestic price of sesame (DPi)terms of trade index of exports which is a measure of trade openness (TOT), and net inflow of foreign direct investment (FDI).

4.3 Data sources

22 year secondary data employed in this study are collected from the agricultural production, supply and trade database of FAO (FAOSTAT) , the United Nations Conference on Trade and Development Statistics (UNCTADSTAT), Ethiopia Grain Trade Enterprise (EGTE) and ECX . Data that will be collected from FAOSTAT include EXPTVal, EXPTVol, EXPTprice, GDP and DP. The other variables that include REXR, RIR, ToT, FDI (net inflow), and GCF are collected from UNCTADSTAT. The remaining domestic price data is collected from EGTE and ECX. Based on the study from Kindey 2010, sesame local consumption is what is remaining from the export. This consumption is divided for household consumption, local market, seed source, wage in kind payment and animal feed. To determine the local consumption, local sesame consumption is calculated based on the volume of production in tones and volume of export in tones.

4.4 Model specification

4.4.1 Data Analysis and Testes

The time series data for analyzing was analyzed using Ordinary Least Squares estimation technique to assess the magnitude and effects of key determinates of sesame export volume and sesame export value based on the literature reviewed. Unit root tests was conducted to test for stationary using ADF to find out the existence of unit root test. This was followed by performing diagnostic tests of serial correlation, model stability, heteroskedasticity, autocorrelation and normality.

4.4.2 Multivariate Model Development

Sesame export supply can be referred as to how sesame is offered for sale after factors that determine it have influences the quantity and value. How production, local consumption, international and domestic prices as well as the capital formation have been moving across years influence sesame export. Of these factors movement, which factors movement is influence is captured using two models. Based on the literatures reviewed, export decisions on agricultural commodities are based on GDP, capital formation, production, and price of the crops, production, and real effective exchange rate, and real interest rate, flow of foreign direct investment and terms of trade. Each of these variables are defined below.

Domestic sesame production (Prod): is the quantity of sesame produced in Ethiopia. This production includes sesame produce from smallholder farmers as well as commercial farmers. The variable was added because the beginning of any agricultural commodity export is from the available production. As the level of production increase, all other factors remaining constant, the larger the growth of the export volume becomes. On the contrary, holding other factors constant, domestic supply reduces export value. Read literatures. According to Nwachuku IN, Agwu N, Nwaru J, Imonikhe G 2010, the study discovered that there is strong positive impact of increments in production on volume of export. But in some instances where there is an internationally abundant production of the commodity globally, production and export growth can have opposite relationship Kumar & Rai 2007.

Export price of sesame (EXPTprice): as one of the key determinants of the agricultural export, especially for less developed countries for the mere fact that they are mostly price takers, export prices positively influence value and volume of exports. Nothing that price movements have acute impact on value and volume of export, it's fundamental to see on which a greater and significant impact it has. According to Edwards 2004, export prices has a strong positive impact in the short run and in the long run it has a negative impact on export growth since prices adjust to the changes in cost of capital. While according to Kingu 2014, international price has a significant and positive impact on export growth in both the short run and long-run. In this regard, the export price of sesame is calculated based on value and volume of exports as follows:

Export price = [(Value of export)/ (volume of export)] * 1000……(Eq, 1)

The outcome is in $/tonne. Multiplication of the fraction by 1000 is due to the fact that value of exports gathered from the FAOSTAT is in $ 1000, while volume of exports is in tones.

Measure of terms of trade openness (Terms of Trade index – TOT): Trade openness is measured as:

$$ToT = \sum (TE + TI)/ GDP \quad \text{(Eq, 2)}$$

TE = Total export

TI = Total import

GDP = Gross Domestic Product

Trade openness is expected to raise productivity through increased competition and transmission of technology from the rest of the world (Levine and Zervos, 1998). Further based on Ngouhouo & Makolle 2013, openness to trade introduces countries to competitions from other countries creating opportunities, as well as markets. Hence, the study discovered a significant positive relationship between terms of trade index and export performance of a country. While deterioration in terms of trade index results in contraction of export performance and hence export earnings (Jayant 2006)

Real Effective Exchange Rate (REXR): Real effective exchange rate is defined with the respect to Ethiopia's major trading partners. These include European Countries, African Countries, Australia, East Asia and Middle East countries. The REXR for a particular times is measured as by:

$$REXR = NEER*P_T/P_N \quad \text{(Eq, 3)}$$

Where

NEER = the nominal effective exchange rate

Real effective exchange rate is most accurate to measure the effect it has on export growth than nominal since real exchange rate adjust for purchasing power difference. According to Maureen et al, 2002, supply response to price incentive captured by real exchange rate depreciation is found to significantly affect export of goods. And hence real effective exchange rate depreciation leads to increase in export performance so the expected relationship between REXR and EXPTVal and EXPTVol is positive. While other studies have mixed signal. Based on Agasha 2009, while there is a strong and positive relationship between real

exchange rate and export growth in the long run, the short run relationship was however not significant. While another study by Sharma 2000, found a positive association between depreciation in real exchange rate and export proving that depreciation in real exchange rate makes exports cheaper in the global market and this consequently stimulate demand increasing export performance overall.

Real Interest Rate (RIR): Real interest rate represents the cost of investment or borrowing. All investments have cost of raising capital either or through equity and debt. Investment in the production and processing for export require finance and the cost can be captured by the real interest rate which can be measured as

$$RIR = NIR - INF \quad \text{..... (Eq, 4)}$$

Where,

NIR = Nominal interest rate

INF = Inflation rate

RIR = Real interest rate

This variable is expected to have a negative impact on export performance. More costliness of financing production or export processing for commodities, the lesser the export performance is. However, according to Abolagba EO 2010, RIR has positive impact on the movement of export performance. This can be true when the real interest increase can be matched by an increase in export price. Hence, other factors remaining constant, RIR has a negative impact on export performance.

Domestic demand (Domcons):. This is measured as follows:

$$(Domcons)_T = (Prod - EXPTVol)_T \quad \text{.....(Eq, 5)}$$

Where, T = time

As production has positive influence on export growth, change in domestic consumption on the other hand has a negative impact on volume of export growth. Abolagba EO 2010, while it's expected that with an increase in domestic production foreign currency will be earned more with the increase in the marketable surplus, it can also increase marketable surplus that can be committed for local market, contracting the export surplus mostly for price taking countries with minimum international market share. But for countries

where the commodity is internationally recognized and production mostly dictated by export, domestic consumption and export growth are negatively related and it is significant, Boansi 2013.

Domestic price (Domprice): is a measure of local sesame price by which producers of sesame tend to provide sesame produce to local markets with a specific destination to local oil millers, and to retailers that supply for the public consumption. Sesame local price has significant effect on the export performance of sesame based on the fact that most of the sesame production in Ethiopia is for international markets and local market hence local sesame price has significant and negative effect on the export volume as well as value (Kindie, 2007).

