ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

EFFECT OF EXCHANGE RATE VOLATILITY ON ETHIOPIAN COFFEE EXPORT

BY

AMEZENECH MULUNEH

June, 2018

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A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Masters of Science in Economics (International Economics)

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School of Graduate Studies

This is to certify that the thesis prepared by Amezenech Muluneh, entitled with: Effect of Exchange Rate Volatility on Ethiopian Coffee Export submitted in partial fulfillment of the requirements for the degree of Master of Science (International Economics) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

This study tried to evaluate the effect of exchange rate volatility on Ethiopian coffee export. It has employed annual time series data (1980-2015) collected from the country's different institutions, namely: National Bank of Ethiopia (NBE), Ministry of Finance and economic development (MOFED) and Ethiopian Custom Authority (ECA). The overall objective of the study was to investigate the effect of exchange rate volatility on Ethiopian coffee export. Tools of descriptive statistics were used to analyze the data and understand the dynamics of the variables included in the analysis. A Bounds testing and Autoregressive Distributed Lag (ARDL) model was used to establish the presence of a long run relationship between exchange rate volatility and coffee export. In order to evaluating exchange rate volatility, the study employed the standard deviation method.

The result of the study indicates that coffee export in Ethiopia has negative and significant relationship with exchange rate volatility. Again Gross Domestic Product (GDP) and Terms of Trade (TOT) have negative effect on coffee export. On the other hand, Trade openness and real effective exchange rate were found to be positively related and significant. From these results, the study recommended that policy makers in the country should try to maintain a well-managed stable exchange rate regime. Also, the government could set up a coffee export stabilization fund that would ensure a certain amount of predictability in coffee prices during export. The other measures should be related with both export and destination diversification. Other agricultural and industrial products and goods to be exported in addition to coffee to earn foreign currency should be assessed. The other one is not only diversifying the export items, but also the government needs to diversify export market destinations.

Key Words: Exchange rate volatility, Exports, Coffee, ARDL

DECLARATION

Firstly, I declare that this thesis titled with "Effect of Exchange Rate Volatility on Ethiopian Coffee Export" is my own original work which has not been submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate and those all sources of materials used for the thesis have been properly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for Master of Science in International Economics at the Addis Ababa University.

Name: Amezenech Muluneh Dagne

Signature: ----------

Date of Submission: June, 2018

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LIST OF ABBREVIATIONS

ADF: Augmented Dickey Fuller

AIC: Akaike Information Criterion

ARCH: Autoregressive Conditional Heteroskedasitiy

ARDL: Autoregressive Distributive Lag

CUSUM: Cumulative Sum

CUSUUMSQ: Cumulative Sum of Squares

DF: Dickey Fuller

ECM: Error Correction Method

ECT: Error Correction Term

ECX: Ethiopian Commodity Exchange

EPRDF: Ethiopian People Revolutionary Democratic Front

EV: Exchange Rate Volatility

FDI: Foreign Direct Investment

GARCH: Generalized Autoregressive Distributive Lag Model

GDP: Gross Domestic Product

GMM: Generalized Method of Moments

HQIC: Hennan-Quinn Information Criterion

IMF: International Monetary Fund

LCU: Local Currency Unit

LDCs: Less Developed Countries

MOFED: Ministry of Finance and Economic Development

NBE: National Bank of Ethiopia

OLS: Ordinary least square

PP: Phillips Perron

PPP: Purchasing Power Parity

REER: Real Effective Exchange Rate

RIR: Real Interest Rate

SAPs: Structural Adjustment Programs

SIC: Schwarz Information Criterion

TOP: Trade Openness

TOT: Term of Trade

US: United State

USA: United Sate of America

WTO: World Trade Organization

CHAPTER ONE: Introduction

1.1 Background of the Study

African countries are waking up from poverty complex and destitution which have challenged the continent for years. Recent performance of the economies of these countries is one of progress which reflects the implementation of better policies and structural reforms (Biruk, 2012).By the policies and reforms undertaken, export-led growth has been given special attention in many countries. This is so because exports generate foreign exchange reserves that are necessary to finance essential imports required for domestic production and capital formation. The increase in export earning can also improve the balance of payment of a country and plays a prominent role in creating employment opportunities for unemployed groups. Again, an expansion in exports may promote specialization in the production of export products, which in turn may boost the productivity of the export sector. Then, the improvement in productivity may lead to output growth (Kebede, 2011).

However, there still remain a lot of hurdles and uncertainties to keep economic growth fast. The economic and social situation of the continent is vulnerable to domestic and external shocks. Limited investments to diversify economic structures and boost growth, new armed conflicts, poor weather conditions and a deterioration of the terms of trade are the primary challenges the African countries face to uphold the gains in economic performance (IMF report, 2011 as cited by Biruk, 2012).

Since 1992, Ethiopia also under the support and guidance of the IMF and the World Bank has undergone liberalization and enhanced Structural Adjustment Programs (SAPs) to restrain internal and external imbalances of the economy. One of the basic tasks of the new policy regime is to increasingly open the economy to foreign competition with a view of benefiting the economy from expanded markets (Abule and Abdi, 2012). Real devaluation in exchange rate, reduction of government expenditure and increase in taxes were the measures taken. Out of these, exchange rate policy has been a major item on the economic and political agenda of Ethiopia for almost two decades (Haile, 1999).

Also there have been different structural changes undertaken in international trade in terms of the quality, quantity, volume and value of both industrial and agricultural products. Basically, in the agricultural sector, the government of Ethiopia has been trying to diversify agricultural export products. For instance, in addition to the coffee subsector which is the foundation for the country's agricultural and economic development, flower and oil seed export have been started and boosted for the last two and half decades (Abule, 2012).

Ethiopia is among the least developed countries and its economy is based on the primary agricultural products. Agriculture plays a central role in the economic growth of the country for a century. That is why it accounts for more than 39 percent of GDP, 80 percent of export and 80 percent of employment. Coffee, oilseed, chat, hidden and skin and flower are the major Ethiopia's export commodities. Ethiopia has been depending on export those very few primary products to world market for century and the volume and values of those product has been increased time to time (Gezahegn, 2012).

The agriculture based Ethiopian economy is highly dependent on export of *Coffee Arabica* as it contributes to more than 60 percent of the country's foreign exchange earnings. No other product or service in Ethiopia has earned as much (Abule, 2012). The coffee export has taken the biggest share compare with other commodities in Ethiopia. The country is the eighth coffee producer and exporter in the world. However, the share of the country supplies to world market is very low (only 3% to 4%) compare with the world top coffee exporter countries, such as Colombia, Brazil and Vietnam. Coffee export reached high and the country share of trade to world market was 199, 446 metric ton and 0.01 respectively in the year 2009 (Minten, 2014).

But the sector is still challenged with different factors. Among these, exchange rate volatility is the one highly determines the earnings from the export. This fluctuation of exchange rate over time has its own implication on export over all competitiveness and economic growth of the country as a whole.

Exchange rate is the price of a foreign currency unit in terms of the domestic currency units. The measurement is therefore Local Currency Unit (LCU) divided by foreign currency. There are fixed and floating exchange rate systems. Fixed exchange rates are meant to be fixed for a specified period of time. On the other hand, floating exchange rates move up and down from

year to year, week to week, and minute by minute .The term volatility represents the directionless variability of an economic variable as represented by the dispersion of that variable within a given time horizon. Variability refers to the extent to which an economic variable, such as a price or an exchange rate, moves up and down over time in relation to its mean. In mainstream economic theory, volatility contains two principal concepts: variability and uncertainty. Where variability represents the overall movement and uncertainty refers to unpredictable movement (Chege*et al.*, 2014).

Again, exchange rate volatility refers to the extent to which prices of currencies tend to fluctuate over time. The measure captures the uncertainty due to unpredictable fluctuations in the exchange rates. Thus a volatile exchange rate is characterized by or prone to sudden change and is therefore unpredictable. Theoretically, exchange rate volatility is a source of risk and uncertainty which tend to impact negatively on risk averse traders or exporters, thus reducing exports. Volatility in exchange rates cannot be ignored in the exchange markets as both importers and exporters.

Different studies have been done related with the subject matter even though their output is not the same on the net effect of exchange rate volatility on export especially coffee. So that they couldn't come up with an established relationship between exchange rate volatility and exports. By this study, the researcher has tried to investigate the effect and extent to which the exchange rate volatility affects the coffee export and its consequent implications on the country's economic growth.

1.2 Statement of the problem

Exchange rate volatility is mainly a concern for firms that are linked to international markets and therefore exposed to currency risk. Thus exchange rate volatility is an important factor in explaining the worldwide trade pattern. The exchange rate volatility creates risk in macroeconomic policy formulation, investment decisions and international trade flows (Chege*et al.*, 2014). High exchange rate volatility sends conflicting signals to investors as it creates vagueness about their profits. Exchange rate volatility is important as it creates gains or losses to farmers and exporters. This unexpected losses cause exchange rate risk thus discouraging production and this affects volumes of trade leading to adverse effects on economic growth.

Further, exchange rate volatility affects international price competitiveness of exports leading to resource reallocations, which has a bearing on economic efficiency. Exchange rate volatility leads to change in export earnings and is therefore detrimental to growth of exports.

Exchange rate volatility is normally considered as a barrier to trade in Ethiopia especially for agricultural commodities like tea, coffee and horticulture because investment decisions are made way before production and consumption decisions. Volatility highly affects exporters of agricultural products because of their limited ability to adjust to changes in exchange rates and export prices. This in turn becomes a barrier in achieving the required success in the export sector.

A lot of studies are done related with the subject matter. However, there is still no consensus on the effect of real exchange rate volatility on commodity exports (Otieno, 2015) and some group of studies indicated that the effect of exchange rate volatility is ambiguous. Some were unable to establish a relationship between exchange rate volatility and exports. Therefore, to answer the ambiguity that surrounds the effects of exchange rate volatility on exports in general and on specific export commodity, it is very important to undertake further studies to focus on developing countries where continuous and volatile exchange rates is highly observed.

Also most of the previous studies have focused on the effects of exchange rate volatility on aggregate trade flows, ignoring potentially different effects that may be observed at a more disaggregated level of analysis (Chege*et al.*, 2014). Demands for different export commodities and price elasticity may be different. And this may be a reason why aggregate studies have found little evidence of the effects of exchange rate volatility on specific export item. The disaggregated focus is appealing because exchange rate volatility may affect export commodities differently, so that aggregate effects may cloud the effects in individual products, or perhaps cancel out different effects across sectors. Thus the volatility of the exchange rate may be more sensitive when investigations focus to identify its effect on specific export commodity.

Accordingly, this study can be helpful in providing a clear information on the effect of exchange rate volatility on coffee export specifically by using time series annual data.

1.3 Objective of the Study

The overall objective of this study is to investigate the effect of exchange rate volatility on Ethiopia's coffee export. The specific objectives of the study are:

i. To investigate the relationship between exchange rate volatility and coffee export of Ethiopia
ii. To study the relationship between real effective exchange rate and coffee export of Ethiopia
iii. To estimate the short run and long run relationship between coffee export and term of trade (TOT), trade openness (TOP) and gross domestic product (GDP).

1.4 Hypotheses

i. There is short and long run relationship between coffee export of Ethiopia and exchange rate volatility.
ii. Ethiopian coffee export is negatively correlated with exchange rate volatility.

1.5 Research Question

- What is the effect of exchange rate volatility on export of coffee in Ethiopia?

1.6 Significance of the study

There is an increasing interest among economists regarding the effects of changes in real exchange rate on the export performance of a country (Kebede, 2011). If depreciation of real exchange rate really increases the competitiveness of a country's exports, then it is possible to increase production and boost the export earnings. If such relationship does not exist, then depreciating the exchange rate may not be a reasonable way of improving the country's competitiveness. In this case, other forms of incentive schemes may be implemented. In the same way an understanding of the effects of exchange rate volatility on coffee exports from Ethiopia is of interest to researchers, farmers, exporters and policy makers (Minten, 2014). Indeed, producers and exporters of coffee are not only concerned with the magnitude of the price they receive but also about how stable these prices are as it affects their earnings of a consistent income. Hence, this study has tried to examine whether coffee exports of Ethiopia during the

recent years are influenced by the fluctuation of exchange rate of the country against its trading partners.

