RESPONSE OF COFFEE SUPPLY TO CHANGE IN EXPORT PRICE FOR WASHED AND UNWASHED COFFEE OF ETHIOPIA

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A PROJECT PAPER SUBMITTED TO THE SCHOOL OF

GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY

IN PARTIAL FULFILLEMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS IN ECONOMICS IN THE SCHOOL OF ECONOMICS

JUNE 2011

ADDIS ABABA

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

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BY

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APPROVED BY ***SIGNATURE***

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ACKNOWLEDGEMENT

There are many individuals and institutions who contributed towards finalizing my MA study and writing this project paper. Without their support, it would not be in this format this time. If I forgot to mention someone, it is not intentional and I am of course grateful to you all.

My warmest gratitude goes to my advisor Dr. Tekie Alemu for accepting me as his advisee and giving me critical comments starting from the draft research proposal till the final project paper script.

My sincere thanks go to Mahlet Admassu (my wife) for your understanding, encouragement and bearing the family responsibilities throughout my study, without you it would have been difficult, if not impossible, for me to successfully complete my MA program. I would also like to thank my younger brother Mintesinot Tesrea and my friend Sirak Merid (The Federal Environmental Protection Authority) for their all round support.

I should also have to thank senior experts working on managing data in all the institutions I went for search of data, who helped me genuinely and cordially to give me what I wanted, particularly experts in Ethiopian Customs and Revenue Authority, Ministry of Trade, National Bank of Ethiopia and Ethiopian Coffee Producers Associations.

Finally, thanks to the Almighty God for making possible the once 'impossible' dream I had in mind some years ago. When all the possible gates seem closed, this academic achievement in such a short time was not more than a dream if not an illusion at all. Thanks God for giving me the endurance, determination and guidance throughout the valleys and mountains of life. With your light, I saw my way!

Table of Contents

TITLE **PAGE**

LIST OF TABLES

TABLE **PAGE**

Abstract

In this study supply response to economic variables was analyzed for the coffee industry in Ethiopia. The main economic variables studied in the supply response analysis were Production of coffee in Ethiopia and the rest of the world, coffees own price, the exchange rate and domestic consumption.

Three supply response models were estimated, the first one allowing separate estimation of the effects of change in export price on supply of total coffee export (washed and unwashed coffee together) and the second and the third models were estimated to see the separate response of washed and unwashed coffee supply to change in export price. Data on production, consumption exchange rate and unit price were pooled to enable significance tests to detect differences in response between the washed and unwashed coffee.

The main findings of the study are as follows

1. **Total coffee (washed and unwashed) responsiveness to two time lagged price is .27 at 5% significant level and is positive which shows that coffee is fairly responsive to higher prices.**
2. **Response of unwashed coffee to two time lagged export price change is 0.24 which also shows that unwashed coffee is responsive to price change.**
3. **Despite higher price washed coffee earns over and above the unwashed coffee, its response to export price change is much lower and is found to be insignificant even at 10% significant level.**

   This may be because of many reasons among which the major ones are, on the one hand limitedness of quantity of washed coffee produced and on the other hand washed coffee is not consumed domestically because of its higher price therefore the

total volume of washed coffee produced is exported or sold for any price offered at the international market even if it is below the price at the local market.

4. **There appears to be a lagged response of supply of coffee to price change and a two years lag of export price is found to have significant effect on supply.**
5. **Neither of the priori assumed factors that affect supply of coffee to the export market such as domestic consumption, world coffee supply and exchange rate are found significant.**

Chapter - 1 Introduction

1.1 General

Agriculture is the most important economic sector of the country. According to the data from the Central Statistical Agency (CSA, 2008/2009) it contributes 45% of the GDP, 85% of the foreign earnings and employs around 83% of the total population of the country. The country's main exports consist of coffee, leather and leather products, pulses, oil seeds, meat (canned and frozen), fruits and vegetables, live animals, khat, gold, and flowers. Agriculture is supplemented by services, manufacturing, mining, trade, tourism, and construction.

The coffee sector contributes about 12 percent of the agricultural output and employs 25 percent of the total labor force. Coffee has been the leading cash crop for its growers and Small private coffee plantations contribute about percent of the country's coffee, while large, state-owned plantations account for the rest. The land area under coffee cultivation is difficult to determine because plots are fragmented and interspersed with other crops. It is estimated, however, that Ethiopia has over 320,000 hectares of coffee trees. Annual production ranges from 200,000 to 250,000 metric tons. About 35 percent of total production is consumed locally.

The Ethiopian government is encouraging private investment in the coffee industry, which it hopes, will lead to the expansion of large-scale commercial plantations and improved quality and productivity". Currently coffee generates less than 35 percent of the total export earnings. For the last several years its relative predominance in the

export sector is decreasing because of increased contribution of other agricultural products like horticulture and floriculture.

Consequently, only a little over 26% percent of the total export earnings is contributed by coffee during the 2008/2009 (NBE, 2008/2009). This is the lowest share earned from export of coffee in the history of economy of the country and the trend for the last several years shows that the share of coffee in foreign exchange earnings will further decline. Coffee also contributes for sizeable amount of government tax revenue. It seems that Ethiopia will, to some certain extent, continue to rely on this item for its export earnings in the coming future.

Despite its economic and social importance for the Ethiopian economy, the performance of the coffee sub-sector has remained unsatisfactory. No significant change in mode of production and processing has occurred for several decades. Among other things, imperfection in the market policy and the low base of market infrastructure were cited as major causes of weak performance (IFPRI, 2003).

During the military regime (1974-1991) the Ethiopian Coffee Marketing Corporation (ECMC), a state monopoly, operated using fixed price arrangements and handled about 80% of the entire coffee trade. Private traders had a limited role in both domestic and export marketing. Similarly, coffee farmers also had very limited power when it came to securing their proper share of the market price.

Although coffee is produced in many parts of Ethiopia most of the marketed coffee comes from the regions of Orormia and Southern Regional State. The two regions contribute for more than 90 % of the total coffee production (CSA, 2008/09).

The government of Ethiopia through its Plan for Accelerated Sustainable Development Program (PASDEP) designed a strategy for a market oriented agricultural development in which expanding exportable products in type, quality and quantity is given priority.

In line with this strategy, to increase the productivity of coffee, the government has been taking some basic measures during the last two decades. Some of the measures taken were: lifting price ceiling of any kind, streamlining of export licensing procedures, removal of price control, currency devaluation, foreign exchange auctioning, creation of relatively better investment environment through new investment code and regulations , launching of new export promotion strategy, suspending all the export taxes and the recent establishment of The Ethiopian Commodities Marketing Authority and The Ethiopian Commodity Exchange (ECX) to facilitate agricultural product marketing were the major ones. These measures have contributed to increase in the supply of coffee to the export market

1.1.1 Coffee production

Coffee is produced in more than 50 developing countries providing income for approximately 25 million smallholder producers (DFID 2004; Oxfam 2002b), and employing an estimated 100 million people (NRI 2006). World coffee production in

2006/2007 is forecasted at 7416000metric tons and world coffee export is forecasted at 5568000 metric tons (USDA 2006). In 2005/2006, 52 percent of world production was accounted by the three main coffee producers (Brazil, Colombia and Vietnam), Brazil currently supplying about a third of total production (ICO statistical database).