Lagged export growth (EXPTVol + (-1)): This variable is included to control autocoliniarity of the dependent variables: to minimize the factor by how much the dependent variable is explained by itself. According to Musinguzi 2000, there is a significant and positive association between lagged export growth and current export growth.

Net Foreign Direct Investment (FDI): Net foreign direct investment is measured as the difference between the total direct investment into the country and the total direct investments elsewhere. This variable stimulates domestic productions and marketing and plays a significant role in less developed economies by advancing technology transfer, improving efficiency, and quality of export performance. Some studies have found a negative and significant relationship between FDI and export, Jeon 1992, on the other hand Pfaffermayr 1996 & Cabral 1995, found a significant and positive association between FDI and export performance. In countries where the commodities markets are mostly export oriented, FDI on such commodities tend to positively and significantly affect their export performance.

Gross Domestic Product (GDP): real gross domestic product is a measure of all value of goods and services that an economy produces. It's used as a proxy to the supply capacity of a country. Other factors remaining unchanged, the increase in the real GDP, positively affects the export performance (Oyejide 1986 and Eita 2009). GDP accounts for goods and services produced that are marketable on that given period. There are goods and services that are non-tradable and do not directly influence sesame export performance. Since is difficult to get the data on the direct investments made to supply sesame for export markets, it's is appropriate to use GDP as an independent supply capacity for sesame export performance.

Gross Capital Formation (GCF): this is defined as Gross fixed capital formation which measures country's infrastructure development. This measures countries fixed assets that facilitate the production and supply of goods and services. These fixed assets inventories of a country include plant developments, public services such as road, utilities etc., schools, hospitals, private and commercial residents, marketing

infrastructure including market information systems. Improved infrastructure and institutional support systems including the public and private sector are important components of export minimizing transaction cost and reducing trade barriers. According to Elbadawi, 1999 and Collier 2002, GCF and export performance are strongly correlated and has positive impact.

4.5 The Model

The study utilized a model used by Byanyima 2011, and David et al 2014. Production volume, domestic consumption, international price, terms-of-trade index export, real effective exchange rate, GDP, growth capital formation, and foreign direct investment were used as the explanatory variables of export of sesame volume and value of export.

Thus sesame export supply function is the following linear equation.

$$EXPTVol = C + \beta_1 Prod + \beta_2 EXPTprice + \beta_3 TOT + \beta_4 REXR + \beta_5 GDP + \beta_6 GCF + \beta_7 FDI - B_8 Domcons - B_9 Domprice - B_{10} RIR + \beta_{11} (EXPTVol + (-1)) + U_t \quad \text{(Eq, 6)}$$

$$EXPTVal = C + \beta_1 Prod + \beta_2 EXPTprice + \beta_3 TOT + \beta_4 REXR + \beta_5 GDP + \beta_6 GCF + \beta_7 FDI - B_8 Domcons - B_9 Domprice - B_{10} RIR + \beta_{11} (EXPTVol + (-1)) + U_t \quad \text{(Eq, 7)}$$

Where,

EXPTVol = Volume of sesame export

EXPTVal = Value of sesame export

Prod = Domestic production of sesame

EXPTprice = Export price of sesame

TOT = Terms of Trade Index of exports (measure of trade openness)

REXR = Real Effective Exchange Rate

GDP = Growth Domestic Production

GCF = Growth Capital Formation

FDI = Net Foreign Direct Investment

Domcons = Domestic sesame consumption (local demand)

Domprice = Domestic price of sesame

RIR = Real Interest Rate

B = Intercept

U_t = Stochastic error term

In order to estimate the elasticity of the dependent variables in relation to the independent variables, equation 6 and 7 were written in log form to generate equation 8 and 9. Log transformation helps in measuring constant elasticity showing that the change in log dependent variable per unit change in log independent variable remains the same no matter at which log independent variable we measure the elasticity. It also helps to make comparable effect analysis between the dependent variables and the independent variables. It will also help to reduce the issue of heteroskedasticity. Based on this formulation however, RIR is not log transformed because the variable contains negative values, yet log of non-positive numbers leads to missing data generated. Thus the models are specified as a log form below:

Thus the log form of Sesame export supply function is the following:

Ln (EXPTVol) = C + Ln (Prod) + Ln (EXPTprice) + Ln (TOT) + Ln (REXR) + Ln (GDP) + Ln (GCF) + Ln FDI - Ln (Domcons) - Ln (Domprice) - B_{10} RIR + Ln (EXPTVol + (-1)) + U_t …… (Eq, 8)

Ln (EXPTVal) = C + Ln (Prod) + Ln (EXPTprice) + Ln (TOT) + Ln (REXR) + Ln (GDP) + Ln (GCF) + Ln FDI - Ln (Domcons) - Ln (Domprice) - B_{10} RIR + Ln (EXPTVol + (-1)) + U_t ……(Eq, 9)

Both of these equations are estimated using Ordinary Least Squares (OLS) method. In particular, a multiple regression equation relating volume and value of sesame export and the quantitative factors affecting the performance of sesame export sub-sector were run and results are presented in the subsequent sections. Diagnostic tests were performed to find out whether the model conformed the Classical Linear Regression Model (CLRM) assumptions. These tests include appropriateness of model specification, heteroskedasticity test, autocorrelation test, multicollinearity test, and normality tests.

CHAPTER FIVE

RESULT AND DISCUSSION

5.5 Basic exploratory data analysis and normality test

Before commencing the necessary testes and the regression, it's fundamental to establish the descriptive statistics and the correlation matrix. The descriptive statistics of all the variables in logarithm form and liner form is described under table 5. 1 and the correlation matrix for all the variables is described under table 4.2

Table 5.1: Descriptive statistics and normality test result

	logdomc	logdomp	logexp	logexpva	logexpvo	logexv	logfdi	loggcf	loggdp	logpro	logrexr	logto	logrir
Mean	16.569	6.586	9.502	20.344	17.749	16.136	12.764	11.326	12.616	18.214	4.551	5.367	-0.007
Median	16.569	6.429	9.356	20.741	17.942	16.308	13.095	11.165	12.507	18.062	4.660	5.580	-0.026
Maximum	18.468	8.036	11.523	22.856	19.359	18.642	14.190	13.004	13.480	19.607	5.100	7.664	0.176
Minimum	11.429	5.036	8.503	17.476	14.755	13.195	10.370	10.490	11.959	16.753	3.891	2.649	-0.171
Std.Dev.	1.532	0.705	0.747	1.708	1.462	1.527	1.260	0.695	0.495	1.131	0.395	1.293	0.109
Skewness	-1.659	0.331	0.994	-0.204	-0.501	-0.420	-0.824	0.863	0.396	-0.100	-0.578	-0.674	0.052
Kurtosis	7.100	3.571	3.681	1.939	1.975	2.169	2.406	2.872	1.763	1.291	2.198	3.103	1.760
Jarque-Bera	24.359	0.671	3.871	1.129	1.797	1.164	2.688	2.621	1.888	2.588	1.735	1.600	1.354
Probt.	0.000	0.714	0.144	0.568	0.407	0.558	0.260	0.269	0.389	0.274	0.419	0.449	0.508

