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THE IMPACT OF DEVALUATION ON TRADE BALANCE

THE CASE OF ETHIOPIA

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Abstract

The purpose of this paper is to investigate the impact of devaluation on trade balance of Ethiopia. The demand for export and import function of the country from the period 1980 to 2003 is estimated. The demand for export is estimated using the ordinary least square (OLS) model and the demand for import is estimated using instrumental variable estimation model. Since the issue of nonstationarity in time series data often causes a spurious regression problem, the cointegration approach and error correction model is used in the paper to solve the problem.

List of variables

X	Quantity of exports
M	Quantity of imports
PX	Unit value of exports in Birr
PXC	Unit value of coffee export In Birr
WCD	World coffee demand
PXCW	World coffee price in Birr
PM	Unit value of imports in Birr
Y	Ethiopian GDP in Birr
YW	Rest of the world GDP (Ethiopian trading partner countries) in Birr
EX	Official exchange rate (Birr/USD)
EX_1	Lag in official exchange rate
P	Premium (the ratio of parallel exchange rate to the official exchange rate)
PXW	Weighted average of export prices of Ethiopian trading countries in Birr
PD	Domestic price level of imports in Birr
RF	Rainfall in mm
PX/PXW	The relative price of exports in Birr
PM/PD	The relative Price of imports in Birr
R(exports)	The residual from the export demand equation
R_1(exports)	The lag of the residuals from the export demand equation
R(imports)	The residual from the import demand equation
R_1(imports)	The lag of the residuals from the import demand equation
R(SC)	The residuals from the supply of coffee equation.
R_1(SC)	The lag of the residuals from the supply of coffee equation
R_1(PXC)	The residuals from the export price of coffee equation
R_1(PXC)	The lag of the residuals from the export price of coffee equation
D_ER	Dummy Variable (1 the period before 1992, when Eritrea was part of Ethiopia and 0 then after)
D_D	Dummy for devaluation (1 for 1992 and zero before and after 1992)

All the variables except the dummy are in log forms and represented by ¨L¨.
The entire prices are measured in the same currency (Birr).

Chapter 1: Introduction

In the process of international trade there is an imbalance between Ethiopia and its trading partners. In other words, the country has been in a balance of payment deficit. A major means of financing the deficit has been public borrowing from abroad supplemented by drawing down on foreign exchange reserve. Consequently, the country's debt position has been deteriorating. In addition to this adverse effect of the unfavourable world economic atmosphere, the natural calamities, particularly the recurrent drought with catastrophic consequences have rendered the condition even worse.

It is argued that the balance of payment deficit in general and balance of trade deficit in particular is caused by exchange rate misalignment, particularly overvaluation. Many writings spelt out that Ethiopian currency was overvalued during the Derg[1] regime. With the overvaluation of exchange rate, imports become cheap which gives incentive for the country's residents to import more. According to Gashaw, 1992:

> ¨...an overvalued exchange rate could encourage the use of capital intensive techniques instead of labour intensive, imported intermediate goods instead of local materials and imported consumer goods instead of indigenous substitutes because imports are cheap at the existing official rate¨

However imports face lower price in terms of local currency (birr) and hence they do not get incentive to increase the volume of export.

The EPRDF[2], to mitigate the economic problem in general and the trade balance deficit in particular began comprehensive macro economic and structural reforms. Devaluation of the Ethiopian currency was one of the undertaken measures to stabilize the economy. The objective of devaluation, according to EPRDF, stated to improve the country's balance of payment.

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[1] Derg was a military government which ruled Ethiopia from 1974 until 1991.
[2] EPRDF means the Ethiopian Peoples Revolutionary Democratic Front which became the government of Ethiopia in 1991.

Given the EPRDF's devaluation objective there is hot controversial issues whether devaluation would result in improving the current account balance and hence the trade balance by increasing the volume of exports, decreasing the import bills and eliminating market distortion. Along this there is a condition, which is based on the price elasticities of export and import, on the impact of devaluation on trade balance. This is called the Marshal – Lerner (M-L) condition. According to Pilbeam (1994), if the sum of the demand elasticities of export and import is greater than unity, then devaluation will improve trade balance (current account) otherwise it will not. However there is a dispute on this issue among writers. Some writers argue that the elasticity sum is less than unity for developing countries and greater than unity for developed countries.

Though there is no clear cut answer for the effect of devaluation on trade balance among writers the EPRDF employed devaluation as instrument of exchange rate policy to improve the balance of trade. Therefore what the effect of devaluation on the Ethiopian balance of trade was and whether the sums of the export and import elasticities are greater or less than unity would be considered as the problem of this study.

Empirical results show that the trade balance of Ethiopia is still deteriorating after the attempt made in devaluating the country's currency. Hence the main objectives of this paper are to examine and give clear picture of the effect of devaluation on trade balance. More specifically, the study will attempt to shed some light on the following specific objectives: to examine the effect of devaluation on export, import and trade balance and to test the fulfilment of Marshal-Lerner condition to the improvement of trade balance.

The result of the study can have some bearing on the designing of policy packages that are aimed at improving the external balance of trade. So, a major contribution of this paper will be to provide additional information on the existing literature. The finding of the study is also expected to initiate other interested bodies to undertake a better and detailed study in the area.

The paper involves a survey of the secondary data and tables, percentages and other mathematical calculations are used in the paper. Econometric models like the ordinary least square (OLS), instrumental variable model and the error correction models are used in the

study to create a strong base for the finding and to indicate the effect of devaluation on trade balance in the country.

The study focuses only on the impact of devaluation on trade balance while it affects various macro economic variables. The paper consists of six chapters. Chapter one is about the introduction of the study, chapter two is the review of the literature on the area. Chapter three give the general description of Ethiopian foreign exchange regime, price and volume of imports and exports and historical development of Ethiopian trade balance. The fourth chapter concentrates on the model specification and econometric tests and followed by the data analysis chapter. The last chapter is the conclusion part.

Chapter 2:   Theoretical and empirical literature review

2.1 Theory of exchange rate

2.1.1   Exchange rate concepts

There are different kinds of exchange rates, but some of these are: nominal exchange rate and real exchange rate.

The exchange rate that prevails at given date is known as the nominal exchange rate (NER), it is merely the price of domestic currency units per foreign currency units with no reference made to what this means in terms of purchasing power of goods and services (Pilbeam, 1994). It is the amount of Ethiopian birr that will be obtained for one United States dollar (USD) in the foreign exchange market. There is also an effective exchange rate which is the weighted average of the exchange rates between the Ethiopian currency (Birr) with the most important trading countries of Ethiopia, with weights given by the relative importance of the Ethiopian trade with them.

As mentioned above, the second kind of exchange rate is the real exchange rate (RER). The most traditional definition of RER is the one, which states as nominal exchange rate adjusted for international price differential.

Mathematically, RER = NER*Pd/Pf

Where   RER   real exchange rate

NER   nominal exchange rate

Pd   domestic consumer price index

Pf   foreign consumer price index

This traditional approach is known as the purchasing power parity (PPP) (Edwards, 1989). The modern approach of the RER is the relative price of tradable to non-tradable (Edwards, 1989). Edwards (1989) defined four versions of the modern approach.

1. RER = NER*PT*/PN

   The relative price of tradable and non-tradable including taxes on trade.

2. RER = PT/PN

   The domestic relative price of tradable to non-tradable.

3. RER = PM/PN

   The domestic relative of importable goods to non tradable

4. RER = PX/PN

   The domestic price of exportable goods to non tradable.

   Where   PT*   price of tradable goods in foreign currency;

              PT   price of tradable goods in domestic currency;

              PM   price of importable goods in domestic currency;

              PN   price of non tradable goods in domestic currency; and

              PX   price of exportable goods in domestic currency

Although the best measure of RER structure is the second version of the above four approaches, lack of disaggregated data on price of tradable and non-tradable goods prompted the use of alternative definition of RER = PT*/PN (Edwards, 1989). This approach has got an advantage that it is more realistic and simple for studying RER behavior in Least Developed Countries (LDCs) where there is segregated data on price of tradable and non-tradable.

2.1.2   Alternative exchange rate systems

Fixed exchange rate systems

Fixed exchange rate is a ¨system under which central banks intervene in the foreign exchange market to maintain fixed exchange rates¨ (Manure, 1995). Under this system, there

is complete government intervention in the foreign exchange market. The exchange rate is fixed at a given equilibrium level; and if the market forces of demand and supply tend to upset this equilibrium, the central bank would intervene and see that the fixed exchange rate is maintained (IBID). This is accomplished through selling and buying of foreign exchange assets. That is, pegging or supporting the equilibrium exchange rate. The purpose is clearly to stabilize the price of foreign exchange at given equilibrium rate (Manure, 1995). Fixed exchange rate has many advantages. First, it insures stable exchange rate there by creating an atmosphere in which international trade and capital flow could proceed smoothly and orderly. Second, it prevents currency appreciation or depreciation thereby inspiring confidence in the ¨strength¨ of domestic currency (Manure, 1995). Third, it promotes trade and investment. Fixed or stable exchange rate removes exchange rate risk to traders and investors. Finally, fixed exchange rates are anti-inflationary; it can make the domestic firms and employees' costs under control in order to remain competitive in international markets. As a result the government maintains low inflation and in a long run reduces interest rate to promote trade and investment (Sodersten, 1994). Countries with fixed exchange rate often impose controls on the capital movement (degree of capital mobility) from and to their country; this helps the government or the central bank to control the inflow and outflow of currency to the country. Under a fixed exchange rate fiscal policy is more effective than monetary policy.

However, fixed exchange rate has also disadvantages as discussed by Baker (1995). First, it puts heavy burden on the government. This is especially the case if the pressure on the balance of payment (BOP) is only in one direction, particularly towards deficit disequilibrium. If excess demand for foreign exchange continuous indefinitely, the government may not be able to find easy to sell foreign currency in the market to support exchange rate. This may lead to sudden devaluation with all its adverse effect on the ¨strength confidence¨ of the home currency (Baker, 1995). Second, to make the fixed exchange rate system effective, there is a need to build large foreign exchange reserves. This in turn requires a large BOP surplus with which the country can build official foreign reserves. The LCDs are not generally in a position to build such huge reserves of foreign exchange. Thirdly, fixed exchange rate does not solve the problem of BOP; it only suppresses the balance of payment via government intervention. The forces underlying or causing deficit and surpluses in the BOP remain to be control by factors other than exchange rate. The policy of fixed exchange rate would sooner or later result in a situation, where

internal stability has to be scarified for the sake of external balance or exchange rate stability. Finally, it creates a great need for the formation of international arrangement for borrowing and lending like the International Monetary Fund (IMF).

As Ethiopia is one of the LDCs, which cannot able to build a large foreign exchange reserves and experiencing a balance of payment deficit, the fixed exchange rate regime is not the appropriate one.

Floating exchange rate systems

Under freely floating exchange regimes, exchange rate determined by supply and demand conditions in the market for foreign exchange. As a result one can find different values of exchange rate in the market depending on the relative strength of demand and supply for foreign exchange.

Under this system there is appreciation and depreciation of foreign exchange rate that brings BOP to equilibrium. But the fact that automatic adjustment in the exchange rate brings equilibrium in the BOP depends on the elasticity of supply and demand for imports and exports.

There are many reasons for adopting floating exchange rate. One is that countries face problems in pegging their currencies to some other currencies (Tew, 1982). Another reason is to absorb the parallel markets into official stream of transaction. Further more, IMF and World Bank policy advice recommend the flexible exchange rates. To this end IMF has guidelines for the management of floating rates (Tew, 1982). However, two conditions are necessary for the effective operation of floating exchange rate system (Helmers, 1988). First, there must be a well-developed market for the domestic currency and second, there must be a well-developed internal market for foreign currency (Helmers, 1988).

Floating exchange rate has advantages and disadvantages. The major advantage of freely floating exchange rate is that its open market determination protects the economy from changes the external world, so that loss of reserve does not necessitate domestic deflationary

measures (UNECA, 1991). The disadvantage of this system on the other hand is its uncertainty.

> *¨...the floating of the major currencies introduces uncertainties about real earnings from exports and real costs from imports. Since exports and imports are invoiced in currencies which move against each other in unpredictable ways. This kind of uncertainty discourages allocation of resources to produce goods for exports or competition with imports and introduces complication in debt management.¨ (Tew, 1982: 177)*

By considering the advantages of the floating exchange rate, its automatic adjustment for the fluctuations in the exchange rate and flexibility in determining interest rates, this exchange rate regime is appropriate to Ethiopia. This type of exchange rate regime can help to reduce the balance of payment deficit in Ethiopia when depreciation occurs, the relative prices of exports of Ethiopia falls in the world market (exports of the country more competitive) and the relative price of imports rise in the country's market.

Auction exchange rate systems

An auction market is ¨a highly organized and competitive where the price floats upward and downward to balance supply and demand¨ (Samuelson and Nardhous, 1989:291). Exchange rate auction system is usually applied in the process liberalization programs with the following objectives. First, it narrows significantly the gap between official exchange rate and parallel exchange rates. Second, the auction exchange rate system helps to stabilize the foreign exchange rate when a real depreciation happens in the country. (Elbaw, Aron and Jani, 1994).

Auction exchange rate system has also it own advantages and disadvantages over the inter-banking system. The auction exchange rate system can able to constrain volatility in those thin markets where money and banking system are underdeveloped. Moreover, it is rich in information. Sellers give information by notifying the maximum price (reserve price) and declaring the total amount of supply available at each auction before opening the auction. This helps them to reduce uncertainty. Therefore, the principal goal of auction is to bring the

official exchange rate to the market clearing level and hence absorb the activities of parallel markets in to official system and gradual liberalization in the propagation towards more deeper and competitive financial system (Mulat, 1992).