In general, by investigating the effect of exchange rate volatility on Ethiopian coffee export, the study can helps to provide information to the policy makers to enable them coming up with the appropriate policy regarding with the growth of the sector and the economy as a whole and helps to broaden the understanding of extent of effect of exchange rate volatility which aids policy formulation to improve the performance and ultimately overall economic growth.

1.7 Scope of the study

The study covers a data set from the year 1980 to 2015. The study relies mainly on the use of secondary data drawn mainly from the National Bank of Ethiopia (NBE), Ethiopian Custom Authority (ECA) and Ministry of Finance and Economic Development (MOFED).Depending on these secondary data, the study have tried to investigate the effect of exchange rate volatility on coffee export in Ethiopia in the indicated time period.

1.8 Organization of the paper

This paper is divided into five chapters. Chapter one is the introduction by which adequate background on the topic being studied and statement of the problem including the objectives have been shown in detail. The second chapter reviews some of the theoretical and empirical studies related to the effect of exchange rate volatility on export supply of coffee and gives an overview of the coffee sub-sector in Ethiopia. Chapter three concerns with the data types used, their sources and methods of generating data for some of the variables and setting out the methodology used in estimating the coffee supply function. Chapter four holds result and discussion where the descriptive statistics, unit root tests and results interpretation are given. The last chapter gives a summary, the main conclusions reached and policy recommendations based on the study findings.

CHAPTER TWO: Review of Literature

2.1 Theoretical Review

2.1.1 Standard trade theory

Foreign trade involves both imports of "goods and services produced abroad and consumed domestically" and exports of "goods and services produced domestically and consumed abroad". The volume of exports is mainly influenced by foreign output and the export price relative to foreign goods. If the exchange rate appreciates; the domestic commodities become relatively more expensive and the export volume decreases (Samuelson and Nordhaus, 2001).

A depreciation of the own currency stimulates the production of import substitutes and the production of exports and leads to an increase in the domestic prices. Depreciation causes inflation, since both the import substitutes and export prices are part of the general price index used in the country. The larger the depreciation is the higher inflation will occur in the economy. The increase in the domestic price for import substitutes and exports will lead to a shift in the resources in production. It will shift towards the import substitutes and exports and away from non-tradable or purely domestic commodities. This reduces the price advantage that the domestic economy received from the depreciation (Samuelson and Nordhaus, 2001).

The elasticity of demand and supply for a country is an indication of how easy it is for the country to shift its resources in production from non-tradable and purely domestic commodities to import substitutes and to exports. It also shows how inflationary the shift will be (Salvatore, 2004). When there is depreciation in the domestic currency, the exports becomes cheaper for the foreign market. The foreign currency is worth more in terms of the domestic currency i.e. the demand increase.

2.1.2 Marshall-Lerner condition

The Marshall-Lerner condition verifies whether the foreign exchange market is stable or unstable. Conclusions that can be drawn from the Marshall-Lerner condition is depending on the shape of the curves for the demand for import and exports in a country. The condition indicates that the foreign exchange market is stable if the sum of the price elasticity's of the demand for

imports and exports are greater than one, in absolute terms. It is better for the country if the two elasticity's exceed one by a large amount since the current account then improves more in case of a depreciation. If the price elasticity's sum up to less than one in absolute terms, the foreign exchange market is unstable. The current account will be unaffected by a change in the exchange rate if the elasticises sum up to exactly one, in absolute numbers (Salvatore, 2004). The reasoning behind the use of the Marshall-Lerner condition is to examine if the foreign exchange market is stable or unstable. The exact shape of the demand and supply curves of the foreign exchange market is hard to determine if the foreign exchange market is stable or unstable. If the supply curves could be determined it would be straight forward to correct a deficit in the current account by deprecating the currency (Salvatore, 2004). Policymakers today are taking the responsiveness of trade flows to relative price changes into account when constructing an exchange rate policy or a commercial policy. Historically, the elasticities of the demand for imports and exports had a bigger impact and were used more frequently by policymakers in order to make a decision (Bahmani-Oskooee and Niroomand, 1998). The sum of the elasticities for the demand for imports and exports would need to be sufficiently larger than one so that the supply and demand curves of the foreign exchange rate are elastic enough and depreciation can therefore make it possible to correct a balance of payments deficit. This is the reason why it is important to calculate the real world value of the price elasticity's of the demand for imports and exports (Salvatore, 2004).

2.1.3 Major export products of Ethiopia

The country's economy is dominated by agriculture sector. The majority of the Ethiopian population, over 85 percent consists of agrarian communities who live in rural areas and obtain their livelihood from agriculture. The country has a vast potential of agricultural land with favorable climatic conditions, soils and vegetation, which are supportive to the production of a number of crops for domestic consumption and export purpose. According to different reports, it has been estimated that 67 percent of the total area of the country is agricultural land of which 12.9 percent is under cultivation, 11.4 percent seasonal crops and 1.5 percent permanent crops and 54.2 percent is permanent pasture, 3.9 percent forests, 0.8 percent swamps, 0.6 percent lakes and 27.8 percent others. On the other hand, the industrial sector of the country's economy is relatively small, though it has been growing steadily over time. Ethiopia's other natural resources

include gold, platinum, copper, potash and petroleum even if some of which are not yet fully exploited. Because of these economic situations in the country, agricultural products like coffee, pulses and oil seeds, livestock and livestock products and flowers are among the common export items to earn foreign currency for the country's economy growth.

a. Coffee

The importance of coffee to the Ethiopian economy is manifold. Coffee alone earned and still earns more foreign exchange than all the other export commodities put together. On average it contributes 60-65 percent of the total foreign exchange. For example, the share of coffee export earnings, which was about 50 percent in 1963/64, although having fluctuated, grew to 64.1 percent in 1980/81 (Yitbarek, 1986).Ethiopia's diverse coffee varieties, flavors, and natural forest-friendly production methods provide Ethiopian wild coffee producers and the country with a comparative advantage in the international specialty coffee market. Even though the country's export of coffee compare with others world leading coffee country such as Colombia, Brazil and Vietnam is low, the country has a capacity to produce per year around 300,000 tons. Ethiopia is the second largest exporter of organic coffee by volume, after Peru. In 2005, the country shipped about 9,000 tons which represented 19% of world organic coffee exports and 6% of Ethiopia's total coffee export volume. The low cost of producing organic coffee in Ethiopia may explain its large export percentage. Most Ethiopian coffee is grown with few or no chemical inputs. Thus, often only the fee for organic certification is required for the coffee to be officially recognized as organic. Some say that no chemical inputs are needed because coffee is indigenous to Ethiopia and thus adapted to local conditions. The government has also introduced improved coffee varieties. Unfortunately, poverty may also play a role, as many farmers cannot afford to apply chemical fertilizers or pesticides. However, from time to time the quality and quantity of the coffee export shows improvement dramatically through area expansion, productive improvement and further processing.

b. Pulses and oilseeds

Ethiopia after decades of socioeconomic and political reformations has become exemplary in terms of sustainable development and economic growth in Africa. The nation is now among the fastest growing non-oil dependent economies in the continent. This is because of untapped and immense investment opportunities in the areas of agriculture with favorable climate, which is

suitable for the production of varieties of pulses and oil seeds, compounded with considerable quality products that would meet the standards of international market. Pluses and oilseed are the second export commodities in the country. In the year 2006/07 the country have gain 188 million USD from this product. More than fifty-five countries around the world are the destinations where pulses and oil seeds are exported to earn foreign currency. However, still the production and export of these agricultural commodities are very few compare with the country's capacity production. But the country is trying to establish an effective marketing system and agricultural development strategy that increase land and labor productivity as well as commercialization of small holder farmers (Gezahegn, 2012).

c. Livestock and livestock product

Ethiopia is the home to one of the largest livestock populations in Africa and has the largest livestock population. According to the government statistics, there are approximately 50 million cattle, 50 million goats and sheep, plus an assortment of horses, donkeys, camels and chickens. Currently the government intends to transform this sector and increases production and exports of meat in order to generate foreign exchange. Different reports showed that the country has a capacity of exporting from 10 to 18 million pieces of hides and skin per year from abundant resource of livestock. In the year 2007, there were 19 tanneries company in the country. Those company primaries targets are to change direct livestock product to semi-processed product for export availability.

2.1.4 Exchange rate volatility and trade

An exchange rate is the price of one nation's currency in terms of another nation's currency. Changes in exchange rates are given various names depending on the kind of exchange rate regime prevailing. Under the floating rate system, a fall in the market price (the exchange rate value) of a currency is called a depreciation or devaluation of that currency; while a rise is called an appreciation or revaluation (Borena, 2013).

According to the report by Dominic (2007), there was no serious argument on the possible effects of devaluation on export trade and on economic growth of a country as a whole until the late 1970s. The dominant view up to that period was the orthodox view which implies devaluation would improve trade balance, alleviate balance of payment difficulties and

accordingly expand output and employment opportunity. The justification behind these positive effects is that devaluation switches demand from imports to domestically produced goods by increasing the relative prices of imports, and makes export industries more competitive in international markets by stimulating domestic production of tradable goods and encouraging domestic industries to use more domestic inputs which are easily available in low price.

Musonda (2008) suggested that the effects of exchange rate volatility can be analyzed in terms of risk or uncertainty. Exporters are either risk averse or less risk averse and this would determine their reaction to exchange rate volatility. Also Chege*et al* (2014) tried to examine and report that the effect of exchange rate volatility on exports can be explained by two schools of thought, namely; the traditional and risk portfolio paradigms. The traditional school of thought is based on theoretical studies by, and Hooper and Kohlhagen (1978). It assumes that higher volatility increases risk and therefore depresses trade. It states that higher exchange rate volatility increases risk and thus dampens trade while the risk portfolio school holds that higher risk of exchange rate volatility presents greater opportunities for profit and thus promotes trade. Traditional school of thought, argued that exchange rate depreciation would promote trade balance, alleviate balance of payments difficulties and accordingly expand output and employment provided the Marshall-Lerner conditions are met (Marshall-Lerner condition states that depreciation would lead to expansion in output if the sum of price elasticity of demand for export and the price elasticity of demand for imports is greater than unity). The mechanism behind these positive effects, according to Taye (1999) is that devaluation switches demand from imports to domestically produced goods by increasing the relative prices of imports and making export industries more competitive in international markets thus stimulating domestic production of tradable goods and inducing domestic industries to use more domestic inputs. In addition, the uncertainty of returns would result in the risk averse and risk neutral producers reallocating resources from the high risk foreign markets to the lower risk domestic markets effectively lowering international trade (Oyovwi, 2012).

On the other hand, based on studies by Broll and Eckwert (1999), Dellas and Zilberfarb (1993) and De Grauwe (1988), the risk-portfolio school asserts that higher risk presents greater opportunity for profit and increases trade. The risk-portfolio claims that the traditional school is unrealistic. The main objection against the traditional school by the risk-portfolio theorists is that

it does not properly model how firms manage risk. The theory postulates that the result of an increase in the exchange rate volatility depends on the convexity of the utility function, which in turn depends on the level of risk aversion. For the highly risk-averse, a rise in exchange rate volatility leads to an increase in the utility of export revenue and encourages exporters to export more to avoid the risk of a decline in their revenues. Exports of agricultural products have played a vital role in economic growth of many developing countries. However the structural adjustment programmes of 1980's disrupted the positive trend of foreign exchange earnings derived from these potential crops (Nzioki, 2002).

A discrete official reduction in the fixed value of a currency is referred as devaluation. Devaluation as a policy instrument is relevant especially in the context of misalignment. A variety of reasons could lead to price misalignments in LDCs: government policies of high tariffs on imports; taxes on exports; overvaluation of the currency associated with import substitution for industrialization as opposed to export promotion policies and restrictions on commodity as well as capital flows. Thus domestic prices deviate from world prices. Devaluation might play a key role in eliminating the market distortions and correcting the price misalignment. However, since economic growth is indispensable, the question of whether or not there is a trade-off between output growth and devaluation becomes a critical issue (Abule and Abdi, 2012).

Since October 1992, Ethiopian birr was continuously devalued from 2.07 Birr/USD to 13.4 Birr/USD in 2010. The first historical devaluation was about 242% (from 2.07Birr/USD to 5birr/USD). This continuous devaluation leads to high variability in exchange rate over time. This variability of exchange rate over time has its own implication on export over all competitiveness of the country (Abule, 2012).