Source: study result

One of the most commonly applied tests for normality is the Bera- Jarque (BJ) test. If the residuals are normally distributed, the probability distribution of the BJ test should be bigger than 0.05 or should be more than 5 percent. As can be observed from the table above, except for domestic consumption (logdomc), all the other variables are normally distributed. The normally distributed variables include domestic price (logdomp), export price (logexp), exported value of sesame (logexpva), exported volume of sesame (logexpvo), lagged volume of export (logexv), foreign direct investment (logfdi), gross capital formation (loggcf), gross domestic product (loggdp), production (logpro), real effective exchange rate (logexr), terms of trade (logto), and real interest rate (RIR). Since 92% of the variables are normally distributed and the

fact that one variable is non-normal, violation of the normality assumption for CLRM is virtually inconsequential (Chris, 2014). Thus, it's desirable to stick with OLS estimation technique and we fail to reject the null hypothesis that the variables are normally distributed.

5.2 Multicollinearity test

One of the assumptions of the OLS estimation is that the explanatory variables. Orthogonal relationship exists if there is no relationship among variables. However, often correlation between explanatory variables will be non-zero. A small degree of association between explanatory variables will almost always occur but will not cause too much loss of precision (Chris, 2014).

Table 5.2: Multicollinearity test result

	logdomc	logdomp	logexp	logexv	logfdi	loggcf	loggdp	logpro	logrex	logto	RIR
logdomc	1.000										
logdomp	0.306	1.000									
logexp	-0.313	0.100	1.000								
logexv	0.305	0.321	0.032	1.000							
logfdi	-0.111	-0.150	0.253	-0.009	1.000						
loggcf	0.473	0.626	0.133	0.577	0.020	1.000					
loggdp	0.512	0.584	0.171	0.607	0.088	0.973	1.000				
logpro	0.610	0.447	0.028	0.748	0.160	0.848	0.917	1.000			
logrexr	0.528	0.538	-0.092	0.472	0.155	0.786	0.822	0.777	1.000		
logto	0.078	0.382	0.121	0.318	0.566	0.681	0.625	0.536	0.556	1.000	
RIR	-0.514	-0.262	-0.119	-0.579	-0.044	-0.707	-0.803	-0.862	-0.668	-0.303	1.000

Source: study result

Most econometricians argue that multicollinearity is more a problem with data than with the model or estimation technique. Be that as it may, let's go through the description and the recommendation to proceed to the next stage. From the table, it can be seen that GDP (loggdp) and GCF (loggcf) seem to be correlated very strongly correlated (0.973) and each of them with production (logpro) and effective exchange rate (logrexr) 0.917 and 0.848, and 0.822 and (0.786) respectively. Accordingly, we can see that the GDP and

GCF are strongly correlated amongst themselves and with other variables including production (logpro) and interest rate (RIR).

Based on Chris (2014), the first option is to ignore the problem with the precondition that statistically the coefficients have to be sound with the appropriate sign and the relationship is near to strong multicollinearity relationship with the moderate range being from 0.4 to 0.59 and the strong collinearity range being from 0.6 to 0.79. However, the result for the GCF and GDP variables is a perfect multicollinearity with 0.973. Hence both variables will be dropped since perfect multicollinearity is observed.

Chris (2014) also suggests that we can ignore multicollinearity if there is a strong theoretical and empirical experiences of not doing so. All theoretical reviews and empirical reviews suggest that production of agricultural commodities is the starting point for any export transaction. Accordingly, production variable will not be dropped from the analysis but the RIR will be dropped given that there is no strong evidence of keeping it in the estimation compared to the production variable. The remaining testes and regression result will be discussed based on this output. GDP, GCF and RIR are dropped from the estimation.

5.3. Unit Root – Stationary test

It's fundamental to test variables for stationarity for the reasons that a stationary series has a constant mean, constant variance and constant autocovariances. For stationary variable series, "shocks" will gradually die out. This means that a shock at time will have smaller effect at time t+1, t+2, and so on and the data can lead to non-spurious regressions. If standard regression techniques are applied to non-stationary data, the end result could be a regression that looks good under standard measures but it is really valueless. Therefore, if the variables are not stationary, then the standard asymptotic analysis will not be valid. Chris (2014), in order to test the stationarity of the dependent and independent variables, we will use Augmented Dickey-Fuller (ADF) test. The hypotheses to be tested in unit root test are:

$H_0 : \alpha_2 = 0$, i.e., there is a unit root – the time series is non-stationary.

$H_1 : \alpha_2 \neq 0$, i.e., there is no unit root – the time series is stationary.

Based on the hypothesis the first level I (0) or level difference the stationarity test is as below.

Table 5.3: Unit – root test result first level difference

Varaibles	t-stat	p-value	1%	5%
logEXPTVAL	-1.8733	0.3371	-3.8085	-3.0206
logEXPTVOL	-1.3137	0.6022	-3.8085	-3.0206
logEXPPRICE	-3.4201	0.0225	-3.8085	-3.0206
logEXVOLL	-0.521	0.8628	-3.9203	-3.0655
logFDI	-2.6483	0.1004	-3.8085	-3.0206
lofGCF	4.4962	1	-3.8315	-3.0299
logGDP	1.7361	0.9993	-3.8085	-3.0206
logPRO	-0.8778	0.7737	-3.8085	-3.0206
logREXR	-1.2448	0.6335	-3.8085	-3.0206
logTOT	-1.886	0.3315	-3.8085	-3.0206
logDOMCONS	-3.647	0.0141	-3.8085	-3.0206
logDOMPRICE	-1.4126	0.5514	-3.8867	-3.0521

Source: study result

If the calculated ADF test statistic is higher than McKinnon's critical values, then we fail to reject the null hypothesis (H_0). This means that a unit root exists in Y_{t-1} and ΔY_{t-1}, implying that the series are non-stationary or not integrated of order zero, i.e., I(0). Hence, based on the table shown above, the variables are non-stationary. According to Chris (2014), if we find that the levels of the series are non-stationary, we could repeat the analysis on the first difference directly. Hence we will difference the series 2nd time i.e. I(1).

Table 5.4 Unit –root test result second level difference

Variables	t-stat	p-value	1%	5%
logEXPTVAL	-4.3604	0.0033	-3.8315	-3.0299
logEXPTVOL	-6.0722	0.0001	-3.8315	-3.0299
logEXPPRICE	-5.0421	0.0008	-3.8315	-3.0299
logEXVOLL	-5.9366	0.0002	-3.9203	-3.0655
logFDI	-4.4294	0.0029	-3.8315	-3.0299
lofGCF	-0.1351	0.9311	-3.8573	-3.0403
logGDP	-2.9689	0.0562	-3.8315	-3.0299
logPRO	-5.399	0.0004	-3.8315	-3.0299
logREXR	-4.0344	0.007	-3.8573	-3.0403
logTOT	-4.9091	0.0004	-3.8315	-3.0299
logDOMCONS	-4.5862	0.0032	-3.9591	-3.081
logDOMPRICE	-4.7141	0.002	-3.8867	-3.0521

Source: study result

Accordingly, except for the Gross Capital formation (GCF) and Gross Domestic Production (GDP), all the other variables t-statistics is greater than the critical values for both 1% and 5% significance level. We can also refer to the p values; except for the GCF and GDP, all the other variables p value is less than 0.05 Hence we reject the null hypothesis and take that all the other variables are stationary at second level difference or I(1). GCF and GDP will be dropped from the estimation.