Thus auction are generally introduced when an item has no certain value faced with uncertainty. The seller can offer commodity, with in the context of a set of auction rules, to a group of bidders who competitively bid for the product. As long as the final price paid is above some minimum valuation of the seller, a Pareto improvement for both parties takes place (Mulat, 1992). Consistent with the basic economic tenets, auction theory investigates both the optimum value of auction for the sellers and ideal strategy for bidders (Mulat, 1992).

There is exchange control under the auction exchange rate systems (the authorities directly administer exchanges of national monies), which makes different from the floating exchange rate. The exchange control impose on the auction differs from country to country, depends on the authorities or central bank objective. For example in the Ethiopian case, the national bank decides how much foreign currency is available and sets criteria who can participate in the auction.

The auction exchange rate system has advantages and disadvantage to Ethiopia. Its advantage is the importers can able to get foreign exchange from the central bank of Ethiopia at a low price. Its disadvantage is, due to the qualifications and limited amount of foreign currency available by the central bank the demand for parallel market increases.

2.2 Theory of devaluation

Devaluation means decreasing the value of the country's currency in terms of other currencies. Originally, devaluation largely applied to ¨…a reduction in the exchange value of a country's monetary units in terms of god or silver¨ (Encyclopedia Britannica, 1994:567). However, ¨with the demonetization of gold the devaluation is being restricted to exchange rate reduction of national currencies which are pegged to USD, other currencies, The Special Drawing Rights (SDR) of IMF and other composite currencies, ¨ (Teklebrhane, 1992:27)

The issue of devaluation has exerted a strong attraction for both theoretical and applied economists. Its analysis has been characterized by controversy for a long period of time. As Dis (1965:101) put it ¨the complexities inherent in analysis of devaluation have come to light one by one, leaving behind them innumerable controversies and obsolete formulas. ¨

There are many reasons as to why a country seeks to adopt the policy of exchange rate devaluation; the main reason is the need to overcome economic difficulties caused by over valuation of exchange rate. Sohmen (1961) considered an overvaluation of a currency as an obstacle to economic development. The main reason is that with overvalued exchange rate government has to provide subsidies for domestic producers and hence resources available to development expenditure are reduced. According to World Bank (1992:22):

> ¨...an over valuation of exchange rate imposes an implicit tax on export
> and hence discourages the production of exportable goods. It also sets
> an implicit subsidy on imports and hence encourages imports
> worsening the current account.¨

The other argument of devaluation is that it normally creates investment opportunities in the devaluating country by improving the situation for foreign investors inviting an inflow of capital (World Bank, 1992). Especially in the countries whose demand for export is relatively income elastic, this means that a percentage increase in income of the country's trading partners increases the export demand of the devaluating by a larger percentage. As a result of this the nation's income from export rises following devaluation. This calls forth investors to the export sector of the country. Devaluation is sometimes adopted to correct the inflationary situation caused by overvaluation.

According to Guitian (1982:28) devaluation works through its ¨expenditure switching and expenditure reducing effect.¨ the manner in which expenditure switching works is through changes in relative price of exportable and non-exportable. That is devaluation is expected to increase the price of exportable relative to that of non-tradable there by shifting aggregate supply to the tradable and aggregate demand to non-tradable. And hence export earning would increase resulting in the improvement of current account and hence balance of payments. In addition to the shift in production from home goods (non-tradable) to tradable, the shift also occurs from import to import substitution.

The expenditure reducing effect of devaluation is associated with the rise in price of imports which reduces the private financial wealth and expenditure. Therefore, ¨by reducing the real value of nominal asset there by creating an access in their demand – devaluation lowers the rate of growth of aggregate demand for goods and services.¨ (Guitian, 1982:28)

Based on the discussed points there are three different approaches for analysis of the impact of devaluation on trade balance. These are: the elasticity approach, the absorption approach and the monetary approach.

2.2.1   The elasticity approach

One way through which devaluation can affect country's trade balance is through changes in the relative prices of goods and services internationally. Devaluation may be able to reverse the imbalance of trade balance by lowering its price so that exports are encouraged while imports are made to decline. One way of accomplishing this is by adjusting the exchange rate through currency devaluation. Devaluation of a currency may improve or worse the trade balance the ultimate outcome of currency devaluation depends on the nation's price elasticities of demand for exports and imports (Baker, 1995).

The elasticity approach of devaluation to the BOP problem is a kind of expenditure switching policy which primarily works by changing relative prices. Under this approach, it is presumed that devaluation leads to a rise in the domestic price of internationally traded commodities and, therefore, to relative price changes between imported and exported goods on the one hand and goods and services not easily traded on the other (Reynolds, 1989).

Marshal-Learner condition

According to Pilbeam (1994), devaluation has two contradictory direct effects on the current account balance. It may improve or worsen the current account through its effects on trade balance. Alfred Marshal (1968) and Lerner (1971) set the Marshal-Lerner (M-L) condition

that indicates whether devaluation improve or worsen the current account balance. Salvatore (1994:465) describes the Marshal-Learner condition as follows:

> *¨...the Marshal-Learner condition postulates a stable foreign exchange market and improvement in the BOP if the sum of elasticities of demand for export and demand for import exceeds unity in absolute value. However the sum of these two elasticities will have to be substantially greater than one to make devaluation as a method of correcting deficit in the nation's BOP.¨*

The effectiveness of devaluation in improving trade balance depends on the fulfilment of the Marshal-Learner condition. In order to check the Marshal-Learner condition in the Ethiopian case the elasticities of demand for export and import will be considered. The elasticities of demand of both export and import mean the responsiveness of buyers to price changes, what will be the effect of 1% increase on the price of imports and a 1% decrease on the price of exports.

The trade balance of a country is the difference between its imports and exports. These are goods produced at home and produced abroad, have different prices as well. According to Rødseth (2000), the standard choice is to measure the trade balance in terms of the home good. The trade balance on volume terms can be expressed mathematically as follows:

$X = Z^* - RZ,$ $\qquad$ $R = EP^*/P$, substitute for R

$$\mathbf{X = Z^* - (EP^*/P)\ Z} \tag{2.1}$$

Where P is price of home goods in domestic currency, P^* is price of foreign goods in foreign currency, Z is volume of Ethiopian imports of foreign goods, Z^* is volume of foreign imports of Ethiopian goods or Ethiopian export volume, X is export surplus or trade surplus and R (the real exchange rate) is the relative price of foreign compared to Ethiopian goods and can be computed by multiplying the nominal exchange rate with the price of foreign goods in foreign currency and divide to the price of Ethiopian goods in Birr (Ethiopian currency).

Devaluation increases the relative prices of foreign goods (imports) in the devaluing country; as a result the demand for home goods in both countries (the devaluating and its trading partners) will increase. An increase in demand for home goods, increase the exports and decrease imports of the country. The increase in the relative prices of imports makes the imports more expensive in terms of exports which cause the deterioration of the trade balance. From these two effects we cannot say that devaluation is way to improve or worse trade balance. To conclude the total effect of devaluation, we have to compute the price elasticities of demand for exports and imports.

As devaluation is to cause the home currency's exchange value to depreciate or increasing the nominal exchange rate, to see the effect of devaluation on trade balance compute the change in trade surplus as a result of the change in real exchange rate (R). Alternatively it is the first order derivative of X with respect to R from equation (2.1).

$$dX/dR = Z^*_R - RZ_R - Z \qquad\qquad\qquad (2.2)$$

Following Rødseth (2000) the total effect to the trade balance is the sum of the above three terms. Both foreign and home quantity effect, devaluation makes foreign goods expensive and home goods relatively cheaper, as a result domestic demand shifts towards domestic goods and decrease import. On the other hand the export demand also increases. In this case both the quantities change in a way to improve trade balance. There is also effect on the increasing of import bills; this is the price effect to the trade balance which affects it negatively.

To sum up, from equation (2.2) we can see both a positive and negative effect to the trade balance i.e. both the quantity and price effect, to tell whether devaluation improves or not the trade balance the above equation can be rewrite in the following way and assuming trade was initially balanced and $Z^* = RZ$:

$$dX/dR = Z\,(Z^*_R/Z - RZ_R/Z - 1)$$
$$= Z\,(RZ^*_R/Z^* - RZ_R/Z - 1)$$
$$= \mathbf{Z\,(a + b - 1)} \qquad\qquad\qquad (2.3)$$

Where $a = RZ^*_R/Z^*$ and $b = -RZ_R/Z$ are the absolute values of the price elasticities of demand for exports and imports respectively. From equation (2.3) we can see the effect of an

increase in R or devaluation, if a + b in absolute value is greater than one devaluation is a way to improve trade balance by assuming it was initially balanced (X = 0). This is what Marshal – Lerner condition is. If a+b = 1 in absolute value devaluation neither improve not hurt the trade balance and if their sum in absolute value is less than one devaluation worse trade balance. From the Marshal-Lerner condition *a* and *b* are the price elasticities of demand for export and import, the demand for export and import will be explained on the next parts.

When the trade balance was initially in deficit, the price elasticity of exports works on a smaller basis than the price elasticity of imports and the sum of a and b is expected to be greater than one (a+b>1). On the other hand, if initially exports are greater than imports, the Marshal-Learner condition is always sufficient for an increase in the real exchange rate to improve the trade balance measured in home goods. (See Rødseth, 2000 P.168)

Therefore according to the M-L condition, starting from the position of equilibrium, devaluation improves the current account only if the sum of the foreign elasticity of demand for export and import is greater than one. But if the sum is less than unity, devaluation will negatively affect current account of the nation. On the other hand if the sum is zero devaluation will have no effect.

Price effects versus volume effects

Devaluation has two counteracting effects, these are: price effects and volume effects. As devaluation makes imports more expensive in terms of exports of the devaluing country, this causes to worsening the current account balance of the country. This is the price effect of devaluation. The second effect of devaluation is the volume effect; this can improve the current account. As exports become cheaper which leads to increase the volume of export and imports becoming expensive leads to decrease the volume of imports. The price effects and volume effects of devaluation can improve, worsen or unaffected the current account of a country.

J-curve effect

Empirical estimates of price elasticity in the international trade part have been aimed at answering whether, according to the M-L condition, devaluation improves trade balance. Most relevant empirical studies are affirmative on this point, World Bank (1992), for instance argued that devaluation will improve the trade balance of a country. A basic problem; however, in measuring world price elasticities is that there is a trend to be a time lag in the process between changes in the exchange rates and their effect on real trade. One popular description of time path of trade flow is the so-called J-curve effect (Carbough, 2006). This view suggests that, in the very short run, currency devaluation will lead to worsening of a nation's trade balance. But as time passes the trade balance is likely to improve. This is because it takes time for new information about price effect of devaluation to be disseminated through the economy and economic units to adjust their behavior accordingly (Baker, 1995).

In the short run a devaluation of exchange rate may not improve the trade balance, this can happen due to the low price elasticity of imports and exports in the immediate action. Initially the volume of imports stays constant and the price of exports of the devaluating country cheap and insufficient to compensate the higher spending on imports. As a result the trade balance may worse for some time. Graphically can be presented as follows:
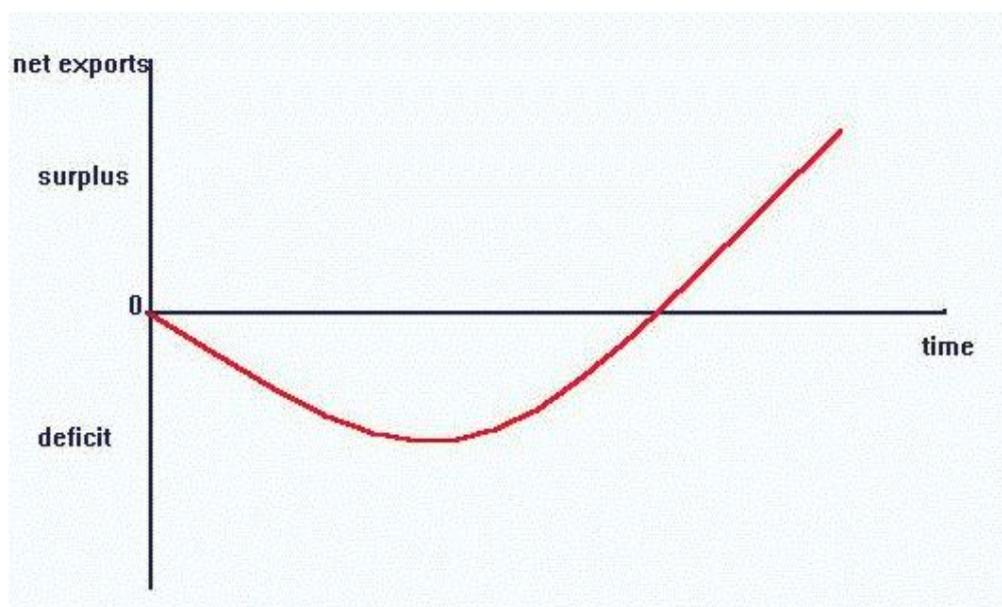
Figure 2.1 J-Curve

In the long run by taking adjustment lags there will be acceleration in the volume of exports and a slower growth of the imported goods, which export volume can compensate the spending on imports. The net result will be an improvement in the trade balance.

The response of trade flow really depends on the time path. In the initial stage of devaluation the trade balance gets even worse and gets better through time. Carbaough (2006:426) explained as follows:

> ¨...the J-curve effect, so called because the trade balance continues to get worse a while after depreciation (sliding down the hook of the J-curve) and then gets better (moving up the stem of the J-curve). This effect occurs because the initial effect of depreciation is an increase in import expenditures: The home-currency price of imports has risen, but the volume is unchanged owing to prior commitments. As time passes, the quantity adjustment effect becomes relevant: Imports volume is depressed, whereas exports become more attractive to foreign buyers.¨

The devaluation of a currency can not materialize immediately. As Carbough said adjustment of lags may be four or more years, although the major portion of adjustment takes place in about two years. There are also factors which can explain time lags, these are: recognition lags, decision lags, delivery lags, replacement lags and production lags. The adjustment lag also depends on the nature of the sector or industry. During the time of adjustment the trade balance will get worse and then after improves the trade balance by increasing exports and reducing imports.