According to Manzur et al. (1992), real exchange rate volatility influences profitability, rents and the purchasing power to a large extent. However, the export volume has stayed almost at the same level while the exchange rate volatility has increased by a large amount. Hence, the larger part of these transfers is made between one agent to another and one should be indifferent to such transfers. Also it is found that exchange rate uncertainty influences only the degree of forward cover and not the amount of international trade when a firm knows how their revenue will be influenced by future exchange rate. However, uncertainty towards how the firm's revenue depends on future exchange rate will make the level of trade sensitive to exchange rate

volatility and will reduce the level of trade and increase the terms of the trade-off of expected profit for a reduction in risk.

Broll, 1994 tried to come with the negative Effects of Exchange Rate Volatility on Exports as international firms are of great importance in the world economy; they have an important role as importers and exporters and are involved in international capital flows. But the profit for a firm that arises from international trade and foreign direct investment (FDI) in the future becomes uncertain by exchange rate volatility. Hence, the volatility in exchange rate has a negative effect upon world trade, since it increases the risk involved in international trade. Bringing a change in the amount received in terms of the domestic currency, or changes in the prices of the commodity exported in terms of the domestic currency will affect the volume of trade which results in lower profit for the exporting firm. When including both the import demand and the export supply of the market, the risk from exchange rate volatility can either be put on the importing firm or on the exporting firm (Hooper and Kohlhagen, 1978).An exporter that is facing uncertainty in a market can eliminate this risk completely if there is an unbiased future market, or another financial asset, that is perfectly correlated to the spot price of the underlying asset. A problem arises since not all currencies or commodities are traded in futures markets. Even if there does not exist any financial asset that is perfectly correlated, the firm can reduce the risk if there is a financial asset that is highly correlated to the foreign exchange rate.

On the other hand, Asmerom (1999) states that exchange rate volatility can positively affect the value of exporting firms through the price and volume impacts of exchange rates. It can also create more incentive for the exporting strategy. This may occur because the comparative advantages a firm can gain from exports become relatively more attractive when exchange rates become more volatile. Thus, investment in export production capacity could be a positive function of exchange rate volatility. For firms that experiences comparative disadvantage in international trade, the exchange rate volatility increases the value of the export strategy and the value of exporting. The value of the export strategy and the value of exporting increase due to the fact that the expected cash flows from exporting grow faster than the associated entry and exit costs.

2.1.5 Exchange rate volatility and coffee export

Coffee is one of the most important traded commodities in the world which generates high export earnings. The sector's trade structure and performance have large development and poverty implications, given the high concentration of production by smallholders in poor developing countries. Coffee's global value chains are quickly transforming because of shifts in demands and an increasing emphasis on product differentiation in importing countries.

Ethiopia also stands in respect not only as the origin of *Coffee Arabica*, an important producer and exporter, but it is also the highest consumer of the crop in Africa (Hailemichael, 2014). By virtue of the importance of the crop in diets and culture of the populace, contribution to poverty reduction and importance in earning of foreign exchange, several policy measures under different regimes have been devised and implemented towards developing the subsector. Each of such measures has contributed in part to the dramatic changes undergone by the coffee subsector over the past five decades. Adverse influences from past policy measures and changes in global and local prices of coffee have over the past years hindered achievement of most poverty reduction and subsector development goals, and worsened conditions of most producers, default in payment of loans, drifting of farmers from coffee production, and increasing unemployment among others (Boansi and Crentsil, 2013).

The performance of the Ethiopia's exports highly dependent on its exchange rate regime and more specifically the real exchange rate. Various studies conducted by different groups have shown that the demand for the county's exports increase when its export prices fall in relations to the world prices. The depreciations of the country's currency compared to other currencies particularly, the dollars makes its exports cheaper on the international market (Nega, 2013).

Although the coffee export in Ethiopia has taken the biggest share compare with other commodities, the share of the country supplies to world market is very few compare with the world top coffee exporter countries, such as Colombia, Brazil and Vietnam. Coffee export reached high around 199,446 metric ton and the country share of trade to world market was 0.01 in the year 2009 (Gezahegn, 2012).

The Ethiopian economy which is based on a griculture, is highly dependent on coffee. Thus, coffee plays a big role around 60 per cent of the country's foreign exchange earnings. No other

product item in Ethiopia has earned as much. Coffee cultivation is labor intensive and also provides much employment in rural areas and is the means of livelihood for over 15 million people in Ethiopia. Thus, as well as being an important export, coffee plays a vital role in both cultural and socio-economic life of the country. Though coffee has been the dominant agricultural export of the country, its share to the total export basket of the country is being decreasing (NBE, 2010).

There have been significant domestic policy reforms in the last decade that affected the structure and performance of the coffee export sector in Ethiopia. First, from December 2008 onwards it became mandatory for private traders to sell their coffee through the Ethiopian Commodity Exchange (ECX), a new modern commodity exchange. ECX trades standard coffee contracts, based on a warehouse receipt system, with standard parameters for coffee grades, transaction size, payment, and delivery (Minten, 2014).

2.1.6 Growth Domestic Product and export

The theoretical foundations have been analyzed by different authors where sanjuan-Lopez and Dawson (2010) argues that the export led growth hypothesis dominates the export income. Firstly according to Keynesian short run arguments, export growth leads to income growth via the foreign trade multiplier. Secondly foreign exchange earned from the export sector can bolster the import of manufactured, capital and technology inputs which ultimately leads to income growth. Thirdly; following Endogenous Growth Theory, the export sector creates positive externalities such as more efficient production methods which lead to growth. Later Solow type growth equations were used to support the export lead growth hypothesis. An aggregate production function is specified with labor and capital as conventional inputs and exports as an additional 'input' were utilized. Sources-of-growth equations are then derived where income growth is determined by growth rates of both conventional inputs and exports. But there were little efforts made to analyze the impact of agricultural exports on GDP growth or the other way round i.e. does growth in GDP leads to increase in agricultural exports. Levin and Raut (1997) who examined the impact of both manufactured and primary export on GDP growth, found that GDP growth can be increased by manufactured export growth, but not by expanding primary commodity exports.

2.2 Empirical Review

2.2.1 Exchange rate volatility and export

Several empirical studies have investigated the effects of exchange rate volatility on export. Some found a positive significant relationship while others reported the reverse. Another group of studies indicated that the effect of exchange rate variability is ambiguous.

Otieno (2015) in the work "Real Exchange Rate Volatility and Exports in Kenya: 2005- 2012", determined the presence of exchange rate volatility using the GARCH model. Also Bounds testing and Autoregressive Distributed Lag model was used to establish the presence of a long run relationship between exchange rate volatility and commodity exports. Then the findings revealed that exchange rate volatility affected tea and horticulture exports to foreign market. It increases uncertainty of profits on contracts denominated in foreign currency and subsequently dampens trade and economic growth since it is expected that exports react to exchange rate movements based on the characteristics of the importing and exporting countries.

Usman (2008) has done fundamental analysis where the flow of non-oil exports from the Nigerian economy is assumed to be predicated on fundamental variables: the country's exchange rate volatility, the US dollar volatility, and Nigeria's terms of trade (TOT)and index of openness (OPN). Using quarterly observations for twenty years, vector co-integration estimate revealed that the naira (the currency of Nigeria) exchange rate volatility decreased non-oil exports by 3.65% while the same estimate for the US dollar volatility increased export of non-oil in Nigeria by 5.2% in the year 2003. Measures that would promote greater openness of the economy and exchange rate stability in the economy are the proposed recommendations given by the study.

On the other hand, Bouoiyour and Selmi (2013) assessed the link between exchange rate volatility and exports in Egypt by combining wavelet analysis with an optimal GARCH model chosen among various extensions. The findings at the end reveal that the relationship between exchange rate volatility and export is so complex and depends widely to frequency to frequency variation and slightly to leverage effect and to switching regime. Also, it is shown that at the low frequency, the coefficient associated to exchange rate volatility's effect on trade performance is more intense than that at the high frequency.

Umaru *et al.* (2013) have investigated the impact of exchange rate volatility on export in Nigeria by using three models: Ordinary Least Square (OLS); Granger causality test; and ARCH and GARCH techniques. The study showed that exchange rate volatility has a positive impact on export. Therefore, to improve export and to increase foreign exchange earnings, the country should depreciate its currency, thereby reducing the price of its products so as to increase demand, which is changing from import-led to export-led economy. Finally, the study recommends that a stable and sustainable exchange rate policy to promote greater openness. Hence, it is possible to promote export trade.

According to Abule and Abdi (2012), export of oilseeds is found to be a negative function of exchange rate volatility. Therefore the continuous devaluation of Ethiopian birr was not in favor this produce. In addition to this, the theory of deteriorating Terms of Trade (TOT) was proved, implying that in an agrarian economy like Ethiopia, prices of primary agricultural products are bound to stack or decrease after a certain level while price of imports are ever increasing.

Again, the results of the study by Chege*et al* (2014) indicates that exchange rate volatility is one of the variables that influence performance of French beans exports from Kenya to the European Union market with a negative and elastic short run and long run relationship. There is interdependence between exchange rate stability, macroeconomic stability, institutional reforms and export performance and hence policy makers need to consider the existence, degree and likely effects of exchange rate volatility while designing, developing and implementing trade policies.

Rutto and Ondiek (2014) have also investigated the extent to which exchange rate volatility affects performance of tea exports using time series data for the period of 1970-2008 in order to recognize the short run and long run behavior of the variables. Co-integration and error correction technique (ECM) developed by Engle and Granger was used. Dickey fuller (DF) and Augmented Dickey Fuller (ADF) unit root test for stationarity was employed in the study. Central bank of Kenya, Kenya National Bureau of Statistics, Tea Board of Kenya and the International financial statistics of International Monetary Fund (IMF) were the source of data. The findings of this study indicate that exchange rate volatility negatively affects performance of tea exports in the country and finally it recommends periodic monitoring of the exchange rate so

as to reduce its impact and drawing of fiscal and monetary policy that will make exchange rate manageable.

Again, Biruk (2012) attempted to investigate the impact of exchange rate volatility on the agricultural exports of 29 selected Sub Saharan African countries using 13 years data (1996-2008) data. Augmented gravity model is estimated using random effect, system GMM and Arellano bond estimation techniques. The result across all the methods on the impact of exchange rate volatility on agricultural export is found to be negative and significant. The significant negative effect on agricultural exports implies that risk averse exporters will reduce their activities, switch sources of supply and demand or change prices in order to minimize their exposure to the effect of exchange rate risk.

2.2.2 Exchange rate volatility and Ethiopian coffee export

To begin with the history of exchange rate regimes in Ethiopia, the country experienced only two major exchange rate regimes. These are the pre-1992 fixed exchange rate regime where the Ethiopian Birr was pegged to the USD and the post-1992 managed -floating exchange rate regimes. After the birth of IMF and also after the issuance of Ethiopian legal currency, Ethiopia, as one of the founding members, committed itself to the Articles of Agreement of IMF under which each currency assigned a central parity against USD and was allowed to fluctuate by minus or plus 1 percent of this parity. Countries were allowed to devalue or revalue their currencies only in case of 'fundamental disequilibria' (Felleke, 1994).

Ethiopian legal tender currency was issued on 23 July 1945, by defining the monetary unit as the Ethiopian dollar (E$) with a value of 5.52 grains (equivalent to 0.355745 grams) of fine gold and replaced the Maria Theresa which had been circulating as legal tender. The linkage with fine gold was in accord with the monetary system established by the Bretton Woods Agreement of 1944 and it automatically established the exchange rate between the national currency and other currencies with the same arrangement. Accordingly, the official exchange rate of Ethiopian currency with US dollar was created (with the official exchange rate of 2.48 Birr per US dollar) on July 23, 1945. Then after two decades, on January 1, 1964, the Ethiopian Birr was slightly devalued to 2.50 Birr per US dollar. Following the collapse of the Bretton Woods System in 1971 and the floating of dollar and ceasing of its convertibility to gold, the Birr was revalued to

2.30 Birr per US dollar (i.e. by 8.75%) on 21 December1971. The subsequent 10% devaluation of the US dollar had temporarily brought about under valuation of the Birr. To realign the Ethiopian Birr, it was again revalued to 2.07 Birr per US dollar in February, 1973. This fixed official exchange rate was left unaltered for two decades despite the floating of the major world currencies including the US dollar (Derrese, 2001).