5.4 Heteroskedasticity test result

This test is conducted in order to ascertain that the disturbance or the errors has the same variance such that OLS estimators are BLUE, that is the coefficient estimates are efficient, consistent and unbiased. In order to detect heteroskedasticity, there are different techniques that can be used. In this study we will use the white test to assess the stability of the variance for both models.

The null hypothesis of no heteroskedasticity is stated as follows for both models:

H_0 = no heteroskedasticity and

The null hypothesis is tested against the alternative hypothesis for both models:

H_1 = there is heteroskedasticity

The null hypothesis, which in this case is a hypothesis for value of export model and volume of export model, will not be rejected in favor of the alternative hypothesis if the probability F-statistics of the white heteroskedasticity test is significant at five percent.

For the first volume of export model, as can be seen under Appendix1, both the F-and X^2 (LM) version of the test statistics give the same conclusion that there is no evidence for the presence of heteroskedasticity since the p-values are considerably in excess of 0.05 - i.e. 0.07 and 0.11 respectively. Similarly, as can be observed under Appendix 2, both the F-and X^2 (LM) version of the test statistics give the same conclusion that there is no heteroskedasticity for the value of export model as well. Therefore, we fail to reject the null hypothesis that there is no heteroskedasticity observed.

5.5 Auto correlation test result

This is done to test the covariance of the error terms over time is zero. In other words, it's used to test the error terms are uncorrelated over time. Before making this test, based on the literature reviews conducted, the volume of export and value of export models incorporate lagged export volume as one of the independent variable to control serial correlation and ascertain the regression is random 9 non-stochastic) and uncorrelated.

There are two ways of assessing autocorrelation. This include the Breusch-Godfrey test and Durbin-Watson test. The earlier test is a more general test of autocorrelation up to the rth order. It examines a joint test for autocorrelation that will allow examination of the relationship between the residual and several of its lagged values. While the later test is to test existence of autocorrelation for first order autocorrelation – i.e. it tests only for a relationship between an error and its immediately previous value. Accordingly, let's see the result of both testes.

The null hypothesis of no autocorrelation is stated as follows for both models:

H_0 = no autocorrelation and

The null hypothesis is tested against the alternative hypothesis for both models:

H_1 = there is autocorrelation

Based on the result from Breusch-Godfrey serial correlation F-and X^2 (LM) version test are presented in Appendix 3 and Appendix 4 for the volume of export and value of export. The conclusion for this version of the test for both models, the null hypothesis of no autocorrelation should not be rejected since the p – values are above 0.05 – i.e. 0.70. To strengthen the result, the DW test also illustrates that there is no autocorrelation for both models – i.e. 1.8. Therefore, the error terms are uncorrelated over time.

5.6 Model stability test

So far, we have been trying to assess the variable coefficients whether they are BLUE or not. In other words, we have been validating the coefficients are unbiased, efficient, and consistent and whether or not they are statistically sound or not. As such, we have seen that that the coefficients are BLUE and the major CLRM assumptions are full filed. Now, let see if the functions that are illustrated under equation 8 and equation 9. To asses this, we will use Ramsey's RESET test of stability.

This test is a general test for misspecification of the functional form of the model. As it's been discussed above we have used a logarithmic linear functional form to establish the relationship. Accordingly, the test was conducted on the following hypothesis.

The null hypothesis stability is stated as follows for both models:

H_0 = models is stable

The null hypothesis is tested against the alternative hypothesis for both models:

H_1 = no stability in the model.

Accordingly, REST stability test was carried out on equation 5 and equation 6. As it can be observed from appendix 5 and 6, t, F – and X^2 versions of the test show that the functions are linear and are stable since the *p*- value of the export volume equation (Eq, 8) is significant at 5% and the p- value for value of export equation (Eq, 9) is significant at 10%. Therefore, based on this result we fail to reject the null hypothesis that the models are linear and stable.

5.7 Discussion of the results

In testing for the appropriate standard BLUE assumption, the residuals and coefficient estimates from estimation of both equations 5 and 6 were found to be normally distributed, non-serially correlated and homoscedastic. This inference is based on observed Jarque-Bera values, Breussh-Godfery and Durbi-Watson serial correlation LM values (for F- statistics) and Chqi-Square statistics, and F-statistic from the White's test for Heteroskedasticity test. Multicollinearity test was conducted and based on the result, Gross Domestic Product (GDP), Gross Capital Formation (GCF) and Real Rate of Return (RIR) independent variables are dropped from the model. As a check on spuriousness of the study result, the residual series for each specification was tested for stationarity through the Augmented Dickey-Fuller unit root test, the outcome of which confirmed stationary (absence of unit root) nature of the residuals except for GCF and GDP variables which are dropped from the analysis. In checking for issues with model stability, Ramsey's RESET test was conducted and the output was consistent and perfectly in line hence we stick to the use of the OLS output for discussion of both models.

Table 5.5: Estimation result of volume and value of sesame export from Ethiopia

Volume of sesame export: LogEXPVOL			**Value of sesame export: LogEXPVAL**	
Variables	**Coefficient**	**Critical p-value**	**Coefficient**	**Critical p-value**
C	-3.132	0.069	-10.040	0.000
LogPRO	1.137	0.000	1.137	0.000
LogDOMCONS	-0.208	0.007	-0.208	0.000
LogDOMPRICE	0.033	0.794	0.033	0.794
LogEXPPRICE	-0.123	0.221	0.876	0.000
LogTOT	0.099	0.288	0.099	0.288
LogFDI	0.134	0.098	0.134	0.098
LogREXR	0.479	0.124	0.479	0.124
LogEXVOLL	0.008	0.902	0.008	0.902
Adjsted R-squared	0.964		Adjsted R-squared	0.974
S.E. of regression	0.261		S.E. of regression	0.261
Prob(F-statistic)	0.000		Prob(F-statistic)	0.000

Source: study result

In interpreting the results, as can be seen on table 5.5, volume of sesame export is noted to have a positive and significant association with production, and negative and significant association with domestic consumption. The other variables that include terms of trade, real exchange rate and lagged volume of exports are insignificant. This reflects a high demand in the international sesame market. As shown in Appendix 7, a total of 96.44% of variations in export volume are explained by the associations identified in this study. This statement is reflected by the adjusted R-squared value observed. Based on this result, with the exception of the insignificant effect of export price and real effective exchange rate, all associations observed are in conformity with our prior expectation.