2.2.2   The absorption approach

As it is discussed in the elasticity approach of devaluation, devaluation leads to increase volume of export and decrease the volume of import. But even if the elasticity condition is satisfied, in order to say the trade balance is improved we have to consider how the country

reacts to the devaluation. As Carbough (2006): the absorption approach gives insights how the country reacts to devaluation by considering two points. These are: the impact of devaluation on the spending behaviour of the domestic economy and the influence of domestic spending on the trade balance.

The balance of trade is the difference between the total domestic output and the domestic absorption. Positive trade balance means the total domestic output exceeds the domestic spending and negative means if the spending exceeds output.

According to Carbough (2006), the absorption approach starts with the idea that the value of total domestic output (Y) equals the level of total spending, where total spending is composed of consumption (C), investment (I), and government expenditure (G) and net export (X-M).

This can be written as:

$$Y = C + I + G + (X - M) \qquad (2.4)$$

The absorption approach consolidates the three economic aggregates C, I and G. which are often called absorption (Rødseth, 2000). We can put this in to a single term 'A' while letting net export (X –M) be represented by 'Z'. Total domestic output thus equals the sum of absorption plus the level of net exports (X - M), and formula 2.4 can be rewritten as follows by substituting 'A' and 'Z'

$$Y = A + Z \qquad (2.5)$$

In order to get the balance of trade A has to be expressed in terms of Y and Z

$$Z = Y - A \qquad (2.6)$$

Equation 2.6 suggests that, if national output (Y) exceeds domestic absorption (A), the economy's trade balance will be positive. Conversely, a negative trade balance suggests that the economy is spending beyond its ability to produce (Carbough, 2006).

The absorption approach predicts that if currency devaluation is to improve an economy's trade balance national; output must rise relative to absorption. This means that the country must increase its total output, reducing its absorption or do some combination of the two.

According to Cooper (1972:102), the absorption approach operates as follows:

> ¨... with the economy operating below maximum capacity the price incentive of devaluation would tend to direct idle resources in to the production of goods for export, besides encouraging spending away from imports to domestically produced substitutes. And the case of an economy operating at full employment, the only way in which devaluation can improve trade balance is for the economy to some how cut domestic absorption, freeing resources needed to produce additional export goods and import substitutes.¨

The absorption approach goes beyond the elasticity approach, which views the economy's trade balance as distinct from the rest of the economy. Instead, devaluation is viewed in relation to the country's utilization of resources and the level of production. Cooper (1972) showed that the two approaches are not substitutes to each other rather they are complimentary.

Therefore the absorption approach goes beyond the elasticity approach by looking the country reaction to devaluation by considering the impact of devaluation on the spending behavior of domestic economy and the influence of domestic spending on the trade balance. This means that devaluation can improve trade balance if national output of a country increases relative to its domestic absorption. This can be done either by increasing its total output, reduce its domestic absorption or a combination of the two.

2.2.3   The monetary approach

According to both elasticity and absorption approaches, monetary consequences are not associated with balance of payment adjustment. The monetary approach developed by Kahn

(1951), Johnson (1968) and Meddle (1968), address this shortcoming. Carbough (1992) explained the monetary approach as follows:

> ¨... *a devaluation of home currency would increase the price level (i.e. domestic currency price of importable and exportable). This increases the demand for money because larger amount of money are needed for transaction. If that increased demand is not fulfilled by domestic sources, an inflow of money from overseas occurs. This inflow results in balance of payment surplus and a rise in international reserve. But the surplus does not last for ever. By adding to the component of the home country money supply, the devaluation leads to an increase in spending (i.e. absorption) which reduces the surplus. The surplus eventually disappears when the equilibrium is restored in home country's money market. The effect of devaluation on real economic variables is thus temporary. Over the long run currency devaluation merely raises the domestic price level.*¨

According to Krugman and Taylor (1977), devaluation increases the demand for money at any given level of output and employment by raising prices, that is, it is likely that devaluation will lead to reduction in the rate of growth of monetary base which cause deflationary influence. In this approach, exchange rate changes are considered as incapable of bringing about lasting change in the balance of payments. Devaluation operates strictly by causing a disequilibria in money market, which lasts until money market equilibrium is reversed via reverse change.

2.3 The effect of devaluation on trade balance

According to Manure (1995), devaluation may work effectively on export promotion if tradable have not import content. If they have import content, devaluation would tend to increase cost of imported raw materials and other components required by industries. As a result of this the price of exports has also to increase more than the increase in the price of inputs, and devaluation may not work effectively on the export promotion.

Devaluation also affects the imports of the devaluing country in several ways. It raises the domestic price of imports there by affecting the demands negatively and encouraging import substitution for production and consumption. On the other hand, from the very nature of the economy in Least Developed Countries (LCDs), the higher income from export earning lead to import of capital goods for investment activities (Eladamic and Aron, 1992).

From the Mundell-Fleming-Tobin model devaluation has expansionary effects which cause to shit the IS curve to the right. The basic assumption of the model is home and foreign goods are imperfect substitutes, which mean that the prices of home goods are predetermined and that production is determined by demand. The shift of the IS curve to the right can happen due to three reasons. These are: (i) it raises the real exchange rate and have a positive impact on the net exports, an increase in the net exports cause to positive balance of trade. (ii) The second one is the wealth effect, when the foreign asset holding of the private sector is greater than zero, an increase in the exchange rate leads to increase the wealth of the private sector and private consumption. (iii) The third is the income effect; devaluation can cause the real disposable to decrease or increase (Rødseth, 2000).

Gylfason and Radetzki (1991) accepted the argument that supports the importance of devaluation in improving trade balance under some preconditions. For them, devaluation can be efficient and appropriate method if (i) it is associated by domestic monetary restraint (ii) real wages are permitted to fall at least enough to prevent employment from declining and (iii) at least sufficient foreign capital is procured to prevent reduction of GDP.

In general, the effect of devaluation on import depends on the elasticity for imports and on the import structure. If the demand for import is elastic, then the possible effect of devaluation on import can be significant. On the other hand, if the demand elasticity for imports is inelastic, the effect of devaluation on imports is limited (Manure, 1995).

2.4 Empirical literature review

There are various literatures which argue about the impact of devaluation on trade balance, price and output. As the paper concentrates on the impact of devaluation on trade balance, emphasis will be given on the impact of devaluation on trade balance.

The impact of devaluation on trade balance can be evaluated by using the ¨Before-after¨ approach, which means comparing the relative economic performance before and after devaluation to analyze the impact. The second approach is the control group, which compares the economic performance of devaluating and non-devaluating countries.

2.4.1   The effect of devaluation in developed countries

Devaluation can improve and worsen trade balance of developed countries. Jacques (1975) had studied the 1967 devaluation of the pound sterling. According to the study, the volume of exports, including semi-finished and manufactured goods of the United Kingdom had expanded rapidly following a 14.3% devaluation of the pound in November 1967. The British balance of trade showed a deficit of $1.3 billion in 1967. The initial impact of the devaluation was negative, because in 1968 the trade balance deficit raise to $3billion. After a time lag and some adjustments in 1969 the balance of trade changed to surplus of $1 billion. By 1971, the impact of devaluation accounts for 18% increase in export volume of the semi-finished and 20% of the finished manufactured goods. On the other hand, the import of finished goods has been substantially reduced by 10.5% from the period prior to the devaluation. By this period the balance of trade surplus raised to $6.5 billion.

As we can see from the experience British pound devaluation in 1967: at initial stage it worsens the balance of trade and after some time lag it improves the balance of trade. And it clearly shows as the J-curve effect of devaluation.

France also devaluate its currency in 1969. According to Dapple (1976), the devaluation had affected the export volume. Specifically, export volume has increased by about 10-20% while imports were reduced. As a result, the country's balance of payment had improved.

2.4.2   The effect of devaluation in developing countries

Many a time, economists do not agree on the net effect of devaluation on trade balance. While some of them argue that devaluation improves trade balance, others do not support the

view that devaluation improves the trade balance. In what follows these opposing arguments will be presented.

Lizando and Montiel (1989) seem to agree on the positive effect of devaluation on the trade balance. According to them, the view that a properly administered devaluation will improve the trade balance is widely accepted. But there is much less consensus about possible effects of devaluation on output and employment. On the other hand, there are claims that devaluation has a contractionary effect on the IS curve, which causes to shift it to the left and low price elasticities of exports and imports which makes the net exports less than zero and has a negative effect on the trade balance (Rødseth, 2000). As Edwards (1989) claims devaluation are usually contractionary in developing countries (Ibid).

However, there is a huge body of literatures that indicates the effect of devaluation of the trade balance to be insignificant. Rose (1991) and Ostray and Rose (1992) in their empirical work suggested that once the time series properties of the variables are properly taken into consideration in the estimation, there is little evidence that relative prices have a significant and predictable effect on trade. While Rose (1990), found that changes in real exchange rate do not have a significant effect on changes in the balance of trade of developing countries. Bhagwati and Onitsuka (1974) also, after having an empirical study in 46 African countries which devalued their currencies, concluded that imports continued to grow after devaluation and in the majority of cases, the growth rate exceeds the pre-devaluation growth rate, that is, conditions that requires the elasticity of export and import demand to be more that unity is not satisfied. This is because of the very strong demand for imported necessities and inelastic foreign demand for African exports. Thus, with relatively inelastic demand for exports and imports, devaluation has little or no effect in changing trade balance in the contest of African countries (UNECA, 1990).

According to UNECA (1990), even institutions where export demand is not restricted by foreign protectionism and synthetic substitution, the long gestation period needed to increase export production makes the export of LCDs relatively inelastic and unable to benefit from devaluation, at least in the short run. Agricultural exports are particularly characterized by this supply rigidity (ibid).

Studies indicate that Rwanda devaluate its currency by 75% in 1996, following its devaluation its export volume increases by 165.7% and its imports decreases by 111.9%. Cameroon and Madagascar devalued their currency in 1970 and 1981 respectively which lead to an increase of 133% and 139% in volume of exports and a decrease of 71.7% and 64.3% in volume of imports respectively. From this we can say that the effect of devaluation on these countries lead to an increase in exports and a decrease in imports. (Hadero, 1993)

On the other hand, devaluation increases the volume of imports and decreases the volume of exports on Kenya, Ghana and Zambia. Devaluation in these countries lead to increase in imports and decrease in exports. For instance, in 1967 a devaluation of 21% in Ghana causes to increase imports by 215% and a decrease of exports by 54.9%. In this case we can see the causal relation between imports, exports and devaluation, therefore devaluation causes to an increase in imports and a decrease in exports. (Hadero, 1993)

Devaluation can also cause to increase both the exports and imports in LDCs. The countries which had such an effect were Zaire (1967), Senegal, Cotedivore (1970) and Malawi (1976). As the effect of devaluation is increasing both exports and imports we can not get a clear conclusion. (Hadero, 1993)

2.4.3   Empirical evidence in Ethiopia

As Ghura and Grennes (1993) stated that there is a misalignment in the real exchange rate (RER), and they suggested that it is the major reason to slow growth in Africa and Latin America. As Ethiopia is one of the Least Developed Countries in Africa, the exchange rate policy in Ethiopia causes slow growth in the country.

There are a number of studies regarding the impact of devaluation on the Ethiopian trade balance with opposing results. While some of them identified devaluation to have a positive impact on the trade balance, other studies do not seem to support the positive impact of devaluation on the trade balance.

For instance, the World Bank document, Export Action program (1987), was positive that devaluation of the Ethiopian Birr could improve the trade balance condition of Ethiopia. The

document was based on the theory of devaluation. It suggested that devaluation encourages export because the export earning in terms of domestic currency is more than pre devaluation but it discourages imports since the price of imports increases following devaluation.

Ethiopia was following fixed and predetermined exchange rate until 1991, such exchange rate policy led to over-valuation of the Ethiopian currency, Birr, which in turn resulted in ever increasing budgetary deficit. The reason for such increasing the budgetary deficit was money creation in order to balance the deficit and the demand increase to tradable and non-tradable goods (increase in domestic credit). These two reasons cause to higher trade deficit and higher prices. Such events will cause to worsen the exchange rate misalignment and further over-valuation of the Ethiopian currency (Kidane, 1994)

The Ethiopian currency devaluated by 242% in September 1992 and a bi-weekly (auction) foreign exchange was a major tool for bringing the economic growth and stability by the new transitional government of Ethiopia on May, 1991.

According to a study by Andualem (1999), for instance although the value of both export and imports have increased following the 1992 devaluation of the Birr, the current account balance deteriorated over the period 1991/92 to 1998/99. According to him, the current account deficit which was 310.6 million Birr in 1991/92 has increased to Birr 365.8 million in nominal terms by the end of 1998/99. This means the current account deficit deteriorated at an average rate of 50.7%.

Befekadu and Kibre (1994), in their study on the possible effect of the 1992 devaluation on the Ethiopian trade balance, argued that in the short-to-medium term both imports and import substitute goods are unlikely to respond to price changes given the structure of the Ethiopian economy. According to them if devaluation of Birr succeeds in decreasing imports, it is likely to reduce capacity utilization and therefore output growth. Thus, the decrease in the current account deficit would be at the cost of the growth of the economy. For them, though the increases in domestic currency prices are necessary, they are definitely not sufficient to increases the volume of exportable. Further more, they argued that the greater foreign exchange availability from higher exports and from easier access to foreign capital made it possible to translate the increase in demand in to actual imports.

Sintayehu (1996) made a study on the impact of devaluation on macro economic variables like price, trade balance and output, argued that devaluation may not improve trade balance of Ethiopia since the country's rate of import is much higher than the rate of export. This indicates that higher sum of price elasticities is expected and the M-L condition is no longer sufficient. In view of this, he argued that the trade balance of the country will deteriorate further in the near future.