According to Haile and Asmerom (1994), as a result of fixation of exchange rate, Ethiopian Birr became over-valued in terms of the US dollar as well as many other foreign currencies. This overvaluation had adverse effect on national economy such as misallocation of resources, loss of international competitiveness, development of illicit parallel market for foreign exchange and illicit cross border trade. Due to these facts, the massive devaluation of 1992 took place. Following this devaluation, in an attempt to liberalize foreign exchange market, the National Bank has taken a number of initiatives. Accordingly, the fortnightly auction market for foreign exchange was introduced on May 1, 1993 with two rates, namely the Dutch auction system (official rate) and marginal pricing auction system (marginal rate). These two rates were unified in July 1995. In August 1996, the fortnightly auction market was changed to weekly to accommodate the growing demand for foreign exchange and commercial banks were allowed to also established foreign exchange Bureaus. In September1998, the retail auction system was replaced by wholesale system. In the same year, the inter- bank foreign exchange market was introduced and worked alongside the auction system until October 25,2001 when the daily inter-bank has fully replaced wholesale auction system (Deresse, 2001). In the present day, the official exchange rate is determined in the daily inter-bank foreign exchange market as the weighted average exchange rate prevailing on the preceding day.

According to the report by Zelalem (2011), exchange rate volatility is one of many factors that influence coffee supply in Ethiopia. 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 and this devaluation enhances export and increased the demand for domestically produced exportable goods among which the main one is coffee. It 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 and improves the competitiveness of the country.

The research conducted by Abule (2012), to find out the effect of exchange rate variability and its components on three important primary agricultural exports of Ethiopia; namely: coffee, oilseeds and flower has employed time series data (1992-2010) collected from the country's different institutions. Different tools of descriptive statistics were used to analyze the data and understand the dynamics of the variables included in the analysis. Autoregressive Distributive Lag (ARDL) model augmented by the Wald test for joint effect of variables was used and the result revealed that export of coffee and oilseeds have negative relationship with exchange rate variability and none for export of flower. Gross Domestic Product (GDP) is found to be insignificant but negative for coffee and oilseeds, implying the change in export of these items are decreasing over time.

As discussed by Abule (2012), exchange rate volatility was found to be negatively and significantly affecting coffee export. The competitiveness index, Real Effective Exchange Rate (REER) was found to be positive and significant for coffee, implying that continuous devaluation had improved competitiveness of the country by lowering price of coffee to the outside market.

The study by Kebede (2011) to examine whether Ethiopia's exports are determined by movements in real exchange rate, took the aggregate export and the exports of two main subsectors; namely, Coffee and Oilseeds into consideration using bilateral exports to seventeen major trading partners over the period 2000-2009. Accordingly, a dynamic panel data gravity model that takes into account the persistent nature of trade is estimated using the system GMM estimator. The findings of the study show that both lagged and current real exchange rates are not in a position to exert significant effect on the bilateral exports of the country.

2.3 Measuring Exchange Rate Volatility

Even though there is no common approach, different literatures have reported that a variety of measures for exchange rate volatility have been used following the inception of studies on exchange rate uncertainty and trade volumes. A majority of the measures used are some variant of the standard deviation of exchange rate (Kandilov, 2008).These include the standard deviation of percentage change in exchange rates and the standard deviation of the first difference in the logarithmic exchange rate. On the other hand, in 1986, Bollerslev, for the first time, proposed the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) method to be used as a

method of determining volatility in exchange rate or inflation rate. The type of method to be used to measure exchange rate volatility may depend on the scope of analysis, the time period over which variability is to be measured, as well as whether it is the unexpected movement in the exchange rate parallel to its predicted value needs to be taken into consideration. Again, in deciding the appropriate way of measuring the exchange rate volatility, the level of aggregate trade flows would be largely acknowledged.

The standard deviation of the first difference of logarithms of the exchange rate is the most extensively used in measuring exchange rate volatility (Tenreyro, 2003). If the exchange rate is on a consistent trend, which apparently could be forecasted and consequently would not be a source of uncertainty, the measure as the ability that it will equal zero. The standard deviation is calculated over a period of one year to indicate a short-run volatility and in acquiring long-term variability, a period of five years is used.

On the other side, GARCH approach of determining exchange rate volatility is based upon conditioning the variance by allowing changing over time based on past errors. In contrast to conventional time series and econometric models which operate under an assumption of constant variance, this type of model is useful in modeling variability in the exchange rate and inflation. Because the ARCH model of conditional variance encountered the problem of negative variance parameter estimates in empirical applications, extension of the ARCH model including a more flexible lag structure was immediately sought (Kafle, 2011).

CHAPTER THREE: Data and Methodology

3.1 Data source

To analyze the impact of exchange rate volatility on coffee export, the study was rely on secondary data sources. The study was based on a country level macro-data covering the period from 1980 to 2015. The necessary data for the paper was annual time series secondary data obtained from the National Bank of Ethiopia (NBE), Ethiopian Custom Authority (ECA) and Ministry of Finance and Economic Development (MOFED).

3.2 Theoretical Frame Work

The choice of a particular approach or methodology and expected outcomes depend on a particular economy and nature and availability of data. Gala and Claudio (2006) state that two main methods of dealing with exchange rate misalignment are the purchasing power parity (PPP) approach and fundamental analysis. The PPP approach, on one hand, is based on relative prices and considers high international price levels as proxy for exchange rate overvaluation for a given GDP per capita level. Fundamental analysis, on the other hand, considers economic fundamentals in modeling exchange rate misalignment. These include terms of trade (TOT), balance of payments (BOP) financing condition, fiscal policy stance (surplus or deficit spending), degree of openness (OPN), GDP per capita, etc. It has also been established in the literature that a drop in exchange rate volatility can increase the volume of trade in two not mutually exclusive ways – by producing more exports, and by increasing the number of firms that are engaged in exporting. It is this theorization that accounts for a negative volatility-trade link, Baldwin, Skudelny and Taglioni (2005). By this, the transmission mechanism through which exchange rate volatility affects coffee export in Ethiopia could be from the supply channel. The supply side effects are related to the fact that exchange rate volatility could affect input prices. This induces some producers to lower output and in the face of volatile exchange rate, makes the exports less competitive. Exchange rate volatility could also affect consumer confidence in importing countries and thus lowers demand. It also adversely affects investment indirectly by increasing producers' cost. Against this, this paper seeks to assess the link between exchange rate and export trade performance in Ethiopia. By this change in both structure and volume of Ethiopian's export as a result of the devaluation of currency. All these will leads to the

model which can capture the factors that related to export supply of the country. The model can be presented as follows:

$XC_t = (GDP, REER, TOT, RIR, TOP, EV) + \varepsilon$ …….. (1)

Where, XC_t= Coffee export supply at time t

GDP = Gross domestic product

REER = Real effective exchange rate

TOT = Term of trade

RIR = Real interest rate

TOP = Trade openness

EV = Exchange rate volatility

ε = Error term

3.3 Definition of basic Variables

a) **Gross Domestic Product (GDP):** is gross domestic product of the country. It is the value of goods and services produced in the country in one fiscal year. A higher GDP implies a higher production and hence larger volume of exports. GDP was expected to have a positive relationship with coffee export. However, use of GDP is limited by the fact that some components of it (non-tradable) do not directly influence coffee export volumes.

b) **Real Effective Exchange Rate (REER):** measures of the competitiveness of one country's export sector in relation to the rest of the world. It is important to construct the real effective exchange rate index (REER), which is the measure of the price of the country's goods relative to the price of its trading partner countries, both expressed in domestic currency. When the value of REER falls either because of a decrease in exchange rate or a decline in the inflation differential or both, show real depreciation of the exchange rate and thus enhanced competitiveness of the country's goods in relation to

foreign goods. On the other hand, an increase in REER represents a real appreciation implying declining competitiveness of the home economy. The REER is measured by:

$$REER = NEER*WPI_w/CPI_D$$

Where

NEER = the nominal exchange rate.

WPIW: Trade-weighted wholesale (producer) price index of trading partners, and

CPID: Domestic Ethiopian consumer price index

Real effective exchange rate depreciation leads to increase in real exports, so the expected relationship between REER &X_t is positive.

c) **Term of Trade (TOT):** is a ratio of volume of export of commodity*i* to the volume of import of commodity *j*. It is one of the determinants of export performance in both developing and developed countries. Favorable terms of trade are associated with increased export growth rate and unfavorable with low export growth rates. It is calculated as:

$$TOT: = \frac{\sum Pi*Exi}{\sum Ej*EMj}$$

Where: *Exi*is volume of export of commodity *i*and,

*EMj*is volume of import of commodity *j*

d) **Trade openness (TOP):** is implies considerable reduction in tariff and non-tariff barriers, so as to establish a noticeable open market. Because opening economic policies to trade with the rest of the world is needed for export and economic growth. It is measured as the sum of total trade, imports and exports divided by gross domestic product. When an increase in openness is assumed to be arising from a decline in tariff rates, leading to a fall in the domestic prices of importable. This will lead to high demand of foreign currency (to take advantage of cheap imports), and less demand for domestic currency. Hence this is expected to lessen exchange rate volatility, increase competitiveness and promote more exports. As a result, the openness variable is expected to carry a positive sign.

e) **Real Interest Rate (RIR):** it represents the cost of borrowing. It is important since export of coffee requires a lot of money which an average citizen cannot manage with own savings without borrowing and insurance. The RIR is calculated as follows:

RIR= NIR - INF

Where, NIR = Nominal Interest rate
INF = Inflation rate

RIR = Real Interest rate

It was expected to have a negative relationship with coffee export volumes/quantity, because a rise in RIR leads to decline in coffee export credit.

f) **Exchange rate volatility (EV):** is a measure that intends to capture the uncertainty faced by both exporters and importers due to unpredictable fluctuations in the exchange rate. And also an index used to measure the movement of exchange rate based on the competitive potential of the country. While a variety of exchange rate volatility measures have been used, there is still no consensus on which measure is most appropriate (Clark, Tamirisa, and Wei 2004). The disagreement is partly due to there being no generally accepted theory of the impact of exchange rate volatility on firm behavior. Additionally, what type of volatility measure is used depends on a number of other factors such as the level of aggregation of the trade flows (bilateral vs. multilateral), and the time horizon (short-run vs. long-run). Although there exist numerous measures for exchange rate risks, the present study applies standard deviation approach to measure exchange rate volatility. Most previous empirical studies have measured exchange rate uncertainty using the sample standard deviation method. In this approach, exchange rate volatility is measured by computing the annual standard deviation of quarterly real exchange rate. Annually real exchange rate volatility EV is defined as the natural logarithm of the standard deviation of quarterly real exchange rates within one year. Mathematically, it is calculated as follows:

$$EV = \text{Log}\left[\sqrt{\frac{1}{n-1}\sum_{k=1}^{n}(REER_{ik} - \overline{REER_i})^2}\right]$$

Where EV is exchange rate volatility

$REER_{ik}$ is the quarterly real exchange rate of country *i*in normal scale,

$\overline{REER}_i$ is the yearly average of quarterly real exchange rates in normal scale a

k is the index of the quarter in a year, on which exchange rate data are available

3.4 Model specification

The Autoregressive Distributed Lag (ARDL) model is increasingly becoming popular as a means of testing for the presence of a long run relationship between exchange rate volatility and exports. The Johansen co-integration technique is still being used, the only challenge being that it can only be applied when all the variables are integrated of the same order. The ARDL model is applicable whether the variables are I (0) or I (1).

In addition to this, ARDL Model is found to be an appropriate model since it is very important method to estimate the influence of continuous devaluation on export supply (Abule, 2012) and Bahmani-Oskooee (2003) also recommended that future studies of the effects of exchange rate volatility on trade flows should rely on the ARDL method.

As a result, for this study ARDL model was used to test for a long run relationship between variables that are not necessarily integrated of the same order. In addition to this, export supply model is used to assess the effect of exchange rate volatility on coffee export, where the volume of coffee exports is the dependent variable and exchange rate volatility, term of trade, real effective exchange rate, gross domestic product, real interest rate and trade openness are independent variable.