The top five consumers of coffee are (in order) the USA, Brazil, Germany, Japan and France, while the Nordic countries have the world's highest coffee consumption per capita. World consumption in 2006 is estimated at around 117 million bags (ICO 2006). About 65 per cent of the world supply of coffee is Arabica, while Robusta currently makes up around 35 percent, compared to 25 percent 20 years ago (Scholer 2004).

Ethiopia is probably the oldest exporter of coffee in the world (ITC 2002). In 2005 it was the sixth largest coffee producer after Brazil, Colombia, Vietnam, Indonesia and India, and the seventh largest exporter worldwide. It is the largest coffee producer and exporter in Africa. Exports in 2010 were 174285 metric tons, a share of 2.82 per cent of world trade in coffee beans (ICO statistical database).

The bulk of current Ethiopian exports go to Japan, Germany and Saudi Arabia. There is a high degree of dependence on these three markets, which absorbed 63.3 per cent of Ethiopia's coffee exports in 2003/2004 (FDRE 2006). Moreover, exports to Japan, Germany and Saudi Arabia have risen in the last 20 years, while exports to the USA have declined (FDRE 2006). The bulk of coffee is exported as green bean for roasting in consuming countries. Although the total share of its coffee exports in

world trade is small, Ethiopia plays an important role in the 'global value chain' because of the fine quality of its coffees (Daviron and Ponte 2005).

Historically coffee accounted for over 60 per cent of Ethiopia's total export revenues (LMC 2000). While this proportion has dipped significantly in recent years with a revival in the prices of major Ethiopian exports in the international market, total coffee export earnings registered substantial growth in 2003/4 and 2004/5 due to increased export volumes. Coffee has also long been an important source of tax revenue to the government.

Agrisystems (2001) estimates the number of coffee farmers at 1.3 million. With an assumed family size of six to seven people, the numbers of Ethiopians associated with coffee growing can be as large as 7–8 million. Moreover, coffee is labor intensive during harvesting and processing, and provides an important source of income from casual labor for many poor rural people. Adding those employed in transporting coffee and ancillary activities, LMC (2000, 2003) estimates that 15 million people are dependent on coffee for at least a significant part of their livelihoods.

Two coffee species are currently used for commercial purposes: *Coffea Arabica* And *Coffea canephora* (also known as Robusta). Ethiopia produces only Arabica coffee, which is widely believed to have originated there. Arabica coffee still grows wild in the forests of the south-western part of the country, which remains an important source of genetic resources for the world coffee industry (Gole 2003).

The land area under coffee cultivation is difficult to determine because plots are fragmented and interspersed with other crops. It is estimated, however, that Ethiopia has over 320,000 hectares of coffee trees. Annual production ranges from 200,000 to 250,000 metric tons, depending on weather and prices. About 35% of total production has consumed locally (fao.com).

Coffee farming systems in Ethiopia are conventionally divided into four categories: forest coffee, semi-forest coffee, garden coffee and semi-modern plantation. Yields are considered to be very low compared to other countries, with estimates of less than 200 kg per ha for forest coffee and around 450–750 kg per ha for semi-modern coffee plantations (FDRE 2003a). Most coffee farmers do not use fertilizers, pesticides or herbicides (LMC 2000).

An accurate estimate of production is difficult because part of the harvest is gathered from semi-wild and wild forests, and a good proportion of the crop is consumed on-farm or locally (Agrisystems, 2001). Most recent ICO estimates suggest that over the past five years annual production has fluctuated between 2.8 and 5 million (60 kg) bags (ICO statistical database), while the United States Department of agriculture forecasts a harvest of 5.5 million bags in 2006/7 (USDA 2006).

Each *woreda* (district) is classified as a major, medium and minor coffee grower based on the area covered by coffee trees (FDRE 2003). Coffee production is concentrated mainly in the Oromiya and the Southern Nations, Nationalities and People's Region (SNNPR). Major and medium growing *woredas* contain an estimated

800,000 coffee farmers with approximately 520,000 ha under coffee, of which 63.3 per cent is in Oromiya, 35.9 per cent in SNPP and 0.8 per cent in Gambela.

Smallholder producers are responsible for about 95 per cent of production, while state-owned plantations account for 4.4 per cent and private investor plantations 0.6 per cent (FDRE 2003a). Finally, coffee from each significant Ethiopian producing region has a particular taste characteristic and a number of these coffee types are internationally well known. According to the International Trade Centre, 'Ethiopia produces some of the world's finest "original" coffees such as Yirgacheffe, Limu and Harar' (ITC 2002, 299).

1.1.2 Coffee processing

After harvesting, coffee cherries are processed by two widely applied methods, namely dry and wet processing. For unwashed Arabica (or sun-dried coffee), the cherries are dried on mats, concrete, or cement floors immediately after they have been picked. After drying to a moisture content of about 11.5 per cent, the outer layer of the cherries are removed by hulling and the green bean obtained is ready for marketing. For washed coffee (wet processed coffee), once the cherries are harvested they are pulped, fermented in tanks and then finally washed in clean water. The wet parchment coffee so obtained is then dried in the sun on raised tables and sorted at 11.5 per cent moisture content (IFPRI 2003).

Currently, there are more than 1000 coffee cherry processing plants in the country, with approximately 492 hulleries and 601 washing stations. The coffee washing

stations are owned by private individuals, farmers' cooperatives or state enterprises, and have an estimated total processing capacity of around 80,000 tons of washed coffee per annum (FDRE 2003a). Historically, over 90 percent of Ethiopian coffee was sun-dried. However, since washed coffee sells at significant premiums over sun-dried coffee, the government has encouraged cooperatives and traders to invest in machinery to raise the output of washed coffee (LMC 2003). In 1980/1, washed coffee was only 9.1 per cent of total coffee exports; by 2004/5, it increased to 32.7 per cent (FDRE 2006).

1.1.3 Testing and grading coffee quality

On arrival in the Addis Ababa or Dire Dawa auction centers, all beans are taken to the auction compound where their provenance and quality is tested on a sample basis by the Coffee and Tea Quality Control and Liquoring Unit (CLU). Grading standards are set according to the number of defects and the type of processing. The main export grades are grade 2 for washed coffee and grade 4 and 5 for unwashed coffee (LMC 2003).