However, Haile (1994) has attempted to estimate the effect of devaluation on the trade balance using the elasticity approach. According to him, the sum of elasticities of export and import is greater than one. Since the Ethiopian trade balance was initially in deficit the Marshal-Learner condition is not satisfied and is not enough. He concluded that although devaluation has an inflationary potential, it will have at least a positive effect on trade balance.

Chapter 3: Foreign exchange regime and trade balance in Ethiopia

3.1 Foreign exchange regime

Ethiopia has experienced and passed through different exchange rate regimes: fixed, flexible and auction exchange rate policy (UNECA, 1999). Exchange rate of the Ethiopian currency has been changed many times since the emergence of the International Monetary Fund (IMF) ruled Bretton Woods System. In this system the currency of every IMF member country was attached to some fixed par value in terms of US dollar, which was equalled to gold (35 US dollar was equal to one ounce gold). For about seventeen years (1942 -1959) the official exchange rate was about 2.44 Ethiopian dollars (Ethiopian currency was called Ethiopian dollar in emperor regime) per one US dollar. Thereafter, the exchange rate was slightly devalued to 2.5 Ethiopian dollars per one US dollar in 1960. This value was used till the early 1970's. However, because of the inability of the Britton Wood System to bring stabilization in the world economy, the continuation of the par value system came under question in the late 1960's and early 1970's. The par value system came to an end in 1971 mainly due to the liquidity problem create in the system. The fixity of exchange rates under the condition of gold scarcity encouraged capital movement in to the US and this aggravated the country's BOP deficit. The liability of US became more than the reserve the country had in terms of gold. Due to this process the United States suspended convertibility of dollar in to gold in August 1971. This suspension of dollar marked the departure from Britton Wood agreement (Divide, 1988).

Due to the increase in the liability of US over the country's gold reserve, the US dollar was devalued by about 8.5%, that is, the price of one ounce of gold raised from 35 dollar to 38 US dollars, as a result of this, the Ethiopian dollar, revalued by about 8% against US dollar and the price of one US dollar fall from 2.5 Ethiopian dollars to 2.3 Ethiopian dollars.

On February 23, 1973 the Ethiopian currency was changed to Birr. During this time the US dollar once again came under pressure and was devalued by 10%. However, the Ethiopian Birr was revalued by 10% against the US dollar. As a result, the exchange rate had become 2.07 Birr per US dollar.

Following this, Ethiopia followed a fixed predetermined nominal exchange rate pegged to the US dollar. The government has pursued appropriate monetary and fiscal policy to maintain the fixed predetermined rate at equilibrium level. Nevertheless, the government fiscal and monetary policy has been expansionary. This was especially true in post revolutionary period (1974-1991).

The expansionary macro policy augmented the demand for both tradable and non-tradable goods in the domestic economy. Since Ethiopia is a small country, that is, its share of exports and imports are very small like 0.014% and 0.037% (NBE, 2005) in the world export and import volumes, respectively, the increased demand of tradable in the domestic economy cannot influence the price of export and import items in the world market later takes as given.

The military government (1974-1991) took a policy measure of foreign exchange allocation and exchange control to mitigate the problems of shortage in foreign currency, and trade deficits. But the exchange control and foreign exchange allocation did not give a solution for the problem of trade deficits and problem at the considerable degree because of the emergence of the parallel exchange markets. The premium (which is defined as the ratio of parallel exchange rate to the official exchange rate) increased from 1.5 in 1973 to 3.38 in 1991 (Refer to table 1); it is on the average 5.9% increment per annum. The underling cause for the flourishment of the parallel exchange rate could be explained in terms of demand and supply side. On the demand side, major consumer items started to be marketed on parallel markets, which caused a rise in the demand for foreign currency particularly the US dollar. On the supply side, the source of foreign exchange may be smuggling of exports to earn higher profit, sale of foreign exchange by tourists, diplomats and foreign workers, remittance sent back by national residents abroad.

Table-3.1: Official and parallel exchange rate, Ethiopia (1965-2004)

Year	Official exchange rate (Birr/USD)	Parallel exchange rate (Birr/USD)	premium
1965	2.50	2.50	1.00
1966	2.50	2.50	1.00
1967	2.50	2.50	1.00
1968	2.50	2.50	1.00
1969	2.50	2.50	1.00
1970	2.50	2.50	1.00
1971	2.30	2.30	1.00
1972	2.30	2.80	1.22
1973	2.07	3.10	1.50
1974	2.07	3.34	1.61
1975	2.07	3.78	1.83
1976	2.07	4.00	1.93
1977	2.07	4.21	2.03
1978	2.07	4.11	1.99
1979	2.07	3.17	1.53
1980	2.07	2.82	1.36
1981	2.07	3.09	1.49
1982	2.07	3.32	1.60
1983	2.07	3.52	1.70
1984	2.07	4.02	1.94
1985	2.07	4.85	2.34
1986	2.07	3.83	1.85
1987	2.07	6.02	2.91
1988	2.07	6.62	3.20
1989	2.07	6.03	2.91
1990	2.07	6.13	2.96
1991	2.07	7.00	3.38
1992	5.00	7.40	1.48
1993	5.00	7.06	1.41
1994	5.95	7.70	1.29
1995	6.25	7.75	1.24
1996	6.40	10.20	1.59
1997	6.70	7.50	1.12
1998	7.10	7.20	1.01
1999	7.40	8.31	1.12
2000	8.20	8.79	1.07
2001	8.50	9.01	1.06
2002	8.59	9.03	1.05
2003	8.63	8.71	1.01
2004	8.65	8.71	1.01

Source: World Development Report and NBE (2005)

The annual increments between the year 1964 and 1971 was zero as shown in the table above. This indicates that there was no misalignment of exchange rate or no exchange controls in this period. However, there was over time increase in the premium from 1972 until 1991, on average. Consequently, there was rapid expansion of in illegal trade and smuggling. The smuggling of major exports had its own implication for the continuous decline in the trade balance and for the shortage of foreign exchange.

In a desire to solve the problems related to the fixed exchange rate the Ethiopian People Republic Democratic Front (EPRDF) devalued the Ethiopian Birr by 241.5% in 1992 in nominal terms. After this massive devaluation the price of one US dollar raised from Birr 2.07 to Birr 5.00 in nominal terms. This was 42% devaluation of Birr in nominal dollar terms; this is the decline of the Birr in nominal dollar terms from 0.48 before devaluation in 1991 to 0.2 in 1992 which is after devaluation. As a result of this, as we can see from table 1 that premium decreases from 3.38 in 1992 to 1.48 in 1992. Therefore devaluation of the country's currency helped to reduce the gap between the official exchange rate and parallel exchange rates but did not remove the premium.

Until the introduction of the auction system in 1993, the country started to use the market determined exchange rate policy by using a bi-weekly foreign exchange rate as a major tool for bringing about economic growth and stability. During this period there was a reduction in the premium from 1.48 in 1992 to 1.41 in 1993 but there was still exchange control by the government (refer table one). In reference to the same table the premium reduces to 1.01 in 2003 and 2004, this indicates that the official and parallel exchange rate was almost the same and equal to the long rum equilibrium.

The auction system in Ethiopia

To make the exchange rate determined by the market and further liberalize the foreign exchange market the EPRDF introduced the auction system on the first of May, 1993. This measure could be considered as the first step towards the floating exchange rate system.

The auction of foreign exchange system has two principal objectives in the case of Ethiopia (NBE, 1993:1). One is ¨to minimize the use of an administrative mechanism in allocation of foreign exchange¨ and the other is ¨to allow the exchange rate to respond to changes in the

demand for and supply of foreign exchange.¨ As to the first objective, the government aims at reducing discrimination against the private sector in foreign exchange allocation. During the Derg regime (1974-1991) foreign exchange had to be administratively rationed and was mainly allocated to the public enterprises, but the private importers took place under Franco Valuate System (Derese, 1996) where the importer had to furnish his/her foreign exchange which he/she could get in the parallel foreign exchange market. Therefore, the government introduced auction to allow private sector participants to have access to foreign exchange. The second objective, which is basic to all auctions, is aimed at reducing the gap between the official exchange rate and that of parallel market exchange rate. That is, at the unification of the two rates.

There are four types of auction systems- the English auction system, the Dutch auctions, first-price auction (Discrimination) and second price auction (uniform) (Mca fee and McMillan, 1987). Ethiopia adopted the Dutch auction system. The Dutch auction system is a descending price auction system where the auctioneer calls starting from the highest price. This process continues until total supply equals the demand. Until this point, each birder gets the amount he/she bids for and pays the price where he/she calls. The auction is undertaken by the National Bank of Ethiopia (NBE). The Bank decides on the amount of foreign exchange and issues import license which qualify the holders of these licenses to participate in the auction. The submission of document and bids on time and the use of foreign exchange by successful bidders are also defined by the Bank. In Ethiopia, in the auction system, the eligible applicants used to be those who are holders of valid import licenses and private industries, other enterprise and organizations that want to import items for their own internal use. But nowadays, the auction is made between commercial banks and the above importers will get their foreign exchange from the bidders' commercial bank(s).

However, there are many weaknesses in the Dutch auction system. First, it is unable to respond to market forces in the determination of exchange rate for extra-auction transactions. Even though the aim is to converge to the parallel rate, the auction rate still coexist with the parallel market even if the premium is highly reduced compared to the Derge regime. The reasons for such coexistence with the parallel market are because of the amount of foreign exchange limits and the qualification set by the National Bank of the country to participate in the auction. As many are not qualified to participate in the auction and the qualified needs more of foreign exchange, they look for an alternative, that is, the parallel exchange market.

The Dutch system also leads to monopolization of the auction. For example, according to Fuja(1993), it was experienced in Zambia that one large multinational company could win over 90% of the total supply of foreign exchange to the auction making eligible bidders unsuccessful. The Dutch auction system also fails to establish single market determined rate (Fuja, 1993).

Second, even though the path to the united floating is a welcome development to Ethiopian government, there are; however, some costs associated with the unification of the official rate with the parallel market rate. In two recent instances, Sieraleon and Zambia (Pinto, 1988) there was a big surge in inflation up on attempted unification of official rate and parallel market rate by adopting market determined official rate. In a summary, the different exchange rate policies that Ethiopia had followed and is following will be summarized in the in the table below:

Table-3.2: Ethiopian Exchange rate policy (since 1960's-2004)

Period	Nominating exchange rate	Policy
Pre-1973	2.50	Ethiopia currency fixed IMF par value system
1973-1991	2.07	Fixed exchange rate system
1992-1993	5.00	Flexible exchange rate (bi-weekly foreign exchange rate)
1994-1995	Different rates	Multiple exchange rate Policy (official exchange rate and market rate)
Post 1995	Varies from time for time	Dutch auction exchange rate system

Source: Derese (1996)

3.2 Ethiopian exports

The export structure of a country is determined by its level of development, resource endowment, policies and development strategies. As Ethiopia is one of the developing countries its economy heavily depends on the agricultural sector, which accounts for about 50 percent of the GDP. It is estimated 85% of the total population depends on the sector directly or indirectly. Ethiopian export structure also heavily depends on the agricultural products. Until 1999 agricultural products used to account more than 90% of the total exports. There has been improvement on the export of industrial sector from 2000 due to the decline of world price on the primary commodities and improved industrial sectors in the country. The share of the industrial sector in exports was 15.2% in 2000 and increased to

26.5% in 2001. The major export commodities of Ethiopia are Coffee, oilseeds, leather and leather products, pulses, meat and meat products, fruits and vegetables, sugar and molasses, chat and gold. Of these coffee is the dominant export commodity and making-up on average 55-60% of the total exports.

Table-3.3: Exports from Ethiopia (1980-2003)

year	Value 1000Birr	Unit value of export index 1980=100[3]	Volume[4] 1980 prices
1980	851509	100.00	8515.09
1981	778083	104.50	7445.77
1982	809625	81.60	9921.88
1983	929625	93.20	9974.52
1984	744572	94.10	7912.56
1985	923816	122.30	7553.69
1986	795284	103.30	7698.78
1987	773642	92.30	8381.82
1988	902753	119.30	7567.08
1989	736806	106.30	6931.38
1990	542485	95.60	5674.53
1991	279026	104.90	2659.92
1992	948983	167.30	5672.34
1993	1419468	166.20	8540.72
1994	2835179	240.10	11808.33
1995	2607288	242.70	10742.84
1996	3901671	264.40	14756.70
1997	4141582	288.50	14355.57
1998	3637260	288.70	12598.75
1999	3957802	296.10	13366.44
2000	3866606	281.90	13716.23
2001	3864320	245.70	15727.80
2002	4142356	254.70	16263.67
2003	5176644	264.50	19571.43

Source: National Bank of Ethiopia annual report, 2004 and own calculation.

Before the period 1992 Eritrea was part of Ethiopia and the data during this period includes Eritrean exports. Eritrea had its own contribution to the total Ethiopian export and GDP. From table-3.3 we can see an average decline of 37.38% and 31.12% on quantity and value of exports respectively from 1980 to 1991. The reasons to such a decline as mentioned by many studies and reports of the country are due to the increment of the premium (the ration of the official and parallel exchange rate), which motivates to illegal exports of the country's

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[3] The unit value of export index is calculated by the researcher from the given data of prices of export commodities by the National Bank of Ethiopia annual report, 2004 (1980=100).
[4] The quantity of exports is derived by dividing the Value of exports to the unit value of export index.

agricultural products. The increment in the premium of the exchange rate is due to the overvaluation of the Ethiopian currency during the period and made the exports of the country more expensive to the rest of the world through the official channel. In comparison the earning from the exports through the illegal channel is higher.