The corresponding structural Coffee export supply model was given as follows:

$XC_t = \alpha_0 + \alpha 1\ GDP_t + \alpha 2\ REER_t + \alpha 3\ TOT_t + \alpha 4\ RIR_t + \alpha 5\ TOP_t + \alpha 6\ EV_t + \varepsilon_t$…… (2)

α_0, is the intercept

α's are parameters

εt is Random error term

GDP_t , $REER_t$, TOT_t, RIR_t, TOP_t and EV_t are the variables defined in above

For econometric analysis, equation 2 was changed in to log form to generate equation 3. The log transformation here helps in reducing heteroskedasticity. However, RIR was not log transformed because it contains negative values, yet log of negative numbers leads to missing data generated. The transformed equation is written as follows:

$$\ln XC_t = \alpha_0 + \alpha_1 \ln GDP_t + \alpha_2 \ln REER_t + \alpha_3 \ln TOT_t + \alpha_4 RIR_t + \alpha_5 \ln TOP_t + \alpha_6 \ln EV_t + \varepsilon_t \quad \ldots\ldots (3)$$

3.5 Data Analysis and Estimation Procedure

This study employed both descriptive and quantitative analysis. For instance, graphs and tables were presented to aid in the descriptive analysis. The unit root test was used to test the data series for stationarity or the order of integration in order to avoid spurious regression results. Furthermore, to obtain both the short and long run parameters of the main variables involved in the study, it adopted the Autoregressive Distributed Lag (ARDL) econometric methodology.

In this study, the estimation procedure is structured into three phases. The first phase investigated the time series properties of the data by using the Augmented Dickey–Fuller (ADF) and the Phillip-Perron (PP) tests. The unit root test was used to check the stationarity properties of the data. The second procedure is concerned with the model estimation to test for short-run and long-run relationships among the variables using Autoregressive Distributed Lag (ARDL) approach. The final phase involves some diagnostic tests to ascertain the robustness of the model used for estimation.

It has been established empirically by various literature that most time series variables are not stationary, hence the need to establish stationarity before using them in a model to avoid spurious regression and to also make precise prediction. A non-stationary variable can be made stationary if differenced appropriately. The appropriate number of differencing is called the order of integration. Hence, if a time-series, for example X, becomes stationary after being differenced *y* times, X is said to be integrated of order *y*, denoted by X~I (y). Therefore, to know the stationarity condition of the time series data the Augmented Dickey-Fuller and Philips Perron (PP) tests were used. The essence of conducting two distinct stationarity tests is to be sure that series enter model to be estimated in non-explosive form and mainly to address the issue of tests with low power. The null hypothesis to be tested is that the variable under investigation “has a unit root” against the stationarity alternative hypothesis the variable to be tested “has no unit

root". In each case, for both the ADF and Phillip-Perron test the lag-length is chosen using the Swartz Information Criterion (SIC). The sensitivity of ADF tests to lag selection renders the Phillips-Perron test an essential additional tool for making inferences about unit roots.

3.6 ARDL Procedure and Bounds Testing

The autoregressive distributed lag model refers to a mathematical expression where the dependent variable y is partly explained by lagged values of itself, current and successive lags of the explanatory variables. This approach has been widely used following findings by Pesaran and pesaran (1999) that it was applicable whether variables were I(0) or I(1). The first step involves ascertaining that there are no I(2)variables in the model. This is followed by conducting bounds tests for the null hypothesis of no co-integration. To achieve this, the calculated F statistic is compared to the tabulated value developed by Pesaran et al (2001). For a given number of variables, lower bounds and upper bounds are provided on the critical values. If the computed F statistic falls below the lower bound it is concluded that there is no co-integration, if it falls above the upper bound, it is concluded that there is co-integration. In the event that the computed F statistic falls between the upper and lower bounds, the test is rendered inconclusive (Pesaran *et al*, 2001).

According to Pesaran and Pesaran (1999), the ARDL approach requires two steps. The first step is to determine the existence of any long-term relationship among the variables of interest using an F-test. The other is to estimate the coefficients of the long-run relationship and determine their values, followed by the estimation of the short-run parameters of the variables with the error correction representation of the ARDL model. The ECM version of ARDL, also help in determining the speed of adjustment to equilibrium.

The general conditional ARDL modeling specifications for equation (3) is given by:

$$\Delta \ln XC_t = \psi_0 + \alpha_1 \ln XC_{t-1} + \alpha_2 \ln REER_{t-1} + \alpha_3 \ln TOT_{t-1} + \alpha_4 RIR_{t-1} + \alpha_5 \ln TOP_{t-1} + \alpha 6 \ln EV_{t-1}$$

$$+\alpha_7 \ln GDP_{t-1} + \beta_{1i} \sum_{i=1}^{n} \ln XC_{t-1} + \beta_{2i} \sum_{i=1}^{n} \ln REER_{t-1} + \beta_{3i} \sum_{i=1}^{n} \ln TOT_{t-1} + \beta_{4i} \sum_{i=1}^{n} RIR_{t-1}$$

$$+\beta_{5i} \sum_{i=1}^{n} \ln TOP_{t-1} + \beta_{6i} \sum_{i=1}^{n} \ln EV_{t-1} + \beta_{7i} \sum_{i=1}^{n} \ln GDP_{t-1} + \mu_t \ldots\ldots\ldots\ldots (4)$$

Where Δ is the first difference operator, the parameters α_i denote the long run parameters and βj_i are the short-run parameters of the model to be estimated through the error correction framework in the ARDL model, ψ_0 is the constant term while μ_t is a white noise error term.

Given that the asymptotic distribution of F-statistic is non-standard without considering the independent variables being *I*(0) or *I* (1), Pesaran et al. (2001) generated and presented the appropriate critical values according to the number of independent variables in the model of presence or absence of constant term in the model. Therefore, the calculated F-statistic is compared with two sets of critical values developed on the basis that the independent variables are *I*(d) (where $(0 \leq d \leq 1)$. The lower critical bound assumes that all variables are *I*(0) whereas the upper critical bound assumes the variables are *I*(1). If the calculated F-statistic exceeds the upper critical value, then null hypothesis of no co-integration is rejected in favor of whether the variable are *I*(0) or *I*(1). This implies that there is a long run relationship among the variables. Conversely, if the F-statistic falls below the lower bound then the null hypothesis of no co-integration cannot be rejected. If the F-statistic lies within the lower critical and upper critical bounds, the test is inconclusive (Pesaran & Pesaran, 1999) However, when all the variables are integrated of order zero, I(0), then the null hypothesis of no co-integration is rejected implying that there exist long-run relationship among the variables, otherwise they are not co-integrated.

3.7 Long run and short run relationship

To obtain the long run coefficients, the model is specified as.

$$\ln XC = \psi_0 + \sum_{i=1}^{n} \alpha 1 \ln XC_{t-1} + XC_{t-1} + \sum_{i=0}^{m1} \alpha 2 \ln REER_{t-1} + \sum_{i=0}^{m2} \alpha 3 \ln TOT_{t-1} + \sum_{i=0}^{m3} \alpha 4 RIR_{t-1}$$

$$+ \sum_{i=0}^{m4} \alpha 5 \ln TOP_{t-1} + \sum_{i=0}^{m5} \alpha 6 \ln EV_{t-1} + \sum_{i=0}^{m6} \alpha 7 \ln GDP_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots (5)$$

To obtain the short-run parameters of the variables when there exist long run relationship among the variables, then the unrestricted ARDL error correction representation with the error correction representation is estimated as:

$$\ln XC = \psi_0 + \beta_{1i} \sum_{i=1}^{n} \ln XC_{t-1} + \beta_{2i} \sum_{i=1}^{m1} \ln REER_{t-1} + \beta_{3i} \sum_{i=1}^{m2} \ln TOT_{t-1} + \beta_{4i} \sum_{i=1}^{m3} RIR_{t-1}$$

$$+ \beta_{5i} \sum_{i=1}^{m4} \ln TOP_{t-1} + \beta_{6i} \sum_{i=1}^{m5} \ln EV_{t-1} + \beta_{7i} \sum_{i=1}^{m6} \ln GDP_{t-1} + \lambda ECT_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots..(6)$$

Where: $\beta_{1i,}$ $\beta_{2i,}$ $\beta_{3i,}$ $\beta_{4i,}$ $\beta_{5i,}$ β_{6i} and β_{7i} $_5$are the coefficients of the short-run dynamics, while ψ_0 is constant. λ is the speed of adjustment to long-run equilibrium following a shock to the system and ECT_{t-1} is the error-correction term. When variables are co-integrated, their dynamic relationship can be specified by an error correction representation in which an error correction term (ECT) computed from the long-run equation must be incorporated in order to capture both the short-run and long-run relationships (Engle and Granger, 1987). ECT tells us how much time

it takes to adjust this short run shocks. So that, the residual of the long run model can be treated as the equilibrium residual and it can be used to connect the short run behavior the model‘s dependent variables to its long run value. It is important because it conveys information for the speed of adjustment from short run disturbance to long run equilibrium. It is expected to be statistically significant with a negative sign which implies that any disturbance that occurs in the short-run model will be corrected in the long-run. The larger the coefficients of the error correction term in absolute terms, the faster the convergence to equilibrium.

Finally to ensure the goodness of fit of model, the diagnostic and stability or cumulative (CUSUM) and cumulative sum of squares (CUSUMSQ) tests must be conducted. This test examines the serial correlation, functional form, normality and heteroscedasticity associated with the selected model. The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the breaks points. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bounds of five percent level of significance, the null hypothesis of stable coefficients in the given regression is accepted.

CHAPTER FOUR: Result and Discussions

4.1 Trend analysis of some independent variables

The figures in this section show the trend of the Real Gross Domestic Product (GDP) and exchange rate volatility in Ethiopia over the study period from 1980-2015.

4.1.1 Gross Domestic Product (GDP)

GDP is defined as the measures of national income and output for a given country's economy which is equal to the total expenditures for all final goods and services produced within the country in a stipulated period of time.

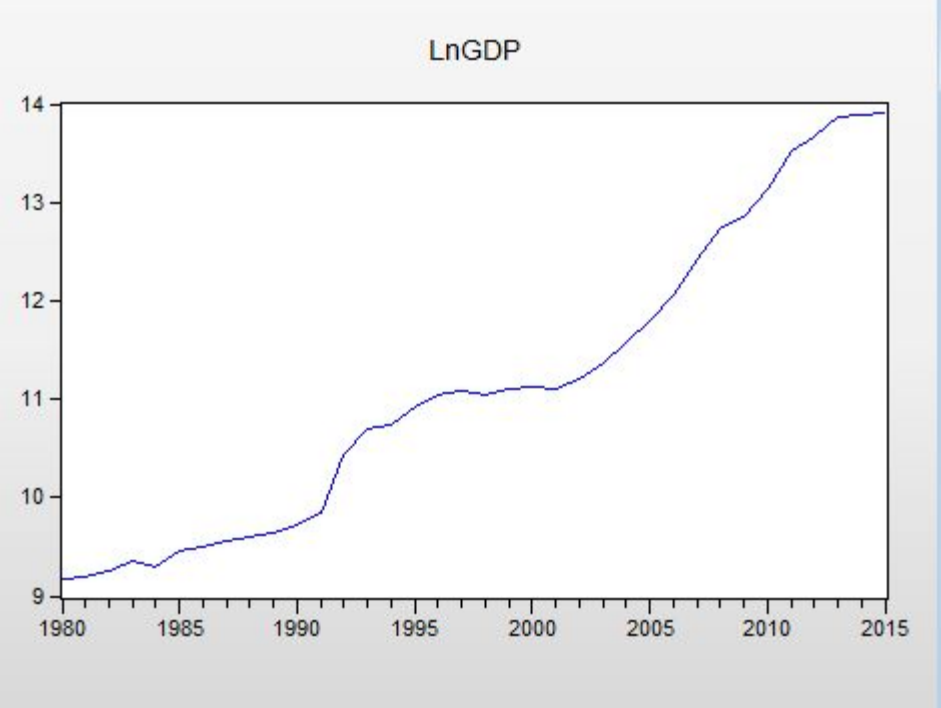

Figure 4.1: Gross Domestic Product (GDP) from 1980-2015

Source: Researcher's own construct using E-view 9

Immediately after Emperor Haile Selassie was overthrown; in September 1974, a Military Committee (known as Derg) was established and the regime installed a command economic system where market system was deliberately repressed and socialization of the production and distribution process followed. This led Ethiopia into the Socialism system. The Derg did not give any opening for privatization to domestic and foreign investors which were the big cause for small increase in total GDP of the country until 1990 as shown in the above figure 4.1. This

means, the policy by the regime made the gap between domestic investments and saving remained wide in the period.