For example, washed coffee supplies are usually dominated by Sidamo 2, Limu 2 and Yirgacheffe 2, while the most common unwashed coffees are Jima 5, Sidamo 4 and Harar 5. At the auctions, there is an emphasis on keeping consignments from different regions separate in order to maintain the distinctive flavor of the different regions (LMC 2003)

1.1.4 Coffee marketing

In the current domestic coffee marketing chain, the coffee bean passes through the hands of several market players before reaching the auction market for export. Small amounts of coffee are produced by an estimated 1.3 million farming households (Agrisystems Ltd, 2001) dispersed over a wide geographical area. It is then collected at dispersed primary market centers by thousands of licensed or unlicensed collectors (sebsabys) or village traders and delivered to private or cooperative wholesalers (akrabys) or to their agents.

These small lots are bulked and transported to processing centers, from where they are delivered to the central auction markets in Addis Ababa and Dire Dawa. Eventually exporters purchase the coffee from the auction centre, process it to export standard and then export it to overseas markets.

The deregulation of the marketing system opened up opportunities for the private sector to participate in all tiers of the marketing chain. As a result, the primary coffee marketing chain is characterized by a large number of buyers and sellers with relatively better levels of competition compared to the pre-reform period. In 2005/06 about 1,080 active wholesalers and over 89 active exporters were participating in coffee marketing (AMPD, 2006).

This increase in private sector participation raised the coffee supply to the auction market from 60,000 tons in 1991 to 221,000 tons in 2005/06. However, as some anecdotal information on the post-reform coffee marketing system in Ethiopia shows, this has resulted in the concentration of power at the export market, mounting illegal

trade across borders, unhealthy competition in the primary and auction markets, and high transaction costs (AMPD, 2006; Petit, 2007).

1.2 Statement of the problem

Because of the chronic balance of payment deficit of most developing countries and the continued deterioration of their commodity terms of trade, it has become very important to develop policies and incentives designed to stabilize the earnings from agricultural export. It is for these reasons that many economists and policy makers have interest in the relationship between price changes and the supply response of primary products.

Ethiopia, being one of the poorest countries of the world and known as member of the group of the so called developing countries, is one of the victims of the above mentioned problem. In order to alleviate this problem the government of Ethiopia has designed and implemented several policy measures including the Agricultural Development led Industrialization (ADLI).

In order to achieve the targets set in ADLI, one of the strategies followed by the government of Ethiopia is to expand the production of exportable items in quality and quantity along with diversifying the type of products. In line with this policy, the government has taken a series of measures among which the main ones are lifting price ceiling of any kind, stream lining of export licensing procedures, removal of price control, currency devaluation, foreign exchange auctioning, creation of relatively better investment environment through new investment code and

regulations , Launching of new export promotion strategy, suspending all the export taxes FOB.

These coffee market reform measures aimed at opening the domestic and export coffee markets were envisaged to present coffee producers with 'right prices' as a means of stimulating productivity and growth, i.e. bringing producer prices closer to international levels and reducing disincentives emanating from policy and non-policy imperfections at the production and marketing levels.

It was hypothesized that it would improve transmission of world and auction market price signals to domestic growers, which in turn is expected to improve the supply and quality of coffee. Most of these measures are basically meant to raise quantity of coffee supplied to the export market through raised producer's price and making marketing channel operate properly.

The last two decades witnessed tremendous increase in supply of coffee which can be attributed to many factors including increased area of land covered with coffee, improved use of modern agricultural technology, enhanced extension services, improved quality, and better prices for producers.

However, other factors also appear to explain coffee supply in Ethiopia. First more than 50% of the estimated total coffee production is consumed domestically, which limits the volume of coffee supply to the official export market. Secondly the exportable coffee supply may be affected by the level of world supply and thirdly the

change in exchange rates of the Ethiopian Birr with regard to other currencies may also affect supply of coffee to the export market.

All the above mentioned factors appear to influence the level of coffee supply to the export market and it is important to identify the contribution of each of the factors so that it will enable policy makers to develop appropriate policies that further enhance the contribution of coffee to the development of the country.

1.3 Objective of the study

Ethiopia is home for hundreds of coffee varieties which are distinctly known for their cup quality. This difference in taste and quality of different categories of coffee give rise to significant difference in price. Apart from the natural inherent quality which may be attributed to ecological and climatic variability, the method used in processing the coffee may bring about difference in quality and its concomitant price.

According to Ethiopian commodity exchange ECX, there are more than 800 identified coffee categories and sub categories which are currently used in the auction center. For the purpose of this study methods of processing the coffee (dry processed and wet processed) is considered as different coffee categories.

The main objective of this study is, in the first place, to estimate price elasticity of supply for coffee in general and in the second place whether there exists a difference in price elasticity of supply between the washed and unwashed categories of coffee. The general objective of this study is to assess the response of supply of Ethiopian coffee to changes in the export price.

1.4 The hypothesis

The hypothesis to be tasted in this study is that, the price elasticity of supply fordifferent categories of Ethiopian coffee (washed and unwashed) to export price is not significant because other non price factors appear to determine coffee supply.

To this end the study has the following specific objectives

1. **To estimate the price elasticity of supply of coffee in general.**
2. **To show whether there is difference in price elasticity based on the difference in their prices for the washed and unwashed coffee.**

1.5 Review of literature

1.5.1 Theoretical Background

A significant volume of literature exists on the supply response of the agricultural sector in general and export crops in particular. The issue has become a prominent research agenda in the studies of African agriculture in the past two decades. The central concern of the supply studies is to investigate the relative significance of different policy parameters that are prescribed to alleviate the poor performance of the agricultural sector.

On the explanation for the poor performance of African agriculture, two contrasting views have emerged since the 1970s. The Berg report (WB, 1981) puts most of the blame on the unfavorable domestic policies which turned the terms of trade against agriculture. From the African side, adverse external environment and climatic conditions are believed to contribute much to the sluggish growth observed in the 1970s and 1980s (Oyejede, 1990).

A good summary of the major contrasting views on the explanations and policy prescription for African agricultural development problem is given by J.G. Beynon (1988). One is the "pricist" view, which is based on the neoclassical school of thought. The 'pricists' recommend that for a better growth, governments have to eliminate distorted agricultural policies. The major recommendation of this school of thought is " get prices right", liberalizing export trade, and making exchange rate adjustments

are also considered as measures that shift the internal terms of trade in favor of agriculture (WB 1981; Oyejede 1990).

The other contrasting view is that of the structuralist school of thought. These attribute the crisis of African agriculture mainly to technological backwardness and structural problems. They argue that unless these are resolved the response to price incentives would be very minimal. Their conclusion is that, supply is more responsive to structural changes than to prices (Beynon, 1988). Binswanger (1988), similarly argues that more resources have to be devoted to bring technological change suitable for agricultural growth.