During the period 1992-2004 the value and volume of exports increase from Birr 949 million in 1992 to Birr 7,331 million in 2004 and from 5672.34 in 1992 to 19571.43 in 2003 respectively. The increase in the quantity and value of exports is due to the devaluation of Ethiopian currency in September 1992. In this period there were also fluctuations on the trend on the quantity and value of exports, as Ethiopia is depending on the export of agricultural products, any change or fluctuation on the world coffee market affects the export volume and quantity of the country.

Figure-3.1:   The trend of quantity of exports

The above graph shows the trend of volume of Ethiopian export. From the figure we can see decrease in the beginning and increases for the next three years; this was mainly due to the weather conditions in the country as the county's exports mainly depend on the agricultural products. The serious decline from 1983 to 1985 was due to the severe drought and famine from the bad weather condition in 1983 which stayed until the good weather condition in 1985. There was an increase from 7553.69 to 7698.78 in volume from 1985 to 1986; the increase in volume coincides with the jump in premium from 2.34 in 1985 to 1.85 in 1986, this clearly indicates smuggling of the export commodities of the country to neighbouring countries reduced and exported through official channels. Then it shows a bit improvement

and decreases until 1991, this was due to the sever war in the country to the end of the military government on May, 1991. As a result of the new transitional government and a new policy reforms (devaluation) there was an increase in the volume of exports of the country from 1991 until 1996 unless a fluctuation in the world coffee prices, there was a major decline from 1997 to 1999 due to the boarder conflict between Ethiopia and Eritrea and bad weather condition in the country.
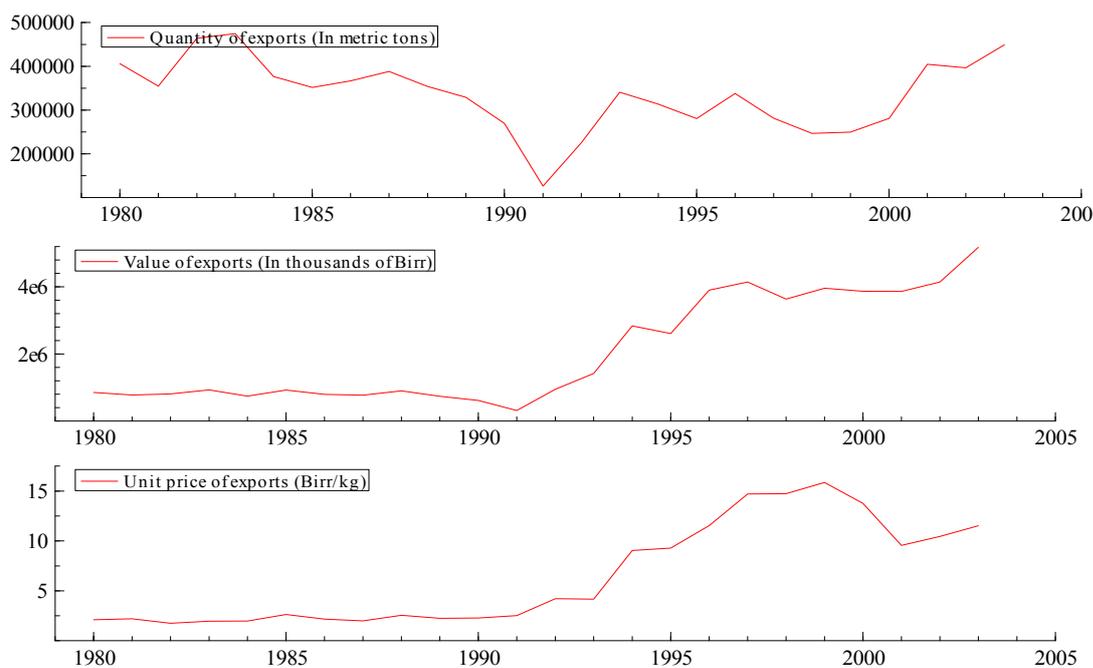
Figure-3.2:   The trend of quantity, value and unit value of exports of Ethiopia 1980-2003 from top to bottom respectively.

The value of exports affects in the same way as the quantities of exports. The poor performances of the world coffee prices during the 1999 and 2000 also affect to decrease the value Ethiopian export earnings. The total value of export decreases from Birr 3,958 million in 1999 to Birr 3,867 million in 2000 and further to 3,864 million in 2001. This was a result of a continual decline in the international market prices of coffee from Birr 20.87/kg in 1999, Birr 18.21 in 2000 and Birr 15.33/kg in 2001 and the decrease of the foreign exchange earning from meat and meat products and live animals by more than half due to the decrease in world demand because of the contagion effects of 'foot-and-mouth' disease of cows in Europe. This indicates how the country depends on the world prices of coffee. It shows an increment in the value of Ethiopian exports from 2001 because of the improvement of the international prices of coffee which is the dominant export commodity of Ethiopia and the export of oilseeds, meat and meat products, live animals and flowers recorded a noticeable performance.

In regard to the prices of exports it affects in the same direction as the volume and values of exports. There was a rapid growth from 1991 until 1999; this is because of devaluation of the country's currency and increment on world prices of coffee. We can see a decline on 2000 and 2001 due to the decline in world prices of coffee. There was a rise in the price of exports from 2002 on wards, as a result of the improvement of the international coffee prices and increase in the volume of export of other commodities of the country.

3.3 Ethiopian imports

The import structure of a country also depends on its level of development, resource endowment, policies and development strategies. Due to its nature of the factors the major imports of Ethiopia are raw materials, semi-finished goods, fuel, capital goods and consumer goods.

Table-3.4: Imports to Ethiopia (1980-2003)

year	Value 1000Birr	Unit value of import index 1980=100	Volume 1980 prices
1980	1384234	100.00	13842.34
1981	1642661	107.28	15311.90
1982	1752945	111.40	15735.59
1983	2065005	111.12	18583.56
1984	1770433	131.53	13460.30
1985	2201265	137.61	15996.40
1986	2237146	124.60	17954.62
1987	2274651	127.30	17868.43
1988	2110353	139.51	15126.89
1989	1824119	146.71	12433.50
1990	2130305	177.37	12010.51
1991	1810897	214.60	8438.48
1992	3618718	236.03	15331.60
1993	4739967	238.78	19850.77
1994	6546272	270.67	24185.44
1995	7708246	273.17	28217.76
1996	8692494	275.36	31567.74
1997	9338459	279.46	33416.08
1998	11702002	281.91	41509.71
1999	11438661	293.63	38956.04
2000	12313956	297.45	41398.41
2001	15289146	281.01	54407.84
2002	16067348	294.22	54609.98
2003	22295690	310.66	71768.78

Source: National Bank of Ethiopia annual report, 2004 and own calculation for unit price of import index 1980=100

There was a higher import of grains due to the severe drought in the country during the period 1980-1985. There was a favourable domestic weather condition in Ethiopian in from 1985 to 1987, as a result showed a substantial drop in grain imports particularly and the total value of imports generally. There was a decline in imports until 1991 as a result of the serious war in the country.

In May 1991, when the transitional government is installed there was new economic policy reforms. One of the economic policy reforms was the devaluation of the Ethiopian currency by 241%, to reduce the imports of the country and increase the exports. But as we can see from the graphs above there is a sharp increase in the total imports, the basic reason for this is, as the country's major import are Raw materials, semi-finished goods, fuel, capital goods and consumers goods which are really hard to decrease of importing them even the prices are increased. The increased in the profitability of the export industry also leads to increased import of raw materials (inputs) and capital goods to the country.
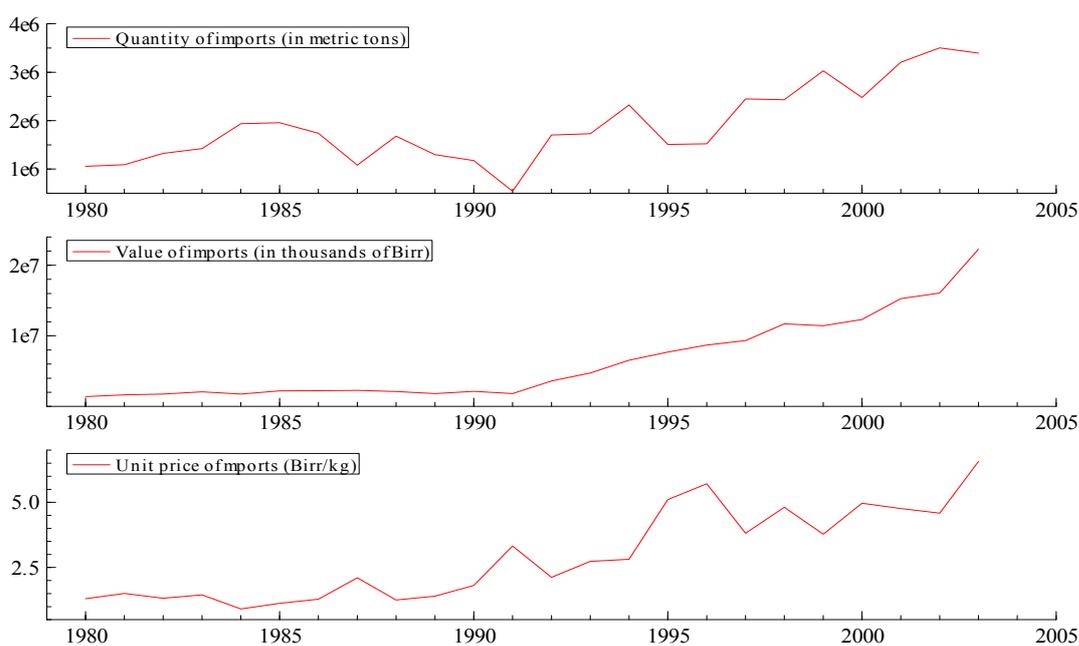
Figure-3.3:   The trend of quantity, value and unit value of imports of Ethiopia 1980-2003 from top to bottom respectively.

As we can see from the graphs there is a decrease in the volume of imports but an increase in the values of the imports during the period 1994-1996, this was because of the devaluation which makes the prices of imports expensive and leads to import small quantity with higher

value. There was a decrease both in the volume and value of imports in 1999, this was mainly because the Ethio-Eritrea border conflict.

The value of fuel imports in Ethiopia increase in 1999, 2000 and 2001 as a result of a rise in both the international oil prices and the increase in volume of domestic fuel consumption. The import of fuel alone consumes about 66 percent of the country's total export receipt in 2000/2001. (National Bank of Ethiopia annual report, 2004)

The raw materials import grew from 2000 to 2003 due to the expansion of in industrial production and higher international prices for metal products such as iron sheet and steel. As a result of the increase in the investment activities of the country the import of capital goods registered a notable increase.

3.4 Trade balance

The trade balance of a country is defined as the difference between the monetary value of it exports and imports over a certain period of time. A trade balance can be positive or negative. A trade balance can be positive (trade surplus) if the monetary value of a country's export is greater than its imports and negative (trade deficit) if the monetary value of its imports greater than its exports.

The Ethiopian trade balance is always negative or deficit. This means that Ethiopian imports exceed its exports or unable to cover its import bills. The reasons to such a deficit trade balance are its level of development, policies and strategies in the country.

Table-3.5: Trade balance of Ethiopia (1980-2003)

Year	Trade balance 1000 Birr	GDP 1000 Birr	Trade balance % GDP
1980	-532725	10993770	5
1981	-864578	11014470	8
1982	-943320	11103480	8
1983	-1135380	11979090	9
1984	-1025861	11693430	9
1985	-1277449	10389330	12
1986	-1441862	11289780	13
1987	-1501009	12943710	12
1988	-1207600	12945780	9
1989	-1087313	12767760	9
1990	-1513921	13024440	12
1991	-1492541	11923200	13
1992	-2669735	25625000	10
1993	-3320499	29075000	11
1994	-3711093	35569100	10
1995	-5100958	39487500	13
1996	-4790823	45324800	11
1997	-5196877	49131100	11
1998	-8064742	49955600	16
1999	-7480859	55211400	14
2000	-8447350	64804600	13
2001	-11424862	72360500	16
2002	-11924992	74028620	16
2003	-17119046	33795808	24

Source: Own calculation from the annual report of National Bank of Ethiopia, 2005

As we can see from table-3.5, the trade balance is negative from 1980-2003, there was a decline from -1135380 thousand birr 1983 to -1025861 thousand birr in 1984, this was because a substantial decrease on the grain imports during the period, but the trade balance share to the country's GDP was the same 9%. The trade balance is affected by the factors that affect the imports and exports of the country (explained in section 3.2 and 3.3). There was a jump in GDP from 11,923 million Birr in 1991 to 2,562 million Birr in 1992, the reason was that the end of the war and increasing domestic activities in the country.

As mentioned earlier Eritrea was part of Ethiopia until 1991. From 1992 Eritrea become a separate country with its own activities of export, import and GDP. The GDP of Eritrea from 1992 is given in the following table.