On the other hand, investment and other economy related policy review in Ethiopia by EPRDF government results in a rapid increase in the total GDP as shown in the figure above. Agricultural and manufacturing sectors became strong and the economy began to recover and the growth rate increased because of different measures taken by the regime that favor GDP growth in the country's economy.

4.1.2 Exchange rate volatility

Ethiopian government have been devaluing the currency, which were expected to improve the competiveness of the country thereby stimulate export and substitute some of the imported commodities by switching expenditure from expensive imported goods to relatively domestic products.

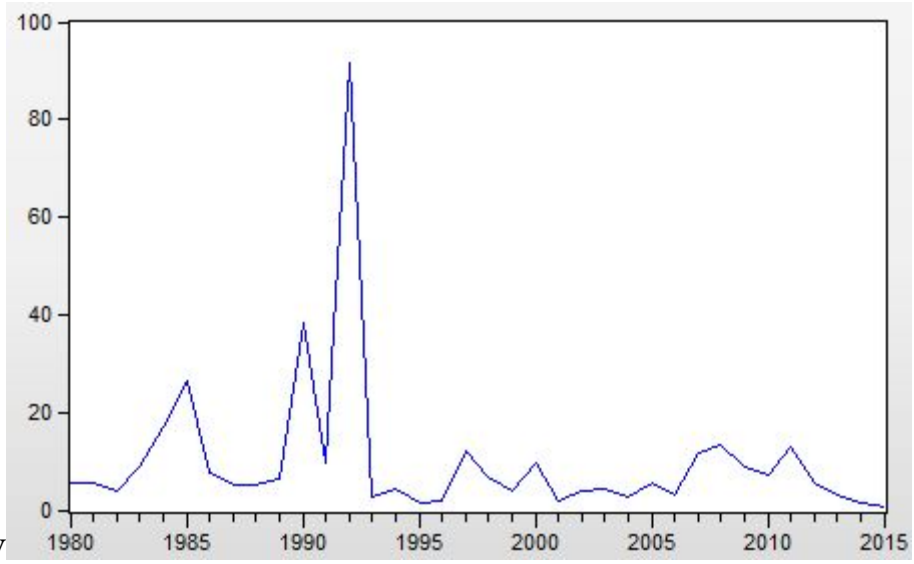

Figure 4.2: Exchange rate volatility (EV) from 1980-2015

Source: Researcher's own construct using E-view 9

As shown Figure 4.2 the exchange rate had several peak points in the beginning until around 1994 and a few hikes the next period under consideration. The real exchange rates experienced a much more volatile period from 1982 to 1993. The exchange rate then was relatively stable until 2015. The trend portrays a period of relative stability between 1994 and 2015. From the figure

above, there was a sharp rise in volatility in 1992 which was caused by the measures taken by the rest of the world including USA to moderate the value of their currencies in terms of another currency according to the world market and world economy. This leads the Ethiopian Birr to be overvalued for two decades and let the nation lose the competition over the world market for Ethiopia made exported goods (Medina, 2015). When the Ethiopian People's Revolutionary Democratic Front (EPRDF) became the government of Ethiopia, it was already realized that pegging the exchange rate has had adverse effects on the economy and the domestic currency need to be devaluated. As a result, the national bank of Ethiopia devaluated the currency very highly since 1992. Overall, the exchange rate volatility was lower during the period of exchange rate liberalization from 1993 to 2015 compared to the period before the exchange rate liberalization from 1990 to 1993.

4.2 Lag Order Selection Criteria

The lag order selection criteria were adopted to obtain optimal lag length for the model. Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC) and the Hennan-Quinn Information Criterion (HQIC) are the most method. Table 4.4 shows the results of the lag length for the different information criteria used. From this the optimal lag length for the Autoregressive distributed Lag Model (ARDL) model is one. The reason is all the information criteria chose 1 as the optimal lag length since it gave the minimum value for each of the evaluated information criterion in AIC, SIC and HQIC.

Table 4.2: Optimal lag length

Lag	Log	AIC	SIC	HQIC
0	-1.99663	0.515159	0.870667	0.637880
1	10.62699	0.078458*	0.611720*	0.262540*
2	13.07997	0.112943	0.786337	0.342590

Note: * indicates the lag length selected by the criterion

AIC: Akaike Information Criterion
SIC: Schwarz Information Criterion
HQIC: Hennan-Quinn Information Criterion

Source: Author's Computations

4.3 Unit Root Test

Even if the ARDL model does not require the pretesting of the variables for unit roots, it is however vital to perform this test to verify that the variables are not integrated of an order higher than one. The aim is to ascertain the absence or otherwise of $I(2)$ variables to make the result free from spurious regression. So before applying the Autoregressive Distributed Lags approach, unit root test was conducted in order to investigate the stationarity properties of the data. As a result, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to all variables in levels and in first difference in order to establish their order of integration. The tests were applied to each variable over the period of 1980-2015 at the variables level and at their first difference. The study used the p-values to make the unit root decision to rejection or acceptance of the null hypothesis that the series contain unit root which arrived at similar conclusion with the critical values. The rejection of the null hypothesis for the test is based on the MacKinnon (1991) critical values as well as the probability values.

The null hypothesis of non-stationaity or unit root was accepted if the absolute values of the computed ADF and PP statistics exceed the absolute critical values at 5 percent level of significance. The result of unit root is presented in table 4.3 below as follows:

Table 4.3: Result from unit root test

Variable	Variable in Level		Variable in 1th difference		Order of Integration
	ADF	PP	ADF	PP	**I**(1)
LXC	-1.392	-1.317	-3.303	-6.501	I(1)
LREER	-1.154	-1.235	-4.751	-4.667	I(1)
LGDP	0.027	0.641	-3.751	-3.719	I(1)
LTOT	-5.203	-5.854	-5.155	-5.118	I(0)
LRIR	-5.157	-5.162	-8.080	-23.268	I(0)
LTO	-0.407	-0.407	-4.286	-4.252	I(1)
LEV	-4.370	-4.355	-9.268	-14.710	I(0)
Critical value at 5%	**-2.951**	**-2.951**	**-2.951**	**-2.951**	

Source: Researcher's computation

In the table 4.3 above, export of coffee, real effective exchange rate, trade openness and gross domestic product are non-stationary at levels but become stationary after the first difference. In other words, each of the four variables is integrated of order I (1). On the other hand, real interest rate, exchange rate volatility and term of trade is stationary in levels or before the first difference. It means that integrated of order I (0).

The computed test statistic for the coffee export was -1.392 in the ADF and -1.317 in PP level series. In the first difference -3.303 ADF and -6.501 in PP, the absolute values of the computed test statistic for the export volume of coffee level series was less than the critical absolute values at 5 percent level of significance in both the ADF and PP test. However, the absolute values of the computed test statistics for the coffee export volumes first difference series were greater than the critical absolute values at 5 percent level of significance in both the ADF and PP tests. The results show the presence of a unit root implying that the coffee export volumes series were non-stationary in their level series. However, the first difference series were stationary, hence it is concluded that the export volumes series was integrated of order one, that is; they were **I (1)**. Similarly, comparisons of the computed and critical values of the ADF and PP test statistics for the real effective exchange rates, gross domestic product and trade openness show that all variables were integrated of order one.

On the other hand the computed test statistic for exchange rate volatility was -4.370 in ADF and -4.355 in PP. In this case the absolute value of the computed test statistic for exchange rate volatility level series was greater than the critical absolute values at 5 percent level of significance in both the ADF and PP test. From this exchange rate volatility is integrated of order zero I(0). Like this real interest rate and term of trade were integrated of order zero.

From the above unit root test results, all variables are integrated of either order zero I(0) or one I(1). Since the test results have confirmed the absence of I(2) variables, therefore ARDL methodology is applicable for the estimation.

4.4 Bounds Test for Co-integration

The existence of long run relationship between dependent and independent variable is tested as a first step of ARDL analysis. From the above lag order selection, the optimal lag length of 1 is used in the bounds test. After the lag length was determined, the F-test statistic computed within the bounds test framework is compared with the upper and lower critical values. The results of the bound test procedure for co-integration analysis between export of coffee and its independent variable are presented in Table 4.4.

Table 4.4: Bound test result

F-Statistics	Significance	Lower bound	Upper bound
4.42	1%	3.15	4.43
	5%	2.45	3.61
	10%	2.12	3.23

Source: Researcher's computation

As shown in Table 4.4, the joint null hypothesis there is no long run relationship is rejected at 5 percent significance level. This is because the calculated F-statistic value of 4.42 exceeds the upper bound critical value of 3.61 at 95% and 90% levels. This means the null hypothesis of no long run relationship between coffee export and independent variable is rejected at both the 5% and 10% significance levels; hence there exist co-integration or long run relationship between them.

4.5 Long Run ARDL Model Estimation

After confirming the existence of long-run co-integration relationship among the variables, the next step is running the appropriate ARDL model to find out the long run coefficient. The appropriate lag length for each variable on the ARDL is selected by AIC, SIC and HQIC criteria. Therefore, we estimated an ARDL (1, 1, 1, 1, 0, 0, 1) long-run model. The results are presented in table 4.5 below.

Table 4.5: Estimates of the Long Run Coefficients of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEV	-0.308260	0.112082	-2.750309	0.0114
LNGDP	-0.307221	0.237261	-1.294865	0.2082
LNTOP	1.318764	0.376135	3.506096	0.0019
LNREER	1.092650	0.335439	3.257374	0.0035
RIR	-0.007063	0.006768	1.043666	0.3075
LNTOT	-0.138460	0.131532	1.052671	0.3034
C	-3.015471	1.638396	-1.840503	0.0786

As shown in the above table 4.5, the export functions of coffee export trade informs that trade openness (LNTOP) and real effective exchange rate (LNREER) are two important factors that influence Ethiopian coffee export performance in the long-run. Trade openness has 1.318 percent variation in the Ethiopian coffee export trade activities. As it is expected, the long-run influences of trade openness on Ethiopian coffee export between the study periods under investigation is found to be positive and significant at 1 percent level of significant. This result is in line with (Nega, 2013 and Abule, 2012).

On the other hand, real effective exchange rate has 1.092 percent variation in the Ethiopian coffee export trade activities. Again as it is expected, the long-run influences of real effective exchange rate on Ethiopian coffee export between the study periods under investigation is found to be positive and significant at 1 percent level of significant. This shows devaluation makes the export of the country cheaper and increase the competitiveness of the country. Also it is possible to boost coffee export volume in the long run to gain foreign currency earnings. Generally, this relationship is consistent with the theory and Marshal-learner condition.

The coefficient of the variable of exchange rate volatility (EV) had a negative and significant effect on Ethiopian coffee export. By this for instance, a one unit increase in exchange rate volatility decreases Ethiopian coffee export by 0.30 percent (Table 4.5). This result is consistent with Kandilov (2007), Cho et al (2002) and Kafle (2011). Hence exchange rate volatility imposes a large impact on Ethiopian coffee export because of the relative sensitivity of agricultural sector to the exchange rate movements. In addition to this, agricultural products in their characteristics have extremely limited storability as compared to non-agricultural products which forces

agricultural traders to sell their products regardless of the fluctuations in the exchange rate market.

The other variable TOT has a negative impact on Ethiopian coffee export in the long run as shown in the above table 4.5. But its relation with coffee export is insignificant. This result informs that Ethiopia promotes export of roasted and decaffeinated coffee in addition to exporting raw and washed one. By this the foreign earnings gained from the coffee export become improved to cover price of imported items from abroad which results in a large value of TOT.

When we see the relation between GDP and export of coffee, it is negative which is unexpected relationship. This implies that Ethiopia's export tends to be diversified with providing a big focus for other agricultural commodities like flower and oil seed exports in addition to coffee. By this the share of coffee to the total export earnings is decreasing now a days.

The other variable real interest rate is in line with Faustino (2011), the estimated result has the expected negative sign but it is insignificant and weakly related to coffee export. Any improvement in real interest rate leads to reduce the capability of borrowing.