In regards to foreign direct investment, the result is found to be inconclusive to be considered significant for two reason even though the result is sound at 10% in both volume of export and value of export models. The first reason is that most FDI's in Ethiopian agriculture are directed to horticulture particularly the flower industry, hence no data is found showing FDI investment in sesame sub-sector as the producers are smallholder farmers and local investors.

As shown in table 5.5, with the exception of terms of trade, real exchange rate, domestic price, and lagged volume of export, which were found to have insignificant effect on the value of sesame export, the intercept terms, production, export price, and domestic consumption are found to affect value of export at 5% significance level. While the intercept is found to be significant at 10% signify that, other factors reaming constant, value of sesame export reduces with time, as other variables captured by the residual assumed to affect it. This shows that a highly competitive nature of world sesame export industry and a relatively low power of Ethiopia in terms of share on the world market. A total of 97.4% of variations in value of sesame export are explained by the association observed in this study. By this, with the exception of the insignificant effect of real effective exchange rate, all associations observed are in conformity with our prior expectation. Association observed in this study apply only to sesame exports and may not necessarily reflect on agricultural exports in the broader sense.

A one percent increase in domestic production of sesame leads to a 1.13% increase in both value and volume of export, significant at 1% level. Increasing production of sesame ensures adequate volumes of the produce for both domestic and for export. This positive association is confirmed by the Boansi (2013), by Nwachuku et al, (2010) and by Abolagba et al (2010).

In as much as domestic production has a "boosting" or "pushing" effect on export, domestic consumption has on the other hand, as suggested by Boansi 2013, has a "pulling effect" on both export volume and value of export. With 1% increase in domestic consumption leads to a 0.20% decrease in both volume and value

of export, significant at the 5% level. This observation affirms a suggestion by Ball et al, (1966) that at relatively higher levels of domestic demand, the quantity of resources devoted to export is lower. By this, at lower domestic demand, the surplus obtained from production lead to increased volume (and probably value) of exports. Neutralization of this significant "pulling effect" could be ensured through increasing volumes of production at rates equal to or well above that for domestic consumption.

A 1% increase in export price faced by the country leads to a 0.87% increase in value of exports significant at the 1% level, but no significant on volume of exports. Lagged volume of exports is noted to have no significant effect on both value and volume of exports. From this, we infer that value of Ethiopia's sesame exports has been driven more by price faced by exporters than by actual volumes exported. This affirms competiveness of Ethiopia in sesame exports, thus a price-driven export rather than quantity driven exports. In addition, export demand is in theory believed to increase with a drop in price and vice versa, however, the inverse association observed in this study between price and volume of export is not significant. This is an indication of competitive advantage of Ethiopia in export of sesame. Improving on the quality of the country's export, and attracting higher prices could therefore go a long way to increase value of sesame exports from Ethiopia.

As discussed in different, FDI has been quite controversial in promoting export performance of developing countries. According to Pfaffermayr (1996), FDI has a positive effect on promoting export while on the other hand Majeed et al, (2006), FDI has insignificant or weak effect on promoting export. Other researches including Jeon1992, found a negative association between FDI and export growth. Highlighted in such studies, the effect of FDI depends on the motive for such investment. Export oriented investments generally contribute to export growth by taking advantage of a countries comparative and competitive advantage. Most of the FDI investments in Ethiopia are directed towards export with few focusing on domestic market with value additional and processing. In the present study, a one percent increase in net inflow of foreign direct investment is associated with a 0.134% increase in both volume and value of sesame exports, significant at the 10% level, other factors remaining constant.

In summary, should there be no major improvements in current economic, policy and marketing environments, value of sesame exports will decrease significantly with time, albite the decrease in volume may not be significant. In as much as value of exports is driven by prices faced by exporters, the effect of export volumes on the value is relatively insignificant. Both value and volume of sesame exports from Ethiopia are noted to increase with increasing production. However both decrease with increasing domestic consumption and export price for value of sesame export. Real effective exchange rate (as a surrogate

measure of incentive) is found to have no significant effect on both value and volume of sesame exports from Ethiopia requiring further study going forward.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Summary

Ethiopia's import has been shooting in an alarming rate for the past ten years; from 1, 3 billion USD in 2008 to 5 billion USD in 2017, with an annual increment of 20%. On the other end of the spectrum, Ethiopia's export growth has been sluggish; from 265 USD in 2007 reached 1 billion in 2017 with annual growth rate of less than 10 percent. Compared to the import sector on aggregate, Ethiopia's export has been unable to cope with the import sector growth. In 2016, according to the government of Ethiopia the country import has reached over 18 billion USD's per annum while the export sector is still less than 1/4 of the import; export ins the same year was only 3 billion USD from few commodities. Overall, the country's export performance can be characterized as heavily traditional with limited diversified and inferior quality. This has put a lot of pressure on the trade balance account of the country: -$7.206 billion USD in 2016 or 1 trillion 9 billion ETB based on the 2016 average exchange rate.

The agriculture sector, which generates more than 43% of the country's GDP and 83.9 % of the foreign currency earnings, which is commissioning a significant portion of the population with more that 80% of the population employed in it which has been the case for 20 years, is the key sector that the export earning fluctuation can be attributed too. That fact that Ethiopia has a wide plot of uncultivated agricultural land that is still fertile and productive, the fact that more than 50% of the population can be considered as an active labor force with more than 54 million individuals according to the recent population censes, and the fact that Ethiopia has a conducive ago-ecological characteristics for intensive agricultural production, facilitates the country to have a comparative advantage on the production and export of agricultural commodities over its actual and potential competitors. Focusing on this sector, not only closes the trade deficient gap, but also unshackles the economy from its subsistence production characteristics in general and the agriculture sector in particular.

The major agricultural export commodities of Ethiopia are coffee and oilseeds. The growth of coffee value of export has been 19% but the volume of export has been almost 0% based on the cumulative annual growth rate (CAGR) from 2001 – 2013. On the other hand oilseeds, specifically the trend of sesame volume and value of export has been 16% and 27% respectively for the same years on average. Export earnings from Sesame seed, which Ethiopia is among the world five major producing and exporting country, has been fluctuating for the past 20 years; export volume were 45, 21, 15, 255, 213, and 288 million kg in 1994,

1999, 2000, 2009, 2012 and 2014 respectively, and export value were, 109, 10, 88, 66, 28 and 170 USD/quintal in the same respective years. This is due to conditions in the commodity value-chain from production to export in general and continuously changing international market conditions. Hence, as a country aiming to achieve middle income economy by 2025 having a significant portion of its population directly engaged in agriculture, understanding the main constraints in sesame value-chain and the key variables manipulating its international market position is of paramount importance for any development studies including this study.