Delgado and Mellor (1987) extend the debate to the case of primary export commodities, and address the difficulty for small countries to pursue an independent price policy. The commodity and market concentration of African trade, the protectionist policy of its trade partners, "weather conditions, resource endowment, the level of technology, domestic market growth, and population growth, all determine the supply of a developing country's exports" (see Bond. 1987, P 204). In spite of all these arguments against the effectiveness of the price policy, the latter has become the medicine that has often been prescribed by donors, and accepted by domestic policy makers as the remedy for the African economic crisis.

The level of supply response is usually measured in terms of elasticities. In the literature, short run and the long run responses, and aggregate output and individual crop responses are distinguished (Askari and cummings, 1977: Bond 1983: Oyejede, 1990). Long run supply elasticity is usually higher than the short run ones because

resources or factors of production are fixed in the short run (except variable costs) and variable in the long run.

Individual crop elasticity is higher than for aggregate production because farmers can often shift their resources between crops in response to relative price changes (Benswanger 1989, Bond 1983). Some researchers also distinguished between total production and marketed surplus where on farm consumption is significant (Behrman 1968, Bond 1983).

The argument for the possibilities of resource shift assumes that there is full employment of resources. If there are unutilized or underutilized resources, output can increase without requiring a shift of resources within or between sectors.

With respect to coffee, which is the subject of this study, producers may respond to a rise in market price by releasing more supply form their stock, or by performing more complete harvesting, or by increasing cultivation, or by using improved production techniques that increase output or by a mixture of these. If it appears that the gap between the existing supply and demand (reflected by a rise in price) still continues, they respond by planting new seedlings, possibly improved types (Bevan, Collier and Gunning 1989). The impact of this new plantation on the level of supply will be seen after 3 to 5 years.

On the other hand, producers may respond to a fall in prices by holding more stock, by applying less labor (or other inputs) or by incomplete harvesting. However, coffee supply tends to be price inelastic in the short- run because of its fixed cost structure

and, production continues as far as prices are more than the marginal cost of harvesting: the upper limit of output being the physical crop on the stock of trees (Clifford and Wilson, 1985).

The rationale for attaching more importance to the price variable is the assumption that increased prices will raise the purchasing power of the farmers, and enable them to buy more of other goods and modern inputs. This, however, needs some qualification in terms of changes in relative prices. Even if producers receive a larger share of the world price, this by itself does not guarantee that they would be induced to produce more if the world price itself is falling. Likewise, if the price fails to transmit the required signal from the world market, the objective of increasing producer prices will not be effective.

In less developed countries, government marketing boards are considered to have a depressing effect on producer prices. For Ethiopia, this used to be the case for couple of decades before the current government came to power. The Ethiopian Coffee Marketing Corporation was the sole buyer and exporter of coffee during the previous regime and coffee price was set by the same corporation.

Although the literature on the effect of intermediaries on the level of production is scarce, "coffee servicing activities" such as clearing and grading, storage, packaging, marketing, and transportation, are identified to have a depressing effect on the producer prices (Teshome, 1979b) . The ULG and Food Study Group(1987) also argue that Ethiopian coffee producer prices have been low by international standards

and unable to provide small holders with adequate incentives to adopt basic yield increasing practices.

The level of producer prices partly depends on the world price for coffee. Evidences show that after the suspension of the quota system (July 1989), African countries are losing up to 1.5 billion dollars a year (Coffee Annual, 1992p. 23) Ethiopia is among those countries that are in a disadvantageous position due to the collapse of the quota system.

Like most primary commodities, the production and export of coffee is concentrated in less developed countries, and its import is concentrated in developed countries. From the demand side, in the major coffee importing countries (the US and Europe), the population growth rate has stagnated; the pattern of coffee drink habit is already established, and demand shows comparative stability. Moreover, the change in demand due to change in per capital income tends to decline sharply for coffee. Form the supply side, poor quality and standardization of exportable coffee contribute to the decline in coffee consumption in importing courtiers (Clifford and Wilson, 1985).

1.5.2 Empirical Studies

Coffee supply studies for African countries show that own price elasticities range from 0.12 to 0.64 for the short run and form 0.44 to 1.55 for the long run, with some variations between countries as well as between different studies for the same country (see for example, Bond 1983; and Askari and Cummings 1987). The methodologies of

the studies and specification of models also differ depending upon country conditions, data limitations, and the choice of variables.

For Ethiopia, a coffee supply equation (using export as the dependent variable) was estimated by Teshome (1972b) for 1961/62-1970/71. The result showed that partial coefficients of prices were statistically insignificant even at ten percent level. But the level of the ICO quota allocation was found to be the determinant factor of coffee exports, again, the same author estimated a coffee supply function (using arrivals as the dependent variable) for 1961/62-1970/71 and showed that there is no strong relationship between changes in the level of supply and prices (Teshome, 1972a).

Coffee supply response by Yousef (1994) using arrival as a proxy to coffee supply for the period 1965/66- 1992/93, the elasticity of price was small (0.14) and positive and statistically insignificant. According to Yousef Abdisa the coefficient of the price variable are positive which ever price variable is used but statistically insignificant which suggests that in the short run variation in real prices have no effect on the level of coffee supply.

Stefan and Lulseged (1994) have estimated Ethiopian coffee supply elasticity using the ratio of official and smuggling prices a small but significant relative price response was found (0.102).

Taddese (July 1994) estimated export supply elasticity using export prices of coffee and found out that the price elasticity of the coffee export supply is (-0.37) and statistically significant.

Kidane (November 1999) studied the relationship between real exchange rate, price and supply of coffee for Ethiopia and found that there was a positive relationship for both the short run and the long run supply response and were significant.

1.6 Significance of the study

The study of coffee supply response helps to weigh the relative importance of the price incentive as compared to other policy parameters to induce more supply. The study can be helpful for planners and policy makers as an indicative of the existing constraints to coffee supply. Secondly it may fill existing information gap and provide a measure of coffee supply elasticity. Thirdly, it stimulates further studies in the area.

1.7 Limitation of the study

Like most researches in developing countries one may not get relevant data that suits the particular needs of the research. Besides, lack of adequate budget to finance the necessary costs of the research is the main limitations of the study.

Chapterv2. Methodology

2.1 Data collection method

Secondary data on annual basis is collected from pertinent agencies like The International Coffee Organization (ICO), Ministry of Agriculture, Ministry of Trade, Ethiopian Revenue and Customs Authority, Ethiopian Coffee Producers and Exporters Association , Central Statistics Agency and National Bank of Ethiopia. The data collected consists of the annual quantity washed and unwashed coffee exported in metric tons with its average price Birr per ton, weighted annual average nominal rate of exchange, Estimated annual production of Ethiopia and the world Domestic consumption of coffee and the like..