4.6 Short Run Error Correction Model

After the acceptance of long-run coefficients of the coffee export equation, the short-run ECM model is estimated. The error correction term (ECM) indicates the speed of adjustment to restore equilibrium in the dynamic model. It is a one lagged period residual obtained from the estimated dynamic long run model. The coefficient of the error correction term indicates how quickly variables converge to equilibrium. Based on the appropriate selected ARDL (1,1,1,1,0,0,1) the short run error correction representation of ARDL as follows table 4.6.

Table 4.6: The Error Correction Representation of ARDL Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
C	0.024979	0.062635	0.398801	0.6941
DLNEV	-0.102699	0.051654	-1.988186	0.0600
DLNEV(-1)	-0.133113	0.047458	-2.804840	0.0106
DLNTOP	1.126895	0.359234	3.136936	0.0050
DLNTOP(-1)	0.513713	0.325511	1.578174	0.1295
DLNGDP	-0.761052	0.448744	-1.695963	0.0947
DLNREER	0.975921	0.406594	2.400236	0.0257
DRIR	-0.001278	0.002316	-0.551624	0.5870
DRIR(-1)	0.006595	0.002752	2.396041	0.0260
DLNTOT	-0.248684	0.110216	-2.256334	0.0348
DLNTOT(-1)	-0.326327	0.119488	2.731037	0.0125
ECM(-1)	-0.996389	0.268759	-3.707365	0.0013

R^2 = 0.754820Adjusted R^2 = 0.614717 Durbin Watson statistic = 1.885223

F – Statistic =5.387604 Pro – F-statistic= 0.0000

The Error Correction Estimate results for the short-run situation in the analysis estimated at -0.99 is highly significant, has the correct negative sign, and implies a very high speed of adjustment to equilibrium is properly signed and significant at 1 percent. The result reveals that about 99% percent of the disequilibrium caused by previous years' shock converged back to long-run equilibrium in the current year.

In line with Abule (2012), Kandilov (2007), Cho et al (2002) and Biruk(2012), the coefficient of the exchange rate volatility variable (EV) had a negative effect on Ethiopian coffee export. A significant negative effect for exchange rate volatility implies that an increase in the volatility of the exchange rate would reduce Ethiopia's coffee export. It is also actually in line with the theory of risk aversion, producers speculate against the positive effect of continuous devaluation and which is the basic source of exchange variability in this particular case.

The variable TOT has a negative impact on Ethiopian coffee export in the short run as shown in the above table 4.6. Its relation with coffee export is significant at 5% significance level. It is consistent with (Nega, 2013) and Isah and Raheem (2015).

4.7 Diagnostic Tests

The following diagnostic tests were conducted for the three equations; Serial correlation test, heteroskedasticity test in both case Breusch pagan and ARCH test and the normality test. Results for the diagnostic tests are shown in the appendix. From the result of all tests did not detect any problem of serial correlation, hetroskedasticity, non-normality and model misspecification.

4.7.1 Auto correlation test results

As we know one assumption of ARDL model data must be uncorrelated. So correlation test was performed to establish whether serial correlation existed in the model or not. The null hypothesis of no serial correlation (H0: No serial correlation), was tested against the alternative hypothesis of serial correlation. The null hypothesis is rejected in favor of the alternative hypothesis if the probability of F-statistic is significant at five percent.

The results are presented in appendix A. The probability F-statistic of the test (0.536) is statistically insignificant at five percent level. From this result, we fail to reject the null hypothesis and conclude that there is no serial correlation.

4.7.2 Heteroskedasticity

To conduct this both Breusch-Pagan/Cook-Weisberg and ARCH test was performed. The null hypothesis of no (H0: No Heteroskedasticity), was tested against the alternative hypothesis of Heteroskedasticity.

The null hypothesis is rejected in favor of the alternative hypothesis if the probability F-statistic of Breusch-Pagan Heteroskedasticity tests statistic is significant at five percent.

The results from Breusch-Pagan Heteroskedasticity test are presented in appendix B. The probability F-statistic of the test (0.312) is statistically insignificant at five percent level. From this result, we fail to reject the null hypothesis and conclude that there is no serial correlation.

The ARCH test was also conducted. The null hypothesis of Heteroskedasticity (H0: No Heteroskedasticity), was tested against the alternative hypothesis of Heteroskedasticity (H1: there is Heteroskedasticity). The null hypothesis is rejected in favor of the alternative hypothesis if the probability F-statistic of ARCH test is significant at five percent.

The results from ARCH test are presented in appendix C. The probability F-statistic of the test (0.515) is insignificant at five percent level. From this result, we fail to reject the null hypothesis and conclude that there is no serial correlation.

4.7.3 Stability test results

When analyzing the stability of the coefficients, the Cumulative Sum (*CUSUM*) and Cumulative Sum of Squares (*CUSUMQ*) are applied. Following Bahmani-Oskooee, 2004, the stability of the regression coefficients is evaluated by stability tests and they can show whether or not the parameter estimates are stable over time. This stability test is appropriate in time series data, especially when one is uncertain about when structural change might have taken place. The result for *CUSUM* and *CUSUMQ* are shown in Figure 4.3 and 4.4.The null hypothesis is that the coefficient vector is the same in every period and the alternative is that it is not (Bahmani-Oskooee, 2004). The *CUSUM* and *CUSUMQ* statistics are plotted against the critical bound of 5 percent significance level. According to Bahmani-Oskooee (2004), if the plot of these statistics remains within the critical bound of the 5 percent significance level, the null hypothesis that all coefficients are stable cannot be rejected.

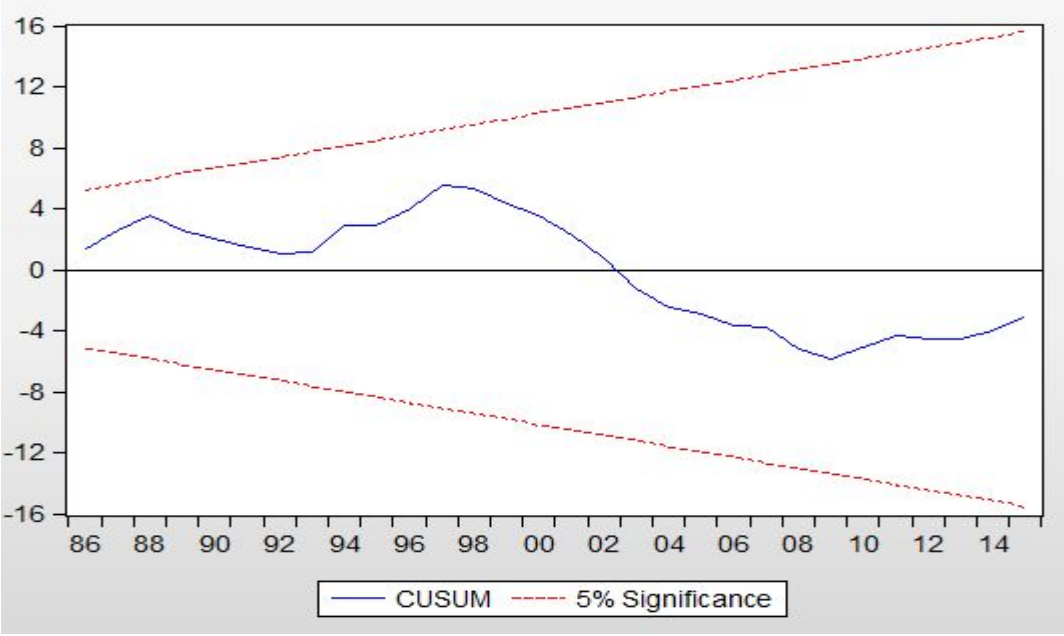

Figure 4.3: Cumulative Sum of Recursive Residuals

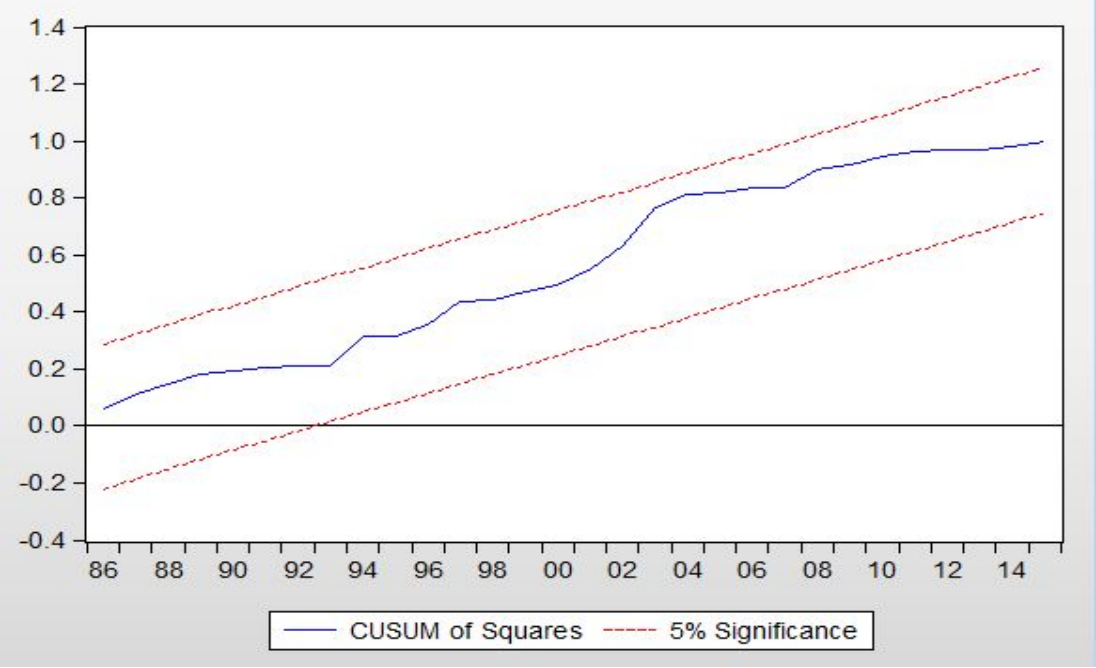

Figure 4.4: Cumulative Sum of Squares of Recursive Residuals

From the above two figures, both the CUSUM and CUSUMSQ residuals are within the 5 percent critical boundaries. So the stability of the parameters has remained within its critical bounds of parameter stability. As result from both graphs in Figures 4.3 and 4.4 that both the CUSUM and CUSUMQ tests confirm the stability of coefficients of the coffee export functions.

CHAPTER FIVE: Conclusion and Recommendations

5.1 Conclusion

From the findings of this study it is possible to conclude that there exists a negative relationship between exchange rate volatility and Ethiopian coffee export whereby exchange rate volatility do impact negatively to export of coffee in Ethiopia. This implies that an increase in exchange rate volatility of Ethiopian birr leads to disproportionate decrease in demand for coffee exports from Ethiopia to different destinations. Again the other independent variable TOT has a negative impact on Ethiopian coffee export in the long run which informs that the country gives a big concern to export roasted and decaffeinated coffee in addition to raw and washed one to increase the foreign earnings gained from the coffee export to cover price of imported items from abroad. The other unexpected relation is between GDP and export of coffee which is a negative relationship. This means that Ethiopia's export tends to be diversified with providing a big focus for other agricultural commodities like flower and oil seed exports in addition to coffee which minimizes the share of coffee to the total export earnings.

5.2 Recommendations

A number of recommendations are derived based on the outcomes of the study in order to improve the foreign earnings gained through coffee export to support the total economic growth of the country. And it is expected that these recommendations may provide directions for policy makers and the government as a whole to come up with potential measures to solve problems existing in the coffee export sector.

First, policy makers in the country should try to maintain a well-managed stable exchange rate regime within a certain limit by which market forces will be the major determinants to encourage coffee exports. Also, the government could set up a coffee export stabilization fund. The fund could be capitalized by charging exporters a tax so that during periods of high coffee prices and high export earnings, the country would accumulate the fund which it would draw down during periods of low coffee prices. This would ensure a certain amount of predictability in coffee prices during export so that price fluctuations would not impose a large impact on coffee growers and exporters in the future. The other measure by the government to reduce the impact posed by exchange rate volatility on coffee export should be related with diversifying export market

destinations. This can be achieved through export market promotion initiatives and providing big focus for quality standards. In addition, coffee export promotion incentives such as input subsidies and tax reduction need to be considered.

References

Abule and Abdi (2012). Evaluation of Effect of Exchange Rate Variability on Export of Ethiopia's Agricultural Product: Case of Oilseeds, Vol.3, No.11, 2012.