Table-3.6 Eritrean GDP (1992-2003)

Year	Exchange rate Nakfa[5]/USD	1000Birr	Size to Etiopian GDP (%)	1000Nakfa	1000USD
1992	4,07	2147945	8	1748427	429589
1993	5,07	2436946	8	2471063	487389
1994	6,07	3515379	10	3586278	590820
1995	7,07	3798174	10	4296495	607708
1996	8,07	4249437	9	5358275	663975
1997	9,07	4800458	10	6498530	716486
1998	10,07	5177225	10	7342909	729187
1999	11,07	5396708	10	8073183	729285
2000	12,07	5195520	8	7647552	633600
2001	13,07	5882750	8	9045594	692088
2002	14,07	5945038	8	9737682	692088
2003	15,07	6014313	18	10498506	696649

Source: World Bank and own calculation

As we can seen from tables 3.5 and 3.6, the Ethiopia GDP shows an increase even after the separation of Eritrea, the high increase on GDP is achieved as a result of the relatively high agricultural output growth. The increase in agricultural output is achieved by the improved farmer's productivity due to better supply of agricultural inputs and favourable weather condition.
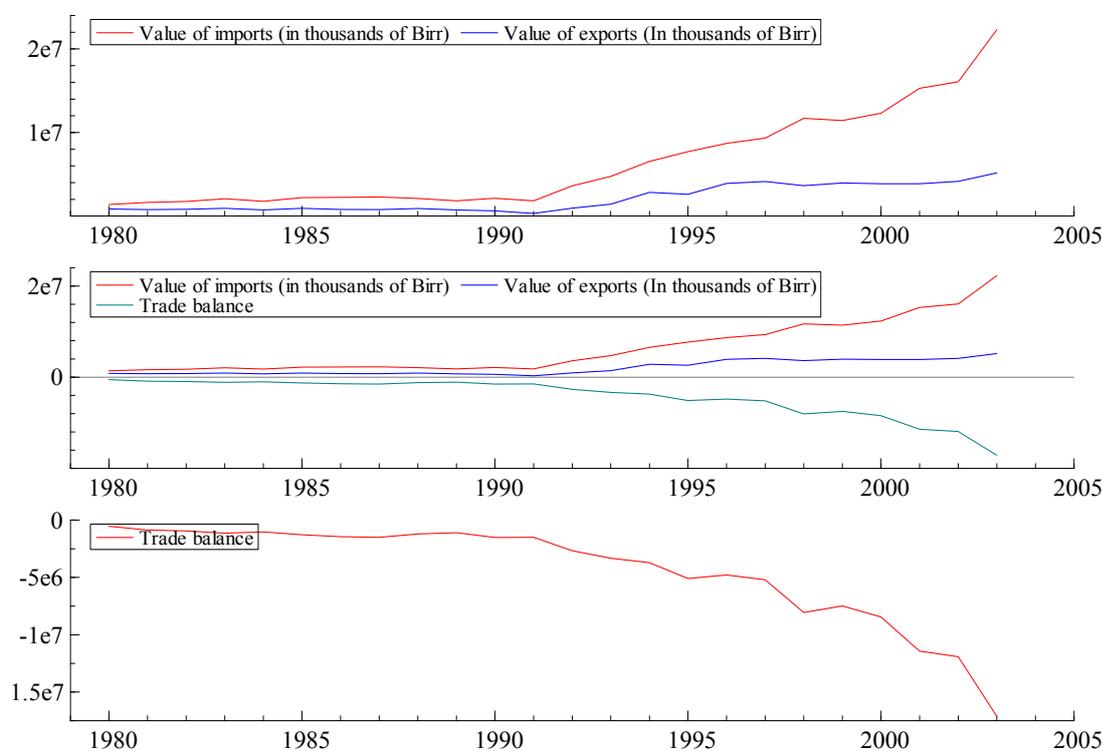
Figure-3.4:   quantity of imports and exports, value of exports, imports and trade balance, and the trend of trade balance of Ethiopia 1980-2003 from top to bottom respectively.

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[5] Nakfa is the national currency of Eritrea.

As we can see from figure 3.4, the trade balance of Ethiopia is negative all the way from 1980 to 2003 and their share to the Ethiopian GDP increases from 5% in 1980 to 24% in 2003. But the gap between imports and exports is getting wider after 1991, which is after devaluation of the Ethiopian currency. The trade balance was -533 million birr in 1980 which is 5% of the GDP of the country and rise to -1,493 million birr in 1991 (13% of GDP). This show that during the period there was excess of Ethiopian imports over its exports. On average there was an increase of 280.17% on trade balance deficit.

In September 1992 the transitional government of Ethiopia devaluate the Ethiopian currency to improve the trade balance of the country. The trade balance deficit rise from -1,493 million Birr in 1991 to -2,667 million Birr in 1992 and to -17,119 million Birr in 2003. As we can see from the figures also the trade balance gets worse and worse.

The reasons to such an increase in the trade balance deficit after devaluation of the Ethiopian currency are the nature of the country's exports and imports. As a result of the devaluation of Birr, the country's exports become cheaper in relative to its imports. As the major imports of the country are raw materials, semi-finished goods, fuel, capital goods and consumer goods and are very important factors to the development of the country. Even if their prices are increasing the country can not decline importing these factors. During the period the country increases importing of capital goods as a result of increasing investment activities and increase the import of fuel and raw materials due to the increase of the domestic consumption. The increase in the volume of imports, international rise in price of oil and metal product and devaluation makes to raise the country's import value at a high rate.

On the export side, as Ethiopian exports are agricultural products which are price and income inelastic, the price decrease in the exports as a result of devaluation and the export demand abroad is not proportional. . The international decline on the price coffee (Ethiopian dominant export item) also affects the country's value of exports to decline.

To sum up Ethiopia is characterized as a trade balance deficit. The country's deficit gets worse after devaluation of its currency in 1992; devaluation plays role in the increase of exports but did not play any role in the reduction of its imports and trade balance.

CHAPTER 4: Model specification

4.1 Introduction

The model specification part of the paper will explain the model to be used in the Ethiopian data to analyze the impact of devaluation on the trade balance to see the effect, econometric analysis will be performed. This part will give the theoretical concepts of the models and their formulation to the relevant data which will be analyzed. The models to be used are the export demand model and the import demand model. Theoretical concepts of the econometric tests will be explained here.

4.2 The export demand model

The exports of Ethiopia are the imports to another country (the rest of the world). The demand for Ethiopian export refers to the demand of Ethiopian goods and services by the rest of the world. Then export demand means foreign imports. According to Rødseth (2000) the export demand is defined as:

$$\mathbf{Z^* = Z^*(R, Y^*)} \qquad \mathbf{Z^*_R > 0;\ Z^*_Y > 0} \qquad\qquad (4.1)$$

Where Y^* is foreign output or output in the rest of the world. The foreign demand for Ethiopian goods depends positively on the foreign activity and the foreign price level. As the foreign activities increase their demand for foreign goods increases, as the foreign prices increases the Ethiopian exports become more attractive and their demand in the rest of the world also increases.

In estimating the export demand function Khan (1974) will be applied to the Ethiopian annual data from 1980 to 2003. The export demand equation in given by:

$$\mathbf{LX = a_0 + a_1 L(PX/PXW) + a_2 L(PX/PXW)\_1 + a_3 LYW^6 + a_4 LP + a_5 D\_ER + a_6 D\_D + U_1} \qquad (4.2)$$

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[6] Since there is no available data of GDP of all Ethiopian trading countries the world GDP is taken as the GDP of the Ethiopian trading countries.

Where X is the volume of Ethiopian exports, PX is price of exports or the unit value of exports of Ethiopia, PXW weighted average of export prices of Ethiopian trading partners (world price level), the distribution lag on the relative price of exports is included in the model and presented by $(PX/PXW)\_1$, YW is the world real income, P is the premium in the official and parallel exchange rate, D_ER is the dummy variable for Eritrea. The dummy Eritrea has a value one (1) when it was part of Ethiopia and zero from 1992. D_D is a dummy variable for the devaluation period, the D_D has value one (1) for the period 1992 which the big devaluation of Ethiopian currency occurred and zero before and after. U is an error term associated with each observation and L is log. The error term contains all the other factors besides the included variables in the equation that determines the Ethiopian export demand.

In the same manner the paper will also estimate the export demand of Ethiopian coffee to the rest of the world and the supply of Ethiopian coffee. Since there are different factors that affect the supply of Ethiopian coffee and the demand of the coffee export, they will be estimated separately using OLS. The supply of coffee equation for the period (1980-2003) is given by:

$$LSC = b_0 + b_1 L(PXG/PD) + b_2 LRF + b_3 D\_D + b_4 t + U_2 \qquad (4.3)$$

Where SC is the supply of Ethiopian coffee, PXG is the price paid to the growers in Ethiopia, PD is the domestic price level, RF is the rainfall, D_D is as explained above t is simple time trend in the coffee production. The error term includes the variables that affect the supply of coffee other than the included variables.

The price of coffee for the same period (1980-2003) is estimated separately and the equation is given by:

$$LPXC = \beta_0 + \beta_1 LXC + \beta_2 LWCD + \beta_3 LPXW + U_3 \qquad (4.4)$$

Where PXC is the price of coffee, XC is the export volume of Ethiopian coffee, WCD is the world coffee demand and PXW is the world consumer price index used to deflate the price of coffee. The error term has the same definition as above.

All the variables in the equations from 4.5 to 4.7 are defined in a logarithmic (L) terms, indicates that we can easily interpret the coefficients as elasticity of exports with respect to corresponding variables. Generally we expect the income elasticity to export demand to be positive ($a_3 > 0$), as the world real income increases the export demand of Ethiopia increases and as the world real income decreases the export demand of Ethiopia decreases. And we expect the price elasticities to export demand $a_1 < 0$ and $a_2 < 0$ as the relative prices of exports increase the demand for Ethiopian export (both the total export and coffee export) decreases and vice versa. Since the Ethiopian production of coffee is highly depend on the rainfall of the country its coefficient is expected to be positive ($a_4 > 0$) to show its positive relationship. Due to the inverse demand function for the price of coffee the coefficient of the world coffee demand is expected to be negative ($\beta_2 < 0$).

4.3 The import demand model

The demand for import refers to the demand of Ethiopian for foreign produced goods and services. Rødseth (2000) defines the demand for import as a function of the domestic activity and the real exchange rate.

$$\mathbf{Z = Z\ (R,\ Y)} \qquad \mathbf{Z_R < 0;\ Z_Y > 0} \qquad \qquad \textbf{(4.5)}$$

Where Y is the domestic output or activity, the domestic import depends positively on domestic income, higher domestic income leads to increase import and vice versa. The demand for imports is negatively related to real exchange rate, because a higher real exchange rate makes foreign goods relatively expensive and obviously decreases the quantity of import. As a result of this we expect $Z_R < 0$ and $Z_Y > 0$.

Khan (1974) demand for import model will be used for the Ethiopian data with some modification. The import demand of Ethiopia is given as follows using the model specification:

$$\mathbf{LM = \eta_0 + \eta_1 L(PM/PD) + \eta_3 LY + \eta_4 LP + \eta_6 D\_ER + \eta_7 D\_D + U_4} \qquad \textbf{(4.6)}$$

Where M is the quantity of Ethiopian import, PM is the unit value imports in Ethiopia, PD is the domestic price level Y is the Ethiopian GDP, dummies as explained above in the export demand equation and U_4 is the error tem associated with each observation. The distribution lag of the relative prices of imports is included in the model as the first lag of the relative prices. The import demand equation of Ethiopia will be estimated by instrumental variable model, rainfall will be used as an instrument for the Ethiopian GDP (Y). .

In the same logic as the demand for export we expect $\eta_3 > 0$, because as the domestic activity increases the demand for import increases and vice versa. We also generally expect $\eta_1 < 0$, the logic behind is as the ration of the unit value of imports to the domestic price level increase, the demand for import decreases and as the ratio decreases the demand for imports increase. The coefficient of the dummy variable of Eritrea expects to be positive, to show Eritrea had a positive impact on the import demand of Ethiopia.

4.4 Econometric tests

As the paper is going to apply time series data, some econometric tests in regard to time series data will be done with the help of stata and PcGive. From a theoretical point of view, a time series is a collection of random variables $[X_t]$. Such collection of random variables ordered in time is called stochastic process. One important class stochastic of process is that of stationary stochastic process.

A stochastic process is said to be stationary if its mean and variance are constant over time and the value of covariance between two-time periods depends on the distance or lag between two-time periods and not on the actual time at which the covariance is computed (Gujurati, 1995).

According to Gujurati (1995), letting Y_t to be a stochastic time series variable that has the following property:

Mean: $\qquad E(Y_t) = \mu$

Variance: $\qquad \text{var}(Y_t) = E(Y_t - \mu)^2 = \sigma^2$

Covariance: $\qquad E(Y_t - \mu)(Y_{t+k} - \mu) = \alpha_k$

Where: α_k is covariance between the values of Y_t and Y_{t+k}, μ is mean and σ^2 is variance. If Y_t is to be stationary mean, variance and auto covariance of Y_{t+m} must be the same as those of Y_t.

If a time series is not stationary in the sense just defined, it is called a non-stationary time series. Non-stationarity has both economic and statistical implication. The statistical implication is that the variables will not have a constant mean, variance and covariance if they are plotted against time (Gujurati, 1995). Using simple OLS for non-stationary variables will give us spurious regression results with high R^2 thus; we cannot make any interpretation of the results unless we check the stationary of the variables. Hence the first step in modelling time series econometric model is to check the stationarity using unit root test. According to the availability of the Ethiopian data the Augmented Dukey Fuller (ADF) test will be used.

The unit root test indicates the order of integration of variables to make them stationary. According to Gujurati (1995), if a time series is differenced once and the differenced series is stationary, we say the original series is integrated of order 1 denoted by *I(1)*. In general, if a time series has to be differenced *d* times before it becomes stationary, then it is integrated of order *d* or *I(d)*. If *d=0*, the resulting *I(0)* process represents a stationary time series. Differencing variables will enable us to obtain stationary data. But differencing variables will make them stationary at the expense of long-run relationship among the variables.

Cointegration test will be used to see the relationship between the dependent and independent variables. According to James D. Hamilton (1994), *¨Cointegration means that although many developments can cause permanent changes in the individual elements of Y_t, there is some long-run equilibrium relation trying the individual components together...¨.* We can say variables are co-integrated if they have the same trend through time.

According to Gujurati (1995), time series variables are cointegrated if the linear combination of the variables, the error term, is stationary but the variables are individually non-stationary. We can perform cointegration test using different methods but to be consistent with the unit root test, this paper will use the Augmented Engle-Granger (AEG) test.

The error correction model (ECM) indicates the short-run dynamics of the OLS estimation results and its adjustment towards the long-run equilibrium. ECM removes non-stationarity from the individual series in order to make the conventional classical regression techniques applicable and to correct the disequilibrium error created in the short term.