The main objective of this study is to understand the overall sesame export fluctuation trend and understand the rational. Specifically, the study tried to understand the main constraints and challenges underpinning the sesame value-chain, identify key determining factors that sesame value and volume of export depends on. Based on these findings the study provides recommendations on how to remedy the major bottlenecks in the value-chain and provide policy alternative. To identify key bottlenecks and provide recommendation, the study collected inputs from senior experts in the field, from bureau heads of Amhara Regional Bureau of Agriculture (ABoA), Tigray Bureau of Agriculture (TBoA), MoANR, ECX, EPOSPEA, selected exporters, processors, and smallholder farmers.

Based on the first objective, the study found out the main problems in the downstream and upstream sesame value-chain. Ethiopia, one of the major five sesame producing country, has a comparatively low average yield per hectare: 0.73 t/ha average yield while China has an average of 1.31 t/ha, which is almost double. This is mainly due to ineffective and inadequate improved sesame seed variety release which the international market demands. This problem is further aggravated by an extension system for smallholder farmers which provides a blanket and limited recommendation for some not all sesame producing agro-ecologies. The current extension package (production manual) in which smallholder farmers base their production on, considers all sesame producing agro-ecologies to have similar agro-climatic conditions, and has limited and outdated land preparation, production, and tillage practices. Hence sesame producing smallholder farmers in Ethiopia have sub-optimal sesame yield, sub-standard quality and inadequate volume to meet the international market demand. The main problems associated with this is research institutions who are mandated to develop and release improved varieties lack up-to-date, technology driven adequate breeding infrastructure and due to lack of adequate institutional frameworks and structures in remote sesame producing areas for agricultural bureaus to provide relevant extension pacakges.

Moving up in the sesame value-chain, institutional and systemic bottlenecks have made Ethiopia not able to benefit from the expansion of its sesame production. Sesmae producers have limited access to key agricultural inputs that include sesame seeds, fertilizers, pesticides or chemicals, post-harvest technologies

and credit. These inputs are paramount for producers to secure better price both internationally and locally. However, the current suppliers of these inputs in have capacity constraints and lack adequate enabling environment. Inadequate capacity of farmer cooperative Unions to supply fertilizer, seeds and credit, and, lack of access to credit for smallholder producers has limited the access of inputs for sesame smallholder farmers. Lack of well-established sesame marketing system and infrastructure also contributes to the low and fluctuating sesame export performance. Loose and inconsistent quality regulation framework and supervision, week marketing infrastructure such as adequate storage, transportation, and lack of coordination among actors are found to be the key bottlenecks that the study identified.

The second objective of the study is to identify the determining factors for sesame volume and value of export using 22 year time series data. Based on intensive literature reviews conducted including theoretical and empirical studies, the study identified Real Effective Exchange Rate (REER), Real Interest Rate (RIR), international price of sesame (Px), quantity of sesame exported (Qs), Gross Domestic Product (GDP) and Gross Capital formation (GCF), value of sesame exported (Qd), domestic production of sesame (DP), domestic consumption of sesame (DC), terms of trade index of exports which is a measure of trade openness (TOT), and net inflow of foreign direct investment (FDI) as the main independent variables. These variables were regressed by applying two logarithms functions on value and volume of sesame export using OLS estimation techniques based on Byanyima 2011, and David Boansi et al 2014 studies conducted in Uganda and Ghana coffee and pineapple sectors respectively.

After defining the model, as OLS dictates, the first test is validating wheter or not the residuals are noramli distributed from the estimation or not. By validating this, we can be confident that the regression estimate is one step closer in explaining the long run relationship between volume and value of sesame export and the actual factors. Accordingly, the test reveals that we fail to reject the null hypothesis is normally distributed. The next test was multicollinearity test which showed that three independent variables that include Production of sesame, GDP, GCF and RIR are strongly correlated with more than 0.6 degree of collinearity. Based on theoretical and empirical reviews GDP, GCF and RIR are dropped from the model.

The next testes include stationarity test, heteroscedasticity test, autocorrelation test and model test. For stationarity test, all variables are stationary at second level difference or I(1) except for two variables: GCF and GDP, which were already dropped from the analysis. All the other variables t-statistics is greater than the critical values for both 1% and 5% significance level with p values less than 0.05. For heteroscedasticity and autocorrelation tests, we fail to reject the null hypothesis that there is no heteroscedasticity and autocorrelation as the p values are greater than 0.05% at 5 percent significance level of both F-and X^2 (LM) version tests.

Finally, REST stability test was carried out on equation 5 and equation 6. As it can be observed from appendix 5 and 6, t, F – and X2 versions of the test show that the functions are linear and are stable since the p- value of the export volume equation (Eq, 8) is significant at 5% and the p- value for value of export equation (Eq, 9) is significant at 10% and the adjusted R-square results for both models are larger than 96%. Following the test results, the regression output result, volume of sesame export depends on production and domestic consumption while value of export dependents on export price and constant intercept as well. Based on this results the study recommends to conduct further study on how domestic consumption affects value and volume of sesame export given that majority of sesame production is targeted towards international market.

6.2 Conclusion and recommendation

The study found out that sesame export performance depends on production and export price, holding other factors constant. These variables are determined by the frequency and quality of sesame seed varieties production and release to smallholder farmers. As discussed above, the limited capability of research institutions to produce timely, agro-ecology specific international quality seed varieties with appropriate packages has resulted in low, and sub-optimal quality yield. To address this it is paramount to improve research institutions, both regional and federal in terms of human and infrastructural capacity henceforth using improved technologies research institutions will be able to enhance their breed effort to release improved sesame varieties for smallholder farmers. Further, research institutions should complete improved variety with applicable recommendation package. They should produce sesame specific extension packages and farmer production manuals that is all agro-ecology inclusive with updated tillage and mono-cropping practices and input application methods.

As inputs are an important component of sesame production, key inputs, both tangible and intangible, are inaccessible and unaffordable for most sesame producing smallholder farmers, as the degree of damage differs across regions. Based on the second section, most of the challenges revolve around policy, capacity, and structural bottlenecks, the recommendations will also be as such. By revising and introducing policy frameworks, improving primary cooperatives and Farmer Cooperative Unions (FCU's) and private input providers outreach will help sesame farmers who have limited retail store access. Further, it's critical to enhance institutional capacity of most primary farmer cooperative and selected FCU's in terms of human resource knowledge and skill capabilities. Another outreach problem includes limited ability of regional agricultural bureaus in providing technologies to all sesame farmers as there structure stretches only to some sesame producing areas. This has resulted in limited Farmer Demonstration Centres (FDC) providing production technology and skills to a significant number of farmers. Stretching the structures of the regional

agricultural bureaus to include remote and inacceptable areas, will create access to farmers to break-through technology for quickly adoption and uptake.