Abule Mehare (2012). Evaluation of effect of exchange rate variability on export of Ethiopia's agricultural products: case of coffee, flower and oilseeds, MSc thesis, University of Malawi.

Asmerom Kidane (1999). Real exchange rate price and agricultural supply response in Ethiopia: The case of perennial crops. Department of statistics and Demography, University of Asmara, Eretria.

Bahmani-Oskooee, M., and Kara O. (2003). Relative Responsiveness of Trade Flows to a Change in Prices and Exchange Rate. International Review of Applied Economics 17, pp 293-308.

Bahmani-Oskooee, M. (2004) "Long-run demand for money in Hong Kong: An application of ARDL model," *International Journal of Business and Economics*, 1(3), 147–155.

Bahmani-Oskooee, M. and Niroomand, F. (1998), Long-run price elasticity's and the Marshall-Lerner condition revisited, Economic Letters, 61, p. 101-109

Baldwin, R. Skudelny, F.and Taglioni, D. (2005). "Trade Effect of the Euro: Evidence from Sectoral Data," European Central Bank Working Paper Series, No. 446.

Bart Minten, Seneshaw Tamru, Tadesse Kuma, and Yaw Nyarko (2014). Structure and performance of Ethiopia's coffee export sector, working paper 66.

Biruk Tekle (2012). The Impact of Exchange Volatility on the Agricultural Exports of Sub Saharan African Countries.

Boansi D. and Crentsil C. 2013. Competitiveness and determinants of coffee exports, producer price and production for Ethiopia. Corvinus University of Budapest, Hungary.

Borena DessalegnLencho (2013). The effect of exchange rate movement on trade balance in Ethiopia, International Political Economy, University Of Tokyo,

Bouoiyour J. and Selmi R. 2013.Exchange Volatility and Export Performance in Egypt: New Insights from Wavelet Decomposition and Optimal GARCH Model.

Broll, U., and Eckwert, B., (1999). Exchange Rate Volatility and International Trade. Southern Economic Journal, 66: 178-185.

Cho, G., I. Sheldon, and S. McCorriston. 2002. Exchange Rate Uncertainty and Agricultural Trade. American Journal of Agricultural Economics. 84 (4): 931-942.

Clark, P., N. Tamirisa, and S. Wei. 2004. "Exchange Rate Volatility and Trade Flows—Some New Evidence." International Monetary Fund report, Washington, DC

De Grauwe, P., (1988). Exchange Rate Variability and the Slowdown in Growth of International Trade. International Monetary Fund, Washington, D.C.

Dellas, H., and Zilberfarb, B., (1993). Real Exchange Rate Volatility and International Trade: A Re-examination of the Theory. Southern Economic Journal, 59(4):641-647.

Deresse Degefa. 2001. Export Performance and Economic Growth in Ethiopia.

Dominic, S. (2007). International Economics. 9th Edition, John Wiley and sons Inc.

Engle, R., and Granger, C., (1987). Co-integration and Error Correction: Representation, Estimation and Testing. *Econometrics,* 55:251-276.

Felleke. 1994. Export Performance and Economic Growth in Ethiopia.

Gala, P. and Claudio R. L. (2006) Exchange Rate Misalignment and Growth: Old and New Econometric Evidence, Journal of Economic Literature.

Gezahegn G. (2012). Long-run effect of Export volatility on GDP: Case of Ethiopia, Södertörn University Department of Social Sciences, MSc thesis

Haile K. (1999). The Impact of Devaluation on Macroeconomic Performance: The Case of Ethiopia. Journal of Policy Modelling 21(4):481–496, Elsevier Science Inc.

Haile K. and Asmarom k. (1994). Exchange Rate Regimes and Export sub-sector Development

in Ethiopia.

Hailemichael Mulie. 2014. The Determinants of Profit Efficiency of Coffee Producing and Marketing Cooperatives, the Case Study of Sidama Coffee Farmers' Union). Department of Management, School Of Business and Economics, MadaWalabu University, Addis Ababa, Ethiopia.

Hooper, P., and Kohlhagen, S., (1978). The Effect of Exchange Rate Uncertainty on the Prices and Volume of International Trade. Journal of International Economics, 8:483-511.

Kandilov, I. T. 2008. The effects of exchange rate volatility on agricultural trade. American Journal of Agricultural Economics, 90(2): 1028-1043.

Kashi Ram Kafle (2011). Exchange Rate Volatility and Bilateral Agricultural Trade Flows: The case of the United States and OECD Countries. MSc thesis, The Department of Agricultural Economics and Agribusiness, Tribhuvan University, Nepal.

Kebede B. (2011). Does Real Exchange Rate Matter for Ethiopia's Exports? A Gravity Model Analysis, Addis Ababa University, Ethiopia.

Levin A. and Raut L.(1997), "Complementarities between Exports and Human Capital in Economic Growth: Evidence from the Semi-industrialized Countries", the university of Chicago.

Manaseh OtienoOiro (2015). Real Exchange Rate Volatility and Exports in Kenya: 2005-2012, Journal of World Economic Research, Vol. 4, No. 5, 2015, pp. 115-131.

Manzur, M, Chen, D.L. and Clements, K.W. (1992), Exchange rates, Prices and World Trade; New Methods, Evidence, and Implications, Routledge, USA.

Medina Mohammed Umer (2015). Devaluation and Its Impact on Ethiopian Economy. MSc thesis. Department of Economics, Hacettepe University, Turkey.

Musonda, A. (2008). Exchange Rate Volatility and Non- Traditional Exports Performance: Zambia, 1965–1999. Financial Markets Department, Bank of Zambia. AERC Research Paper 185African Economic Research Consortium, Nairobi November 2008.

National Bank of Ethiopia (2010). Quarterly Reports, 2007-2009.

National Bank of Ethiopia. Annual Reports, 2008-2010

Nega Muhabaw (2013). What determines the export performance of Ethiopia? A time series analysis, MA thesis, Addis Ababa University, Ethiopia.

Nzioki (2002). Exchange Rate pass through in Ghana. Department of Economics, University of Nairobi, Kenya.

Oyovwi, O. D. (2012). Exchange Rate Volatility and Imports in Nigeria. Academic Journal of Interdisciplinary Studies. Vol 1 No 2 November 2012. Published by MCSER-CEMAS-Sapienza, University of Rome.

Pesaran M. H., Shin, Y., and Smith, P. R. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels. Journal of the American Statistical Association, Vol. 94, No. 446, pp. 621-634.

Pesaran, M.H., Shin, Y., and Smith, R.J. (2001). Bounds Testing Approaches to the Analysis of level Relationships. Journal of Applied Econometrics, 16(3), 289-326.

Rutto R. and Ondiek A. 2014. Impact of exchange rate volatilityon Kenya's tea exports. International Journal of Economics, Commerce and Management. University of Kabianga, Department of Economics and Finance, Kenya.

Salvatore, D. (2004), International Economics, Eight edition, John Wiley & Sons, USA

Samuel ChegeMwangi, Oliver L.E. Mbatia and Jonathan MakauNzuma (2014). Effects of Exchange Rate Volatility on French Beans Exports in Kenya, Department of Agricultural Economics, University of Nairobi, Kenya

Samulson, P.A. and Nordhaus, W.D. (2001), Economics, seventeenth edition, McGraw Hill,USA

Sanjuan-Lopez A. and Dawson P. J.(2010) "Agricultural Exports and Economic Growth in Developing Countries: A Panel Co-integration Approach", Journal of Agricultural Economics.

Shehu Usman RanoAliyu. 2008. Exchange Rate Volatility and Export Trade in Nigeria: An Empirical Investigation. Bayero University, Kano, Nigeria.

Taye, H.K (1999). The Impact of Devaluation on Macroeconomic Performance: The Case of Ethiopia. J. Policy Mod, 21, 481-496.

Tenreyro, S. (2003), On the Trade Impact of Nominal Exchange Rate Volatility, Federal Reserve Bank of Boston.

Umaru A., Malam B. and Musa S. 2013. An Empirical Analysis of Exchange Rate Volatility on Export Trade In a Developing Economy. Journal of Emerging Trends in Economics and Management Sciences. Vol. 4(1): 42-53, USA.

WTO (2007). World Trade Organization Data Base, 2007

Yitbarek Befirdu (1986). A Model for the Analysis of the Effects of Coffee Export Earnings Instability on Selected Macro-Economic Variables: The case of Ethiopia. Master of Science thesis in Economic Policy and Planning, Institute of Social Studies, Hague, Netherlands.

Zelalm Tesera (2011). Response of coffee supply to change in export price for washed and unwashed coffee of Ethiopia. Masters of Science thesis, Addis Ababa University, Ethiopia.

Appendices

Appendix A

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.394558	Prob. F(1,22)	0.5364
Obs*R-squared	0.616647	Prob. Chi-Square(1)	0.4323

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 05/12/18 Time: 13:40
Sample: 1981 2015
Included observations: 35
Pre sample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNXC(-1)	-0.081140	0.181966	-0.445910	0.6600
LNEV	-0.012301	0.060406	-0.203643	0.8405
LNEV(-1)	-0.014523	0.062390	-0.232778	0.8181
LNGDP	-0.143465	0.467561	-0.306837	0.7619
LNGDP(-1)	0.180828	0.466527	0.387605	0.7020
LNTOP	0.006529	0.269330	0.024241	0.9809
LNREER	0.021343	0.236781	0.090138	0.9290
RIR	-0.000563	0.003374	-0.166820	0.8690
RIR(-1)	-0.000453	0.003802	-0.119130	0.9063
LNTOT	-0.012318	0.135118	-0.091166	0.9282
LNTOT(-1)	0.022053	0.123997	0.177850	0.8605
C	-0.336349	1.446156	-0.232581	0.8182
RESID(-1)	0.213674	0.340171	0.628139	0.5364

R-squared	0.017618	Mean dependent var	6.00E-16
Adjusted R-squared	-0.518226	S.D. dependent var	0.181215
S.E. of regression	0.223286	Akaike info criterion	0.117825
Sum squared resid	1.096846	Schwarz criterion	0.695526
Log likelihood	10.93807	Hannan-Quinn criter.	0.317247
F-statistic	0.032880	Durbin-Watson stat	2.002114
Prob(F-statistic)	1.000000		

Appendix B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.196436	Prob. F(11,23)	0.3425
Obs*R-squared	12.73832	Prob. Chi-Square(11)	0.3108
Scaled explained SS	7.481419	Prob. Chi-Square(11)	0.7589

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/12/18 Time: 13:47
Sample: 1981 2015
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.380000	0.311414	-1.220242	0.2347
LNXC(-1)	-0.033185	0.029710	-1.116984	0.2755
LNEV	-0.002704	0.013247	-0.204089	0.8401
LNEV(-1)	0.001446	0.013433	0.107618	0.9152
LNGDP	0.017055	0.094576	0.180326	0.8585
LNGDP(-1)	0.019511	0.085103	0.229265	0.8207
LNTOP	-0.035759	0.062388	-0.573167	0.5721
LNREER	0.011597	0.054321	0.213496	0.8328
RIR	-0.000827	0.000754	-1.096941	0.2840
RIR(-1)	0.001515	0.000865	1.750192	0.1934
LNTOT	-0.002046	0.030991	-0.066017	0.9479
LNTOT(-1)	0.023283	0.027568	0.844545	0.4071

R-squared	0.363952	Mean dependent var	0.031900
Adjusted R-squared	0.059755	S.D. dependent var	0.053381
S.E. of regression	0.051761	Akaike info criterion	-2.818495
Sum squared resid	0.061622	Schwarz criterion	-2.285233
Log likelihood	61.32367	Hannan-Quinn criter.	-2.634413
F-statistic	1.196436	Durbin-Watson stat	2.351232
Prob(F-statistic)	0.342548		

Appendix C

Heteroskedasticity Test: ARCH

F-statistic	0.432415	Prob. F(1,32)	0.5155
Obs*R-squared	0.453316	Prob. Chi-Square(1)	0.5008

Appendix D

Ramsey RESET Test

Equation: UNTITLED
Specification: LNXC LNXC(-1) LNEV LNEV(-1) LNGDP LNGDP(-1) LNTOP LNREER RIR RIR(-1) LNTOT LNTOT(-1) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.193087	22	0.8487
F-statistic	0.037283	(1, 22)	0.8487