Regressing the first differences of the dependent variable on the first difference of the independent variables using OLS shows the short term dynamics of the model but we can use the one period lagged error term to tie the short-run behaviour of the dependent variable to its long-run value (Gujurati, 1995).

CHAPTER 5:   Data analysis

5.1 Introduction

In this section of the thesis the estimation results of the Ethiopian data (1980-2003) will be discussed. Estimation of the export demand equation will be discussed in section 5.2. The estimation result of the Ethiopian coffee will be presented in section 5.3 and section 5.4 will deal with the estimation of import demand. The analysis is made using data for the period 1980 to 2003. Data are obtained from various sources. Data for export, import, GDP, export price index, official exchange rate and parallel exchange rate are collected from various annual publications of the National Bank of Ethiopia (NBE). Foreign price of import is computed by multiplying the unit value of import obtained from the international statistics book of the IMF by its corresponding official exchange rate of Ethiopia. Premium is computed as the ratio of parallel exchange rate to official exchange rate.

5.2 Estimating the export model

The test for stationarity of the variables is shown in Annex 3. The result is that the variables are non-stationary at level and are stationary at the first difference. This shows a long-term relationship between the dependent and independent variables of the model. And they are cointegrated. The OLS result for log linear export model is shown is given in annex-1, EQ1.

The estimation result for the log linear export model can be set and interpreted as follows:

$$LX= -35.76 - 0.47L(PX/PXW)+0.86LYW-0.24LP - 2.29D\_ER + 0.52D\_D+U_1 \qquad (5.1)$$
$$\quad (15.15) \quad (0.20) \qquad\qquad (0.33) \qquad (0.55) \quad (0.58) \qquad\quad (0.72)$$

Total quantity exports, annual data 1980-2003. Standard errors are shown in parentheses.

From the regression result, the F-test shows that the explanatory variables jointly explain export because the computed value 14.07 is highly greater than the critical value at 1% level of significance. This is confirmed by the high R^2, which shows that the explanatory variables explain 89% of the variation of the dependent variable (quantity of export).

The ADF unit root test of residual of the export demand equation shown in appendix 3 is stationary at level; this stationarity of the residual indicates the co-integration of the variables in the long run.

Test for serial correlation (AR-test), which is used to check where the error terms are correlated to each other or not, indicates non-existence of serial correlation. The null hypothesis for this test is that there is no serial correlation but as shown from the result the computed F-value is lower than the critical value at 5% level of significance and 1% level of significance. Hence we accept the null hypothesis. The ARCH test (test for hetroscedasiticity in time series) also indicates absence of hetroscedasticity. The null hypothesis for this test is there is homoscedasticity and we accept the null hypothesis because the computed F-value 0.05 is less than the critical value. The Jargu-Bera test of normality also does not reject that the error terms are normally distributed with mean zero and constant variance. The Ramsey's regression specification error term test (RESET), on the other hand, shows absence of functional problem (there is no problem on the specification of the variables by the log linear). The null hypothesis for this test is that there is no functional problem. Since the F-value is sufficiently low, we accept the null hypothesis.

The sign of the estimated coefficients are consistent with the prior theoretical expectation. Accordingly, the coefficient for LYW is positive and significant at 1% this clearly indicates that the Ethiopian export demand is highly affected by weighted average of real incomes of the country's trading countries. A 1% increase in YW will increase the export demand of Ethiopia by 0.86%, which means that Ethiopian exports are income inelastic. Premium has negative relationship with the quantity of export demand of the country. As the premium increases the smuggling of the country's goods increase to the neighbouring countries and the export demand through the official channel decreases. The coefficients for L(PX/PXW) and D_ER are negative and significant at 1%, 5% and 1% respectively. The variables have a negative relationship with the quantity of export demand of Ethiopia.

The coefficient for the D_ER negative means the quantity of Ethiopian export was smaller when Eritrea was part of Ethiopia, this can justified by the amount of export products that were used in the Eritrean market when it was part of Ethiopia. These goods was not treated as exports during that time and become part of exports to Ethiopia. This result may also

indicate that there were smuggling of the Eritrean export items during the time to the neighbour countries (Sudan, Djibouti and Yemen).

One feature of the log linear model is that the slope of the coefficients measure elasticity of the dependent variable with corresponding variable. From the above equation, 1% increase in the relative prices results in 0.47% decrease in the quantity of export. This implies that Ethiopian exports are price inelastic. The price elasticity of export is 0.47 and we can say that the demand of the Ethiopian exports is inelastic.

An error correction model (ECM) is performed to see the adjustment gap between the short-run and the long-run. The above export equation shows the long-term relationship, regressing the first difference of the level equation gives its short-term relation. The adjustment mechanism is presented in the following paragraphs by regressing the first difference of the dependent variable with the first difference of the explanatory variables and the one period lagged error term. The error correction model is done for the total exports.

All the variables are stationary at the first difference and they have a long run relationship and are cointegrated. From EQ2 the OLS estimation of the first difference log linear export equation can be set and interpreted as follows:

DLX= -0.04 – 0.63DL(PX/PXW) + 0.95DLYW - 0.02DLP - 1.56DD_ER + 0.47DEX_1 - 0.96R_1   (5.5)
       (0.12)   (0.19)   (2.24)   (0.04)   (2.77)   (0.16)   (0.35)

Where D is the first difference and R_1 is the first lag of residuals.

The F-test shows that the explanatory variables significantly explain the differenced export model jointly at 1% level of significance. The AR, ARCH, Normality and RESET test show absence of serial correlation, absence of hetroscedasticity, that error terms are normally distributed, and no functional problem, respectively.

One important feature of the coefficients of the adjustment model is that they capture the percentage of disturbance created in the short run (that is the deviation from the long run equilibrium). The coefficients are expected to lie in absolute terms between 0 and 1 if the coefficients are statistically significant. One means the disturbance in the short term will be

corrected each year by 100% but 0 means it takes long period to adjust the gap between the short terms and the long run equilibrium. Although we expect the regression coefficients of the ECM to lie between 0 and 1, the regression results for some of the variables are greater than 1. This is because of the problem of getting all the data from the same source and hence a result greater than 1 in the study is interpreted in such a way that it is 1.

The coefficient of the R_1 indicates that, how fast the short-run is adjusted to its steady (long-run) level. In the case of Ethiopian estimation the short-run adjustment level of exports to their long-run is 96%. Since Ethiopian is at early stage of development it has a high growth rate with fast adjustment.

5.2 Estimating the coffee model

The Ethiopian economy is based on agriculture. Agriculture contributes more than 80% of the exports and employs 85% of the population. Coffee is the major export crop and source of foreign exchange. A separate estimation is done for coffee using OLS. The estimation result the supply of coffee is given in annex-1, EQ3 and the equation is:

$$LSC= 19.55 - 0.08L(PXG/PD) + 1.26LRF - 0.53D\_D + 0.005t\_1 +U_2 \tag{5.2}$$
$$(2.16)\quad (0.08)\qquad\qquad (0.29)\qquad (0.15)\quad (0.01)$$

From the regression result, AR 1-2 test, the DW test, ARCH and normality test results shows no autocorrelation, hetroscedasticity and the data is normally distributed. Moreover, the R^2 shows 45% of the variation in the supply of coffee is explained by the above included variables and accompanied by the F-test which is significant at 5% level.

From the regression result we can also interpret the coefficients, the rainfall and the devaluation dummy are significant at 1% level and clearly indicate how these variables affect the supply of coffee in the country. There is a positive relationship between the variable rainfall and the supply of Ethiopian coffee and can be interpreted as the rainfall increases in the country's supply of coffee increases and vice versa. The devaluation dummy has a negative sign which indicates that it had a negative impact at the devaluation period.

All the variables are non-stationary at level and stationary at the first difference, which indicates they have a long run relationship and they are cointegrated. The stationarity test for the residuals is included in the annex and shows they are stationary to indicate the co-integration of the variables in the long run (refer annex 3).

The estimation result for the price of coffee is given in annex-1, EQ4 and the equation is presented as:

LPXC = 40.56 + 0.36LXC - 3.33LWCD + 6.54LPXW+U$_3$ **(5.3)**
      (29.15)   **(0.30)**   **(1.64)**   **(1.97)**

Where PXC is the export price of coffee, XC is the export quantity of coffee, WCD is the world coffee demand, PXW is the world consumer index and U$_3$ is the error term. From the given regression result there is no problem of hetroscedasticity and the data is normally distributed. The R^2 shows 66% of the variation in the price of exports of coffee is explained by the included variables, this is consistent with the 12.72 F-test statistics. The coefficients of the variables are as expected, the world coffee demand has a negative coefficient which shows the inverse relation between the export price of coffee and the world coffee demand. It is also significant at 5%. The world consumer price has a positive relation with the price of exports of Ethiopian coffee and significant at 1% level.

In reference to annex3, all the variables are non stationary at level and are stationary at the first difference, which indicates that they have a long run relationship and they are cointegrated at the first difference which is supported by the stationarity of the residuals (refer annex 3). As we can see from the coefficients of the variables in equation 5.3, the estimation was unsuccessful and the Ethiopian coffee is determined by the supply side which is given in equation 5.2.

5.2 Estimating the import model

The import demand model is estimated using the Instrumental variable regression model; this is because of the endogenity problem of regressor Y (the Ethiopian GDP). In order to

solve this problem rainfall is used as an instrument to the Ethiopian GDP. From EQ5 the estimation result for import model could be set and interpreted as follows:

$$LM = 3.48 - 1.12L(PM/PD) + 1.32LY - 0.12LP + 0.62D\_ER + 0.60D\_D + U_4 \qquad (5.4)$$
$$\quad (14.84)\ (0.32) \qquad\qquad (1.81) \quad (0.32) \quad (1.43) \qquad (1.85)$$

Total quantity imports, annual data 1980-2003. Standard errors are shown in parentheses.

The ADF unit root test of residual of the import demand equation shown in appendix 3 is stationary at level; this stationarity of the residual indicates the co-integration of the variables in the long run. The variables are non-stationary at level and are stationary at the first difference, they are co-integrated.

The AR test shows absence of serial correlation at 10% level of significance. The critical value is 2.81 at 10% level of significance for F (2, 12). Similarly, the ARCH normality test and RESET test shows absence of hetroscedasticity, absence of normality in the error term and absence of functional problem, respectively.

The signs of coefficients of the estimated import equation are consistent with the theoretical expectation. The relative price of imports has a negative sign and significant at 1% level. This indicates that the import demand of the country is affected by the relative import price. From the import equation, 1% increase in the GDP of the country will result in 1.32% increase in the total value of imports implying that Ethiopian imports are income inelastic. The D_ER shows a positive sign which is opposite from the export demand equation, the reason behind is that during the period the imports of the country has to be distributed to Eritrea as well, as a result the demand of import increase.

The above import equation shows the long-term relationship of the variables. In the same way with the export demand equation, regressing the first difference can show its short-term relation. The adjustment mechanism is presented in the following paragraphs by regressing the first difference of the dependent variable with the first difference of the explanatory variables and the one period lagged error term. The error correction model is done for the total imports.

The instrumental variable (refer section 4.3) estimation of the first difference log linear import equation is given in annex-1, EQ6 which can be set and interpreted as follows:

DLM=-.01-1.11DL(PM/PD)+0.28DLEX_1+2.08DLY-0.11LP-0.37R_1 (5.6)

(1.19) (0.12)   (0.20)   (1.19) (0.06) (0.22)

The level of adjustment of the dependent variable import is shown by the coefficient in the lagged error term. Since it is significant at 10% level of significance, 37% of the gap between the short run and long run equilibrium will be corrected each year.

The AR-test, ARCH- test, normality test and REST test show absence of serial correlation, absence of heterocedasticity, that the error terms are normally distributed and no functional problem at 5% level of significance, respectively. No adjustment will take place each year for nominal exchange rate lag and premium because both are insignificant at 5% level of significance. The GDP is approximately significance at 10% level and the disturbance in the GDP will be corrected each year.

CHAPTER SIX: CONCLUSION

The Ethiopian trade balance deficit worse after devaluation. This may be due to the inelasticity of Ethiopian exports, which means that Ethiopian exports do not sufficiently increase following devaluation to out way the increased imports. This may have something to do with long gestation period of the Ethiopian agricultural exports and the inelasticity of demand for exports. This may also be because Ethiopian imports are strategic goods which are critical for growth, and the strong preference domestic consumers have for foreign goods than domestically produced goods.

The findings of this study show that Ethiopian exports have shown an increasing trend following the devaluation of the Birr. This could be due to; first the amount of money the country receives from a given quantity of exports has increased in terms of domestic currency. Second, the domestic consumption of exports may have declined due to the rise in the price of export commodities.

The finding also indicate that premium has an inverse relation with the demand for exports of Ethiopia, as premium increases the smuggling of the country's goods increase to the neighbouring countries and the export demand through the official channel decreases. As devaluation plays role to decline the premium, we can say that exports that are smuggled out to neighbouring countries declined.

On the import side, the country's import did not show a declining trend following the devaluation of Birr. This may due to the fact that most of imports are strategic goods, which are critical to the development of the country. Besides, reliability and reputation of foreign produced goods than the domestically produced good. So the local residents might have worked in the direction of increasing imports even after the devaluation of the birr.

On the trade balance side of the country and analysis done from the data, devaluation has not improved the trade balance of the country. Although exports have increased after devaluation, the increase was not sufficient to overcome the increase in imports.