2.2 Data analysis method

In this study the method that is employed is the multivariate time series data analysis approach which enables to estimate the price elasticity of supply of washed and unwashed categories of coffee. Annual sold quantities of washed and unwashed coffee which are exported to all destinations along with their unit price is collected for the time period of 1980/81-2009/10. Separate regression analysis will be done for washed and unwashed coffee categories and see whether there is significant difference in elasticity as compared to one another.

2.3 The model used in the study

The analysis of supply response for individual agricultural commodities which rely on time series data to estimate supply elasticity largely rest on the Nerlove's dynamics of supply model. The basic assumption underlying the model is that farmer's decision to produce depends up on their price expectations. This model has been modified in different empirical works to fit the particular crop under investigation.

The modification depends upon the crop under investigation, alternative crops that compete for land and labor, and inclusion of other factors of particular importance for the country and crop being investigated.

With regards to Ethiopia, a modified model can be used where the quantity of coffee supplied to the export market (the dependant variable), is assumed to be the function of price of coffee, production of coffee in Ethiopia, domestic consumption, total supply of coffee in the world, smuggling to neighboring countries, exchange rate of Ethiopian birr for the American dollar, area of land covered with coffee, weather, government policy change, and many others.

Among the aforementioned factors the following are assumed to have significant effect on supply and are selected to be analyzed in this study: coffee own price, Nominal exchange rate, production of coffee in Ethiopia, domestic consumption of coffee, total supply of coffee in the world. The variables are selected because it is these explanatory variables which are continuously changing and are assumed to have bigger effect on supply.

The model of supply response of perennial crops described includes not only observed but also expected variables. This recognizes that a given period of time may have to elapse between the movement of the explanatory variables such as price and the response of the dependent variable such as supply of coffee. In other words, it will take some time to realize the final impact of a new policy such as a change in the real exchange rate on the decision-making process of small-scale farmers. This is especially so if the responses take a longer time; in such a case the explanatory variables may have to be lagged by one or more periods.

A two-period lag may allow the time involved in supply responses to change in price. The specification of lag structure within the supply response model may depend on the time unit of the data. If the period of measurement is larger than the reaction period, then the process of lagging may not be necessary; on the other hand, long-run supply responses of perennial crops may have a longer reaction period than the period of measurement of the data set and therefore lagged dependent variables will have to be included among the explanatory variables. The aim here is to take into account long-run supply changes that take place gradually over time.

CHAPTER 3- Explanation of variables

3.1 The dependant variable (annual quantity of exported coffee)

One can define coffee supply at various marketing points. The first point of supply can be total production of coffee in the country during a given period of time. The available data on total production is not readily available and not reliable because it is only an estimation of experts and significant part of the production is not traced because it is consumed at home.

The second supply point of coffee is the coffee that arrived at different terminal markets or the auction centers i.e. using arrival as dependant variable. Arrivals are the quantity of coffee bought from local markets, assembled and transported to the terminal markets of Addis Ababa and Dire Dawa.

The third available alternative is to use the quantity of coffee exported to all destinations as a dependant variable. The difference between arrival and export is the quantity of coffee rejected at the inspection points which latter will be reprocessed to be exported or sold at the local market.

The total supply of coffee for any particular year may be taken as quantity of coffee brought forward from the previous year plus quantity of coffee produced during the particular year.

Total quantity of coffee available for the year minus domestic consumption and quantity of coffee smuggled to neighboring countries will give total quantity of coffee available for auction centers in Addis Ababa and Dire Dawa.

The above mentioned volume of coffee (total quantity of coffee available for auction centers) minus quantity of coffee which does not fulfill the international quality requirement will make up the bulk of coffee available for export. In this study the dependant variable is the total quantity of coffee actually exported to all destinations.

3.2 The explanatory variable

3.2.1 The price variable

The coffee price is among the most volatile of agricultural commodity prices. The average coffee price remained high in the post-reform period (1981 to 1991), mainly due to the International Coffee Agreement (ICA) quota system. The price showed slight improvement in the initial post-reform period (i.e. 1992 to 1998) before dropping drastically due to the increase in world coffee production. It approached its lowest level in 2001/02 – known as the 'coffee crisis' period, which had serious repercussions for smallholder producers (Daviron and Ponte, 2005).

There are different types of prices to be considered as an explanatory variable such as the New York price, the ICO (international Coffee Organization) indicator price, The Free on Board price (FOB) and the auction price. The first two prices are exogenous prices which do not reflect the producer's price and the remaining prices are the ones related to the producers prices. In this study the free on board price or the export price is collected as an explanatory variable. The export price is the actual amount paid to the exporter and is taken from the Ethiopian Revenue and Customs Authority.

One may also observe a positive trend in the convergence between the farm gate price and the international price of coffee. Several studies were done before and after devaluation. A convergence between the two trends may indicate that non price variables, market rigidities, institutional bottlenecks, and different types of taxes and tariffs may have been eased or liberalized. It should be noted that there is no explicit or implicit government subsidy to small-scale coffee growers.

The difference between the export price and the producer's price is cost of transaction incurred to further process the coffee bought from the auction markets to meet the international quality requirements; hulling, grading, bagging and costs of transporting the coffee to the port. The export price therefore can be taken as a proxy to the producer's price. It would have been best if one uses the producer price because it is the direct incentive to the farmer but because of lack of accurate data on producer's price and the relative difficulty to estimate it we preferred to stick to the export price. The sign of the price variable is positive as it is related to supply directly.

3.2.2 The exchange rate variable

One of the many factors that influence coffee supply is the exchange rate. During the last twenty years the exchange rate of Ethiopian Birr to that of the American dollar has been continuously devaluing from around 2.07 in 1992 to around 16.75 in 2011. The gradual devaluation of the value of Birr has made domestic products more and more chipper for importers from abroad and enhances export and increased the

demand for domestically produced exportable goods among which the main one is coffee.

A fall in the exchange rate of a country's currency can occur due to market forces, where changes in the demand for or supply of foreign currency change the equilibrium price. In case of fixed exchange rate the government can intervene in the foreign exchange market and cause a fall or devaluation in the exchange rate. In either case, the impact of a fall in the value of a currency will be the same.

Devaluation, an official reduction in the value of the domestic currency in terms of foreign currencies or exchange rate adjustments, is a common thing. Devaluation is resorted to help correct the balance of payments disequilibrium by increasing exports and decreasing imports. Devaluation makes foreign goods costlier in terms of domestic currency and this is supposed to discourage imports.

On the other hand, devaluation makes exports from the country that has devalued the currency cheaper in foreign markets. It may appear that devaluation can help solve the problem of trade deficit by stimulating exports and curtailing imports. But in actual practice, the effect of devaluation depends on a number of intricate and, often, interdependent factors.