Going up the value-chain, marketing infrastructure challenges, and inconsistent aggregation and collection quality controlling have put pressure on the quality of sesame export and eventually on the value of export. In order to address market related challenges, improving access to better-quality warehouse technologies and putting in place market information system that is accessible for smallholder farmers for price and post-harvest information, will enable farmers to secure better price for their produce from higher value international markets by attaining international demand requirement. In addition, ensuring export oriented aggregation and collection centres provide consistent quality supervision across all regions is paramount. This can be done by using technology based aggregation and collection system, updating sesame quality inspection manuals, and most importantly enhancing knowledge and skills of warehouse and quality controlling operators at all levels.

Based on the econometrics result, the study provides policy recommendations and suggestion for further studies. In relation to the statistical significant international sesame price, it would be beneficial for exporters to form an agreement with international sesame buyers particularly with those importing to high value markets to manage international price on export. This will ensure the country, exporters, and farmers to earn a better value from sesame production and export. In addition, by addressing production constraints that farmers are currently facing, improving average yield per hectare will increase Ethiopia's sesame international market share allowing it to eventually influence sesame international price. In relation to domestic consumption, which is one of the significant variable determining sesame export performance, a study should be done to establish why Ethiopia's sesame is affected by domestic market albite the fact that the main objective of sesame production in the country is for international market.

In regards to exchange rate, since all inputs are procured from international market government, not having a direct challenge on the producers, the result that exchange rate is insignificant can be found conclusive. As a recommendation, this needs further research on the topic to identify the indirect effect exchange rate has on the production of sesame and its export performance.

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Appendix 1 Heteroskedasticity test 1

Heteroskedasticity Test: White

F-statistic	2.516722	Prob. F(8,11)	0.0789
Obs*R-squared	12.93372	Prob. Chi-Square(8)	0.1142
Scaled explained SS	8.165873	Prob. Chi-Square(8)	0.4174

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/25/17 Time: 14:24
Sample: 1995 2014
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.309164	0.176448	1.752156	0.1075
LOGPRO^2	0.000445	0.001008	0.440940	0.6678
LOGDOMCONS^2	0.000478	0.000484	0.988446	0.3442
LOGDOMPRICE^2	-0.000543	0.002342	-0.231687	0.8210
LOGEXPPRICE^2	0.000814	0.001142	0.712565	0.4910
LOGTOT^2	-0.001168	0.001913	-0.610631	0.5539
LOGFDI^2	-0.001359	0.000670	-2.028753	0.0674
LOGREXR^2	-0.010003	0.007780	-1.285772	0.2249
LOGEXVOLL^2	-0.000487	0.000506	-0.961536	0.3569

R-squared	0.646686	Mean dependent var	0.037662
Adjusted R-squared	0.389730	S.D. dependent var	0.078946
S.E. of regression	0.061673	Akaike info criterion	-2.431787
Sum squared resid	0.041839	Schwarz criterion	-1.983708
Log likelihood	33.31787	Hannan-Quinn criter.	-2.344318
F-statistic	2.516722	Durbin-Watson stat	1.928828
Prob(F-statistic)	0.078926		

Appendix 2 Heteroskedasticity test 2

Heteroskedasticity Test: White

F-statistic	2.516722	Prob. F(8,11)	0.0789
Obs*R-squared	12.93372	Prob. Chi-Square(8)	0.1142
Scaled explained SS	8.165873	Prob. Chi-Square(8)	0.4174

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/25/17 Time: 14:20
Sample: 1995 2014
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.309164	0.176448	1.752156	0.1075
LOGPRO^2	0.000445	0.001008	0.440940	0.6678
LOGDOMCONS^2	0.000478	0.000484	0.988446	0.3442
LOGDOMPRICE^2	-0.000543	0.002342	-0.231687	0.8210
LOGEXPPRICE^2	0.000814	0.001142	0.712565	0.4910
LOGTOT^2	-0.001168	0.001913	-0.610631	0.5539
LOGFDI^2	-0.001359	0.000670	-2.028753	0.0674
LOGREXR^2	-0.010003	0.007780	-1.285772	0.2249
LOGEXVOLL^2	-0.000487	0.000506	-0.961536	0.3569

R-squared	0.646686	Mean dependent var	0.037662
Adjusted R-squared	0.389730	S.D. dependent var	0.078946
S.E. of regression	0.061673	Akaike info criterion	-2.431787
Sum squared resid	0.041839	Schwarz criterion	-1.983708
Log likelihood	33.31787	Hannan-Quinn criter.	-2.344318
F-statistic	2.516722	Durbin-Watson stat	1.928828
Prob(F-statistic)	0.078926		

Appendix 3 Breush-Godfrey test 1

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.595488	Prob. F(5,6)	0.7070
Obs*R-squared	6.633159	Prob. Chi-Square(5)	0.2494

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/25/17 Time: 14:56
Sample: 1995 2014
Included observations: 20
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.676159	2.281993	-0.734515	0.4903
LOGPRO	-0.165155	0.236542	-0.698204	0.5112
LOGDOMCONS	-0.011007	0.112257	-0.098052	0.9251
LOGDOMPRICE	-0.020005	0.173592	-0.115242	0.9120
LOGEXPPRICE	0.208718	0.190490	1.095691	0.3152
LOGTOT	0.032376	0.126904	0.255119	0.8072
LOGFDI	0.033421	0.091320	0.365979	0.7269
LOGREXR	0.372907	0.548688	0.679634	0.5221
LOGEXVOLL	0.044107	0.083260	0.529755	0.6153
RESID(-1)	-0.993232	0.744195	-1.334638	0.2304
RESID(-2)	-0.535727	0.617775	-0.867188	0.4192
RESID(-3)	0.045108	0.668574	0.067470	0.9484
RESID(-4)	-0.409295	0.420279	-0.973866	0.3677
RESID(-5)	-0.523071	0.457366	-1.143660	0.2963

R-squared	0.331658	Mean dependent var	2.61E-15
Adjusted R-squared	-1.116416	S.D. dependent var	0.199108
S.E. of regression	0.289661	Akaike info criterion	0.555815
Sum squared resid	0.503420	Schwarz criterion	1.252828
Log likelihood	8.441849	Hannan-Quinn criter.	0.691879
F-statistic	0.229034	Durbin-Watson stat	1.848531
Prob(F-statistic)	0.987559		

Appendix 4 Breush-Godfrey test 2

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.595488	Prob. F(5,6)	0.7070
Obs*R-squared	6.633159	Prob. Chi-Square(5)	0.2494

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/25/17 Time: 14:56
Sample: 1995 2014
Included observations: 20
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.676159	2.281993	-0.734515	0.4903
LOGPRO	-0.165155	0.236542	-0.698204	0.5112
LOGDOMCONS	-0.011007	0.112257	-0.098052	0.9251
LOGDOMPRICE	-0.020005	0.173592	-0.115242	0.9120
LOGEXPPRICE	0.208718	0.190490	1.095691	0.3152
LOGTOT	0.032376	0.126904	0.255119	0.8072
LOGFDI	0.033421	0.091320	0.365979	0.7269
LOGREXR	0.372907	0.548688	0.679634	0.5221
LOGEXVOLL	0.044107	0.083260	0.529755	0.6153
RESID(-1)	-0.993232	0.744195	-1.334638	0.2304
RESID(-2)	-0.535727	0.617775	-0.867188	0.4192
RESID(-3)	0.045108	0.668574	0.067470	0.9484
RESID(-4)	-0.409295	0.420279	-0.973866	0.3677
RESID(-5)	-0.523071	0.457366	-1.143660	0.2963