Depending on these factors the net effect of devaluation may be favorable or unfavorable. If factors are, by and large unfavorable, exports may not increase sufficiently enough to improve the trade position or the high cost of imports and

certain other developments resulting from devaluation may cause inflation and nullify the initial effect of devaluation on export prices.

A basic assumption related to devaluation is that the demand for the country's exports and imports is price elastic, i.e. a fall in export prices will substantially increase the demand or export and an increase in the process of imports will significantly reduce imports. However, these things need not necessarily happen.

The demand for higher proportions of exports of the developing countries, lie in the primary commodities, is regarded as relatively price inelastic that is, a fall in the price will not significantly increase the demand. On the other hand, the demand for many of the imports of the developing countries, like essential consumer goods, capital goods, technology etc. is also relatively price inelastic i.e. an increase in the import prices will not considerably reduce the imports.

It should be noted that devaluation may lead to a fall in the unit value of exports and hence the total earnings will increase only if the quantity of exports increase more than the rate of fall in the net value of exports following the devaluation. If the quantity of exports does not increase to the extent that the rate of fall in the unit value of exports following the devaluation, there will be fall in the total export earnings.

However, as trade balance is a function of both export and imports, we have to consider the effect of devaluation on both exports and imports. In other words, devaluation will improve a country's trade balance only if the sum of elasticity's of demand for exports and of its demand for imports is greater than one.

3.2.3 Domestic Coffee production

Area of land covered with coffee is, as mentioned earlier very difficult to estimate because in the one hand coffee is grown wild in the country and is very difficult to measure e area and on the other hand significant part of coffee plantation is grown intercropped with another annual and perennial crop which makes it difficult to estimate the total land area covered with coffee plant and the associated annual coffee production.

This being the prevailing truth The International Coffee Organization estimated the total coffee production for Ethiopia and the world. In this study I used this estimate.

3.2.4. World coffee production

One of the most important factors that determine the quantity of coffee exported to all destinations from a particular coffee producing country is the total supply of coffee in the world. Because of higher supply of coffee production coming to the world market each year The International Coffee Organization (ICO) used to set quota of sales to each coffee producing country which was said to be effective in keeping price stable.

In 1989 GC the quota system was abandoned and the so called free market system was put in to practice in favor of importing countries particularly The USA. The abandonment of the quota system was followed by immediate sharp fall in coffee price and countries like Ethiopia which heavily depend on single agricultural product for their foreign exchange earnings were badly affected.

Since then coffee producing countries sell their product in a competitive market but there are some disadvantaged group of countries like Ethiopia which are found far from heavy coffee consuming or rather importing countries. The relative distance of coffee producing country from coffee importing country will make the selling price of far away countries more than the competitive price offered for coffee from nearby producing countries.

A good example of this is the north American market which is geographically located near to the Latin American biggest coffee producing countries in the world like Brazil and Colombia or one can site another example of the newly emerging economies of Asia and the neighboring market of Europe which are located near to second largest producers of coffee in the world, Vietnam Indonesia and India.

Countries like Ethiopia which are located far away from the biggest coffee importing countries have limited buyers and have better selling opportunity during bad harvesting seasons in the biggest coffee producing country like Brazil when attacked by frost incidence which significantly reduces coffee production . In light of these facts world coffee supply is assumed to have negative effect on supply of coffee to the export market.

3.2.5 Domestic Consumption

According to different rudimentary estimates made by researchers and relevant organizations including The International Coffee organization (ICO) Ethiopia is

considered number one consumer of coffee. As shown in the annexed data more than 40 % of the total product is estimated to be consumed locally and what is more important is the consumption habit of coffee is not changing despite the fact that coffee price has increased for the last several years. In this study domestic consumption is assumed to affect coffee supply negatively.

CHAPTER 4. Analysis of time series estimation

4.1 Discussion of time series regression results

The modified log linear form of the Nerlovian model is used to estimate the supply response of coffee to change in price. A separate time series data is obtained from relevant government agencies such as Ethiopian Revenue and Customs Authority, Ministry of Trade, the national Bank of Ethiopia and The official website of The International coffee organization (ICO).

Two sets of secondary data were given attention and separately analyzed using STATA 10 software. The first set of data consists of a thirty years of data on coffee production, consumption, exchange rate, unit price and total quantity of coffee exported (washed and unwashed together). The data is taken for the period of 1981-2010.

The second set of data is taken for the period of 1987-2007 and takes into account the difference in quantity exported of washed and unwashed coffee with their respective unit prices to see if the significant difference in unit price of the two categories of coffee, washed and unwashed, results in difference in response of the supply of different categories of coffee to change in price.

The data sets were tested for stationarity with Dickey Fuller test and were found non stationary at the levels and after differenced once, all except the data for the exchange rate, become stationary. The data of the nominal exchange rate cannot be stationary after differencing it several times and because of this reason it is dropped out.

Appropriate lag structure in this equation was established before hand and tests were made to assess the appropriate lag structure of the price variable.

Lagging two years of the unit price variable produced the best result. Thus two log linear including unp_{t-2} were estimated. These are

1. **Running a regression on the explanatory variable in the specified equation**
2. **Dropping variables with the minimum and statistically insignificant t-ratios and regressing on the remaining variables.**

The result from the first set of data showed that only production and unit price with two time lag are significant and the rest of the variables included in the equation are all found insignificant. Accordingly I dropped those variables which are insignificant turn by turn and try to see the result and found out that the significance of the two explanatory variables (production and lagged price of coffee) increased gradually. The result obtained from the regression analysis is given below.

Table 1:-Regression result for total coffee exported

Source	*SS*	*df*	*MS*	*Number of obs= 28*
Model	*2.3354928*	*2*	*1.16774642*	*F(2, 25) = 22.60*
Residual	*1.2920174*	*25*	*.051680696*	*Prob > F = 0.0000*
Total	*3.6275102*	*27*	*.134352231*	*R-squared = 0.6438*
				Adj R-squared = 0.6153
				Root MSE = .22733

lntotex	*Coef.*	*Std. Err.*	*t*	*P>t*	*[95% Conf. Interval]*
lnunp2	*.266531*	*.0829577*	*3.21*	*0.004*	*.0956765 .437385*
lnprod	*.536720*	*.1516056*	*3.54*	*0.002*	*.2244827 .848958*
_cons	*2.43151*	*1.622663*	*1.50*	*0.147*	*-.9104265 5.77344*

Where

lntotex :- stands for natural logarithm of total annual quantity of clean coffee exported to all destinations.

lnunp$_2$:- stands for natural logarithm of a two time lagged unit price of exported coffee.

lnprod:- stands for natural logarithm of estimated annual quantity of coffee produced.

As shown on the table higher export price exert a positive influence on coffee supply to the export market. The coefficient of lagged export price is positive and statistically significant indicating that favorable price regime is required to increase coffee supply to the export market. The t-statistics at 5% significant level and 28 degree of freedom is 2.048 which is greater than the t-statistics calculated and therefore we reject the null hypothesis which we set earlier and states that the supply elasticity of different categories of Ethiopian coffee (washed and unwashed) to export price is not significant because other non price factors appear to determine coffee supply. The estimated equation for total coffee export is

$$\text{lntotex}_t = 2.43 + 0.54\text{lnprod}_t + 0.27\text{lnunp}_2 + u_t$$

$$(0.151) \qquad (0.83)$$

Where

lntotex_t :-stands for natural log. of total quantity of coffee exported at time t

lnprod_t :-stands for natural log. of estimated annual total coffee produced at time t

lnunp_2 :-stands for natural log. of unit price of exported coffee lagged two times

In this study the supply elasticity of coffee to change in price is found to be 0.27. The measure of goodness of fit R^2 is 64 % and the adjusted R^2 is found to be 61% which implies that the explanatory variables jointly explained higher proportion of the variation in the dependant variable.

Higher prices that persist for relatively longer period will induce investment to expand new plantation of coffee while higher prices which persist for relatively

shorter period will make farmers to respond to price change through better use of modern technology of production, intensive harvesting and post harvest technology.

The second regression is made to see if the price difference between washed and unwashed coffee categories leads to difference in supply response of coffee to the export price. Washed coffee obtains in almost all cases a premium price which is above the unwashed coffee because of its better demand in the world market.

The result of separate regression for the unwashed coffee shows that at 5% significant level you reject the null hypothesis. The calculated t-ratio from the regression is found to be 3.35 which are greater than the 2.101 the t-ratio obtained from the table at 5% significant level and 18 degree of freedom. This shows that higher price for unwashed coffee will induce higher supply.

The elasticity of supply to change in export price for unwashed coffee is found to be 0.25 which is all most similar to the previous regression result 0.27.The measure of goodness of fit R^2 is 0.58 and the adjusted R^2 53% which means the explanatory variables jointly explains fairly higher proportion of the variation in the dependant variable.

As is in the previous case none of the variables were significant which were assumed to be major factors for supply response to price change. Only price and production are the most influencing factors. The price variable is lagged for two periods and found to be more significant.The estimated equation for unwashed coffee is

$$lnunwaex_t = 3.83 + 0.42lnprod + 0.25\ lnunwap_{t-2} + u_t$$

(0.203) (0.073)

Where

lnunwaex $_t$:- stands for natural log. of total quantity of unwashed coffee exported at time t

lnprod $_t$:-stands for natural log. of estimated total annual coffee produced at time t

lnunwap $_{t-2}$:- stands for natural log. of unit price of exported coffee lagged two times

Table:-2 Regression result for unwashed coffee.

reg lnunwaex lnprod lnunwap2

Source	SS	df	MS		Number of obs = 19
Model	1.2427681	2	.62138404		F(2, 16) = 11.26
Residual	.88269568	16	.05516848		Prob > F = 0.0009
Total	2.1254637	18	.11808132		R-squared = 0.5847
					Adj R-square = 0.5328
					Root MSE = .23488
lnunwaex	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
lnprod	.4223504	.2031639	2.08	0.054	-.0083377 .8530386
lnunwap2	.2457646	.0732642	3.35	0.004	.0904515 .4010778
_cons	3.834198	2.351317	1.63	0.122	-1.150371 8.818768

The regression run on washed coffee showed a different result which contradicts the result obtained from the above two regressions. As shown in the table the calculated t-ratio from the regression analysis of price lagged for two periods is 1.07 which is far smaller than the t-ratio found from the table at 5% significant level and 18 degrees of freedom which is 2.101. Based on this you fail to reject the null hypothesis which means that there are other factors which determine the response of washed coffee to change in export price other than its own price.

This may be because of the limited quantity of production of washed coffee which does not change much overtime. Washed coffee processing requires a relatively heavy investment to establish the processing plant, as in the case of unwashed coffee there is no way to process washed coffee by paying a service charge to processing plant owners and most of all the wet processing must start immediately after few hours of harvesting which otherwise the red cherry will ferment and loses its best qualities.

It is only state farms, farmers cooperatives and few large scale commercial farms that own the washed coffee processing plants and for this very reason the quantity of washed coffee supplied to the export market shows only gradual increase while the bulk of the annual production is processed dry particularly the bulk of coffee produced by the small holder farmers apart from the limited quantity bought by cooperatives and private traders who own wet processing factories, the remaining larger proportion is processed dry.

One more reason that should be discussed here is the limited demand for the Ethiopian coffee in the world market. As shown in the data attached in the appendix

there is no one year in which Ethiopia sold all its coffee production during the same physical or crop year besides this the bulk of current Ethiopian exports go to Japan, Germany and Saudi Arabia. There is a high degree of dependence on these three markets, which absorbed 63.3 per cent of Ethiopia's coffee exports in 2003/2004.

Table 3:-Regression result for washed coffee

reg lnwaex lnprod lnwap2

Source	SS	df	MS	**Number of obs = 19**
Model	4.97390931	2	2.486954	**F(2, 16) = 16.88**
Residual	2.35777982	16	.1473612	**Prob > F = 0.0001**
Total	7.33168914	18	.4073160	**R-squared = 0.6784**
				Adj R-squared = 0.6382
				Root MSE = 0.3838

lnwaex	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
lnprod	**1.698086**	**.326094**	**5.21**	**0.000**	**1.006796**	**2.38937**
lnwap2	**.1217911**	**.114223**	**1.07**	**0.302**	**-.1203507**	**.363933**
_cons	**-11.97098**	**3.83643**	**-3.12**	**0.007**	**-20.10386**	**-3.83810**

This study showed that because of the above mentioned reasons washed coffee responsiveness to change in export price is insignificant and lower than the response of supply of total coffee (washed and unwashed together) and unwashed coffee separately to change in export price.

Summary and conclusion

This study is basically done to see the response of different categories of coffee supply to change in export price and the result obtained from separate regressions shows that coffee in general responds fairly positively to price incentive. The separate regression made on total coffee exported, washed coffee exported and unwashed coffee exported considering all three as a dependant variable showed a significant and consistent estimation for total exported coffee and unwashed exported coffee while on the other hand the response of washed coffee to change in export price is found to be insignificant even at 10% significant level and fail to reject the null hypothesis.

Of all the variables assumed to have significant effect on supply response of coffee, estimated annual production and coffee own price lagged for two years are found to be significant in the study and the rest of the variables considered are all insignificant. Therefore the government has to work on these significant variables to increase coffee production and maximize the foreign exchange earnings particularly by promoting domestic and foreign investment on coffee plantation, harvesting and processing of coffee.