R-squared	0.331658	Mean dependent var	2.61E-15
Adjusted R-squared	-1.116416	S.D. dependent var	0.199108
S.E. of regression	0.289661	Akaike info criterion	0.555815
Sum squared resid	0.503420	Schwarz criterion	1.252828
Log likelihood	8.441849	Hannan-Quinn criter.	0.691879
F-statistic	0.229034	Durbin-Watson stat	1.848531
Prob(F-statistic)	0.987559		

Appendix 5 Ramsey RESET test 1

Ramsey RESET Test
Equation: UNTITLED
Specification: LOGEXPTVOL C LOGPRO LOGDOMCONS LOGDOMPRICE LOGEXPPRICE LOGTOT LOGFDI LOGREXR LOGEXVOLL
Omitted Variables: Powers of fitted values from 2 to 4

	Value	df	Probability
F-statistic	14.45915	(3, 8)	0.0014
Likelihood ratio	37.19515	3	0.0000

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.635951	3	0.211984
Restricted SSR	0.753238	11	0.068476
Unrestricted SSR	0.117287	8	0.014661

LR test summary:

	Value	df
Restricted LogL	4.412297	11
Unrestricted LogL	23.00987	8

Unrestricted Test Equation:
Dependent Variable: LOGEXPTVOL
Method: Least Squares
Date: 08/25/17 Time: 21:06
Sample: 1995 2014
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-12207.17	3496.983	-3.490771	0.0082
LOGPRO	1837.426	535.3942	3.431912	0.0089
LOGDOMCONS	-336.5734	98.10522	-3.430739	0.0089
LOGEXPPRICE	-199.3187	58.08413	-3.431551	0.0089
LOGTOT	160.8313	46.89342	3.429721	0.0090
LOGFDI	217.3438	63.36100	3.430246	0.0090
LOGREXR	774.7697	225.9805	3.428480	0.0090
LOGEXVOLL	13.54356	3.970426	3.411110	0.0092
FITTED^2	-136.4453	40.98335	-3.329287	0.0104
FITTED^3	5.116507	1.582227	3.233738	0.0120
FITTED^4	-0.071822	0.022854	-3.142687	0.0137

R-squared	0.996793	Mean dependent var	17.87109
Adjusted R-squared	0.992383	S.D. dependent var	1.387388
S.E. of regression	0.121082	Akaike info criterion	-1.100987
Sum squared resid	0.117287	Schwarz criterion	-0.503548
Log likelihood	23.00987	Hannan-Quinn criter.	-0.984361
F-statistic	226.0488	Durbin-Watson stat	1.716908
Prob(F-statistic)	0.000000		

Appendix 6 Ramsey RESET test 2

Ramsey RESET Test
Equation: UNTITLED
Specification: LOGEXPTVAL C LOGPRO LOGDOMCONS LOGDOMPRICE LOGEXPPRICE LOGTOT LOGFDI LOGREXR LOGEXVOLL
Omitted Variables: Powers of fitted values from 2 to 3

	Value	df	Probability
F-statistic	2.543423	(2, 9)	0.1332
Likelihood ratio	8.960337	2	0.0113

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.271999	2	0.135999
Restricted SSR	0.753238	11	0.068476
Unrestricted SSR	0.481239	9	0.053471

LR test summary:

	Value	df
Restricted LogL	4.412297	11
Unrestricted LogL	8.892465	9

Unrestricted Test Equation:
Dependent Variable: LOGEXPTVAL
Method: Least Squares
Date: 08/25/17 Time: 21:40
Sample: 1995 2014
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1105.596	495.1154	2.233006	0.0524
LOGPRO	-74.94546	33.77894	-2.218704	0.0537
LOGDOMCONS	13.75733	6.201414	2.218419	0.0537
LOGDOMPRICE	-2.172429	0.984453	-2.206737	0.0547
LOGEXPPRICE	-57.42896	25.88392	-2.218711	0.0537
LOGTOT	-6.484335	2.925197	-2.216717	0.0539
LOGFDI	-8.763130	3.951163	-2.217861	0.0538
LOGREXR	-30.99626	13.97744	-2.217593	0.0538
LOGEXVOLL	-0.550998	0.255190	-2.159167	0.0591
FITTED^2	3.295972	1.464905	2.249956	0.0510
FITTED^3	-0.054121	0.024088	-2.246792	0.0513

R-squared	0.990390	Mean dependent var	20.48538
Adjusted R-squared	0.979713	S.D. dependent var	1.623499
S.E. of regression	0.231238	Akaike info criterion	0.210753
Sum squared resid	0.481239	Schwarz criterion	0.758406
Log likelihood	8.892465	Hannan-Quinn criter.	0.317661
F-statistic	92.75687	Durbin-Watson stat	1.756096
Prob(F-statistic)	0.000000		

Appendix 7: Sesame export volume and value: 1994 -2016

Year	Tones	1000 US $
1994	4,503	3,445
1995	2,560	2,272
1996	9,301	8,739
1997	10,549	9,520
1998	21,864	16,392
1999	26,642	30,830
2000	26,859	26,214
2001	14,818	9,684
2002	63,869	35,496
2003	69,092	51,087
2004	69,883	61,804
2005	219,043	173,017
2006	189,515	160,590
2007	139,653	132,764
2008	130,977	209,929
2009	255,783	331,047
2010	228,039	293,564
2011	254,127	349,133
2012	317,920	431,223
2013	240,094	516,206
2014	303,755	714,546
2015	301,850	474,398
2016	382,046	383,585

Source: FAOSTAT (1994-2016)

Appendix 8: Grading parameters

Whitish Humera/Gondar Sesame Seed and Reddish Sesame Seed

Parameter	Grade 1	Grade 2	Grade 3	Grade 4	UG
Total impurity (Foreign matter and DSW) max % by weight)	1	3	5	7	15
Contrasting Colour, max % by weight	1	2	4	6	7

Whitish Wollega Sesame Seed

Parameter	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	UG
Total impurity (Foreign matter and DSW) max % by weight)	1	3	5	7	10	20
Contrasting Colour, max % by weight	1	2	4	6	9	10

Mixed Humera/Gondar Sesame Seed and Mixed Reddish Sesame Seed

Parameter	Grade 1	Grade 2	Grade 3	Grade 4	UG
Total impurity (Foreign matter and DSW) max % by weight)	1	3	5	7	15
Contrasting Colour, max % by weight	>7				

Mixed Wollega Sesame Seed

Parameter	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	UG
Total impurity (Foreign matter and DSW) max % by weight)	1	3	5	7	10	20
Contrasting Colour, max % by weight	>10					