As mentioned elsewhere in the document 90% of the coffee production come from small holder farmers and the area of land occupied by these small holder farmers is very small and part of it is used to grow food grain and as a grazing land for domestic animals the future of expanding production through small holder farmers by increasing area is not promising.

Some economists argue that unlike farmers in developed countries, small-scale farmers in developing countries may not respond to price incentives in a rational and predictable manner. The reason they put forward is that peasant farmers are risk averse especially in the long run. As a result of increased domestic prices, farmers may not take advantage of such incentives and thereby increase their income. Farmers are assumed to have a given income target and once this target is reached leisure time may rise.

This is the so called backward bending supply curve. Studies by Bevan et al. (1989) and Sharma (1992), show that African farmers do indeed respond to price and other incentives in a rational and predictable manner. The result of this study also indicates that the concept of risk aversion among Ethiopian farmers does not seem to be true. From the descriptive statistics as well as from the econometric findings it was noted that farmers do indeed respond positively to price change.

Apart from the above mentioned measures, assessing new markets for the product through promoting the product aggressively is very important. This is because of the reason that two third of Ethiopian coffee is sold for only three countries namely Germany, Japan and Saudi Arabia, effort should be made to expand market.

The share of world price that should go to the producers should increase through decreasing transaction costs of coffee processing, transporting and decreasing the role of middle men through playing vital role to bridge the gap between the producer and auction or central market.

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Appendices

Annual data of washed and unwashed coffee for the crop years 1981-2007

Crop Year	Opening stock	Domestic production	Domestic consumption	Unwashed export	Washed export	Total export	Unwashed price	Washed price	Exchange rate	Wor.coffee production	Unwashed arrival	Washed arrival
1987	113820	178380	130020	58743	14699	73412	2569	3892	2.07	4871340	71131	17634
1988	88320	172980	70020	69290	13809	83099	2977	4217	2.07	6475440	66030	16065
1989	108660	166200	70020	61648	22374	84022	2705	3664	2.07	5367420	92844	22658
1990	116580	206340	72000	66583	16347	82930	3608	4318	2.07	5646840	69945	18462
1991	168000	174540	72000	39799	11168	50967	3478	4778	2.07	5595180	60521	15737
1992	219600	183660	84000	32788	7334	40122	6629	9429	2.77	5910060	51495	8762
1993	279120	107640	78000	59628	9982	69610	19005	41525	5	5347980	81201	14455
1994	239160	171900	78000	70800	9120	79920	12988	21713	5.77	5347980	108296	14750
1995	253140	152220	75000	68843	10401	79244	28456	34069	6.25	5480640	81218	15666
1996	251100	171600	75000	93512	13127	106639	19389	23365	6.32	5051940	132247	18092
1997	241080	196200	90000	93809	17397	111206	20904	24193	6.5	5991960	139518	19110
1998	236100	174960	94980	109555	15839	125394	21583	40386	6.88	5822940	128243	25408
1999	190680	164700	97980	84170	21228	105398	17348	25744	7.51	6323880	111045	36475

Crop Year	Opening stock	Domestic production	Domestic consumption	Unwashed export	Washed export	Total export	Unwashed price	Washed price	Exchange rate	Wor.coffee production	Unwashed arival	Washed arrival
2000	151980	210300	97980	87342	32961	120303	16109	20716	8.14	7590000	124245	46997
2001	124980	225360	109980	65571	19518	85089	13403	18468	8.33	6246060	89281	25863
2002	124020	221580	109980	78078	38276	116354	10111	14629	8.54	7135860	145733	51930
2003	99000	232440	109980	98673	37941	136614	9730	14423	8.58	6174780	140339	51377
2004	79020	274080	109980	96461	45961	142422	11697	15076	8.62	6689640	143749	56242
2005	85920	286740	109980	105789	51408	157197	18321	20968	8.65	6674820	143739	64004
2006	54000	333060	109980	116206	45943	162149	19087	24252	8.68	7734780	161703	59156
2007	55980	358020	109980	116652	49532	166184	19795	26914	8.79	7200840	152920	63899

Annual data of coffee for the crop years 1981-2010

year	Opening stock	Estimated production	Domestic consumption	Exchange rate	Total export	Unit price	World coffee supply
1981	50940	198240	96000	2.07	87906	5931	4843800
1982	65280	192840	97020	2.07	79614	5991	6029940
1983	81420	223500	97020	2.07	90768	5659	5081280
1984	117480	232800	95700	2.07	97894	6475	5355300
1985	129780	139200	98880	2.07	68963	6316	5039280
1986	128220	169980	111180	2.07	73190	9495	5410380
1987	113820	178380	130020	2.07	73412	6537	4871340
1988	88320	172980	70020	2.07	83099	6171	6475440
1989	108660	162000	70020	2.07	84022	6661	5367420
1990	116580	206340	72000	2.07	82930	4558	5646840
1991	168000	174540	72000	2.07	50967	4610	5595180
1992	219600	183660	84000	2.77	40122	7141	5910060
1993	279120	107640	78000	5	69610	22285	5347980

year	Opening stock	Estimated production	Domestic consumption	Exchange rate	Total export	Unit price	World ccoff. supply
1994	239160	171900	78000	5.77	79920	13986	5347980
1995	253140	152220	75000	6.25	79244	29194	5480640
1996	251100	171600	75000	6.32	106639	19876	5051940
1997	241080	196200	90000	6.5	111206	21418	5991960
1998	236100	174960	94980	6.88	125394	23956	5822940
1999	190680	164700	97980	7.51	105398	19038	6323880
2000	151980	210300	97980	8.14	120303	17371	7590000
2001	124980	225360	109980	8.33	85089	14561	6246060
2002	124020	221580	109980	8.54	116354	11597	7135860
2003	99000	232440	109980	8.58	136614	11034	6174780
2004	79020	274080	109980	8.62	142422	12783	6689640
2005	85920	286740	109980	8.65	157197	19177	6674820

year	Opening stock	Estimated production	Domestic consumption	Exchange rate	Total export	Unit price	World coff. supply
2006	54000	333060	109980	8.68	162149	20554	7734780
2007	55980	358020	109980	8.79	166184	21913	7200840
2008	72000	296940	109980	9.24	168330	29004	7710000
2009	110940	415860	109980	10.42	112024	29259	7384440
2010		447000	109980	12.89	174285	40874	8069880

Declaration

I, the undersigned, declare that this project work is my original work and has not been presented, in part or whole, in any other university or college. All source of the materials used for this project work have been dully acknowledged.

Name Zelalem Tesera

Signature_____

Advisor Tekie Alemu(Ph.D)

Signature_____