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ANNEXES
ANNEX-1: Estimation results

```
EQ( 1) Modelling LX by OLS (Ethiopian exports 1980-2003)
        The estimation sample is: 1981 to 2003

                 Coefficient  Std.Error  t-value  t-prob Part.R^2
Constant          -35.7589      15.15     -2.36    0.043   0.2422
LYW                 0.8643       0.3299    2.62     0.038   0.3676
L(PX/PXW)          -0.46523      0.1997   -2.33    0.048   0.6153
D_ERI              -2.28971      0.5782   -3.96    0.001   0.5394
D_D                 0.52189      0.7218    0.723   0.682   0.0123
LP                 -0.2364572    0.5474   -0.432   0.357   0.0608


sigma               0.120111  RSS              0.201974588
R^2                 0.889414  F(8,14) =     14.07 [0.000]**
log-likelihood     21.8182    DW                         2
no. of observations      23  no. of parameters          6
mean(LX)           12.6812    var(LX)            0.0794085


AR 1-2 test:     F(2,12)  =  0.21525 [0.8094]
ARCH 1-1 test:   F(1,12)  = 0.048203 [0.8299]
Normality test:  Chi^2(2) =   1.3306 [0.5141]
Not enough observations for hetero test
Not enough observations for hetero-X test
```

```
EQ(2) Modelling DLX by OLS (Ethiopian exports 1980-2003)
        The estimation sample is: 1983 to 2003

                 Coefficient  Std.Error  t-value  t-prob Part.R^2
Constant          -0.038652     0.12041   -0.321   0.786   0.0055
DWP                0.95243      2.2358     0.426    0.713   0.0100
DLP               -0.023612     0.03477   -0.326   0.679   0.0126
DD_ERI            -1.5632       2.771     -0.564    0.536   0.0279
DL(PX/PXW)        -0.63279      0.19405   -3.261   0.000   0.7037
DLEX_1             0.46523      0.16097    2.89     0.017   0.3413
R_1               -0.96328      0.34901   -2.76    0.011   0.3836


sigma              0.130822  RSS              0.239600086
R^2                0.836501  F(6,14) =     11.94 [0.000]**
log-likelihood    17.172    DW                        1.88
no. of observations     21  no. of parameters         7
mean(DLX)      -0.00157294  var(DLX)           0.0697833


AR 1-2 test:     F(2,12)  =  0.53035 [0.6016]
ARCH 1-1 test:   F(1,12)  =0.0033003 [0.9551]
Normality test:  Chi^2(2) =  0.67513 [0.7135]
hetero test:     F(11,2)  =  0.58620 [0.7737]
Not enough observations for hetero-X test
RESET test:      F(1,13)  =   1.7131 [0.2133]
```

```
EQ( 3) Modelling LSC by OLS (Using Ethiopian export coffee demand
and supply, 1980-2003)
        The estimation sample is: 1980 to 2003

                 Coefficient  Std.Error  t-value  t-prob Part.R^2
Constant            18.5636       2.878     6.45    0.000   0.6865
LRF                0.144636      0.2883    2.502    0.019   0.0131
L(PXG/PD)          0.113605      0.1137    0.999    0.330   0.0499
Lt                0.0526664     0.06732    0.782    0.444   0.0312
D_D               -0.473107      0.1655    -2.86    0.010   0.3006

sigma               0.146312  RSS              0.406736157
R^2                  0.44288  F(4,19) =      3.776 [0.020]*
log-likelihood       14.8772  DW                        1.85
no. of observations       24  no. of parameters            5
mean(LSC)            19.0191  var(LSC)           0.0304196

AR 1-2 test:     F(2,17)  = 0.072336 [0.9305]
ARCH 1-1 test:   F(1,17)  =  0.68392 [0.4197]
Normality test:  Chi^2(2) =   1.3405 [0.5116]
hetero test:     F(7,11)  =  0.43295 [0.8621]
Not enough observations for hetero-X test
RESET test:      F(1,18)  =  0.74852 [0.3983]
```

```
EQ( 4) Modelling LPXC by OLS (Ethiopian imports 1980-2003)
        The estimation sample is: 1980 to 2003

                 Coefficient  Std.Error  t-value  t-prob Part.R^2
Constant            40.5679       29.15     1.39    0.179   0.0883
LXC                0.360570      0.2945     1.22    0.235   0.0697
LWCD               -3.33080       1.641    -2.03    0.056   0.1708
LPXW                6.54148       1.972     3.32    0.003   0.3549

sigma               0.344654  RSS              2.37572128
R^2                  0.65618  F(3,20) =     12.72 [0.000]**
log-likelihood      -6.30149  DW                        0.93
no. of observations       24  no. of parameters            4
mean(LPXC)           2.25256  var(LPXC)           0.287907

AR 1-2 test:     F(2,18)  =   3.8068 [0.0418]*
ARCH 1-1 test:   F(1,18)  = 0.051293 [0.8234]
Normality test:  Chi^2(2) =   2.7137 [0.2575]
hetero test:     F(6,13)  =  0.49939 [0.7980]
hetero-X test:   F(9,10)  =  0.78284 [0.6384]
RESET test:      F(1,19)  =   3.9870 [0.0604]
```

```
EQ( 5) Modelling LM by IVE (Ethiopian imports 1980-2003)
       The estimation sample is: 1981 to 2003

                   Coefficient  Std.Error  t-value  t-prob
LEGDP           Y     1.32161      1.805     0.732    0.508
Constant              3.48729     14.839     0.235    0.807
L(PM/PD)             -1.12365      0.319    -3.52     0.004
LP                   -0.12316      0.1543   -0.798    0.408
D_ERI                 0.62356      1.4301    0.436    0.694
D_D                   0.60213      1.8527    0.325    0.765


sigma                 0.232067  RSS                0.75397091
Reduced form sigma    0.20966
no. of observations         23  no. of parameters         6
no. endogenous variables     2  no. of instruments        7
mean(LM)              14.3904  var(LM)               0.185147
Additional instruments:
[0] = LRF
Testing beta = 0:    Chi^2(8) =   67.644 [0.0000]**

AR 1-2 test:      F(2,12)   =   3.3963 [0.0678]
ARCH 1-1 test:    F(1,12)   = 0.018889 [0.8930]
Normality test:   Chi^2(2) =   3.0330 [0.2195]
hetero test:      Chi^2(14)=   14.003 [0.4495]
Not enough observations for hetero-X test
```

```
EQ(6) Modelling DLM by IVE (Ethiopian imports, 1980-2003)
       The estimation sample is: 1983 to 2003

                   Coefficient   Std.Error  t-value  t-prob
DLEGDP          Y     2.08938       1.187      1.76    0.099
Constant             -0.00824271    0.05218   -0.158   0.877
DL(PM/PD)            -1.10916       0.1270    -8.73    0.000
DLP                  -0.0322972     0.05843   -0.553   0.589
DLEX_1                0.276670      0.2070     1.34    0.201
R_1                  -0.372274      0.2162    -1.72    0.106

sigma                 0.173939   RSS              0.453819298
Reduced form sigma    0.19988
no. of observations         21   no. of parameters        6
no. endogenous variables     2   no. of instruments       6
mean(DLM)             0.0447613  var(DLM)              0.148928
Additional instruments:
[0] = DLRF
Testing beta = 0:    Chi^2(5) =   83.565 [0.0000]**

AR 1-2 test:      F(2,13)   = 0.026325 [0.9741]
ARCH 1-1 test:    F(1,13)   =  0.30446 [0.5905]
Normality test:   Chi^2(2) =   1.8366 [0.3992]
hetero test:      F(10,4)   =  0.18316 [0.9865]
```

ANNEX-2: Figures of actual fitted and residuals of the demand for export, demand for import, supply of coffee and the price of coffee of Ethiopia.

Figures of the residual and fitted of the demand for exports and imports
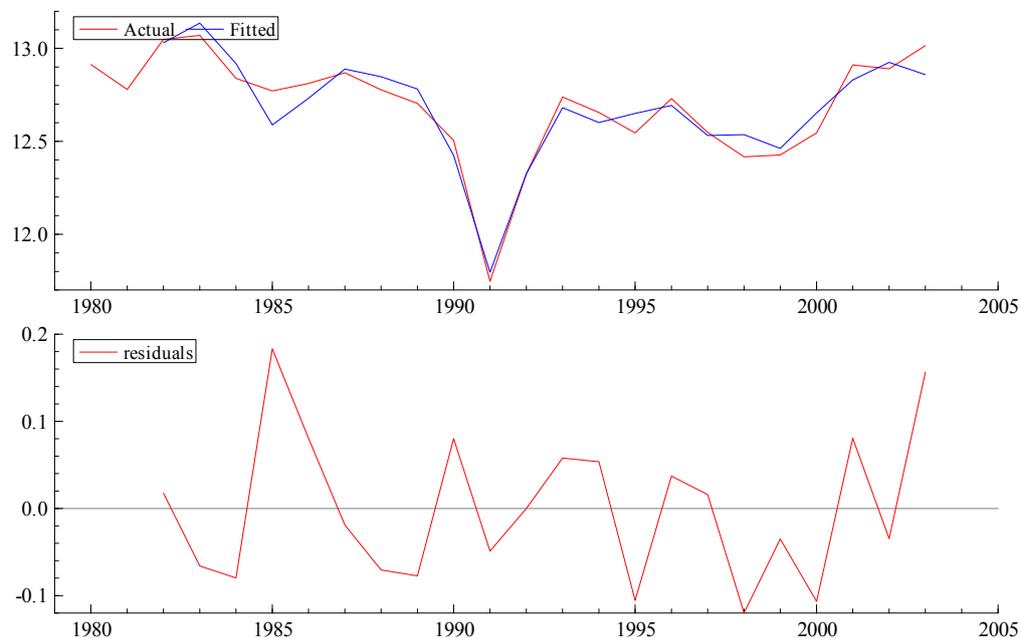
A)Exports
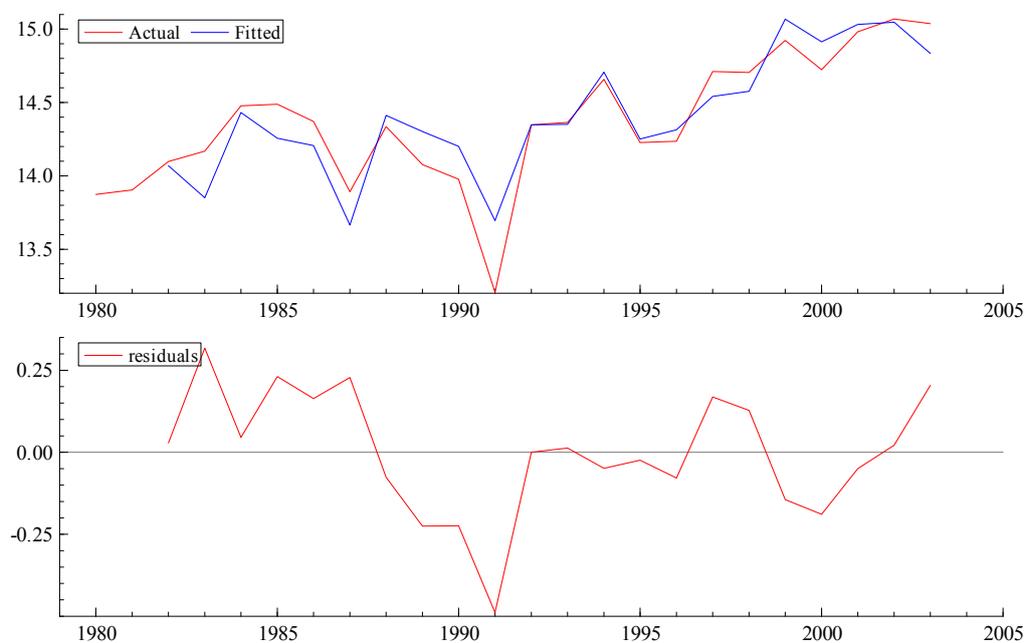
B) Imports
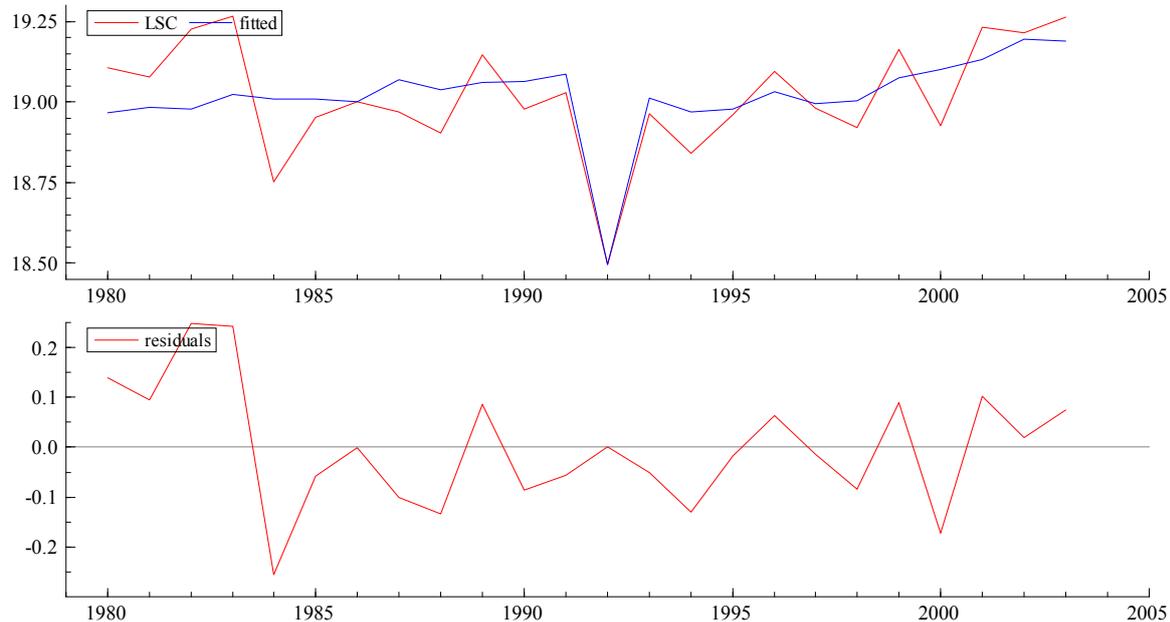
c) Supply of coffee
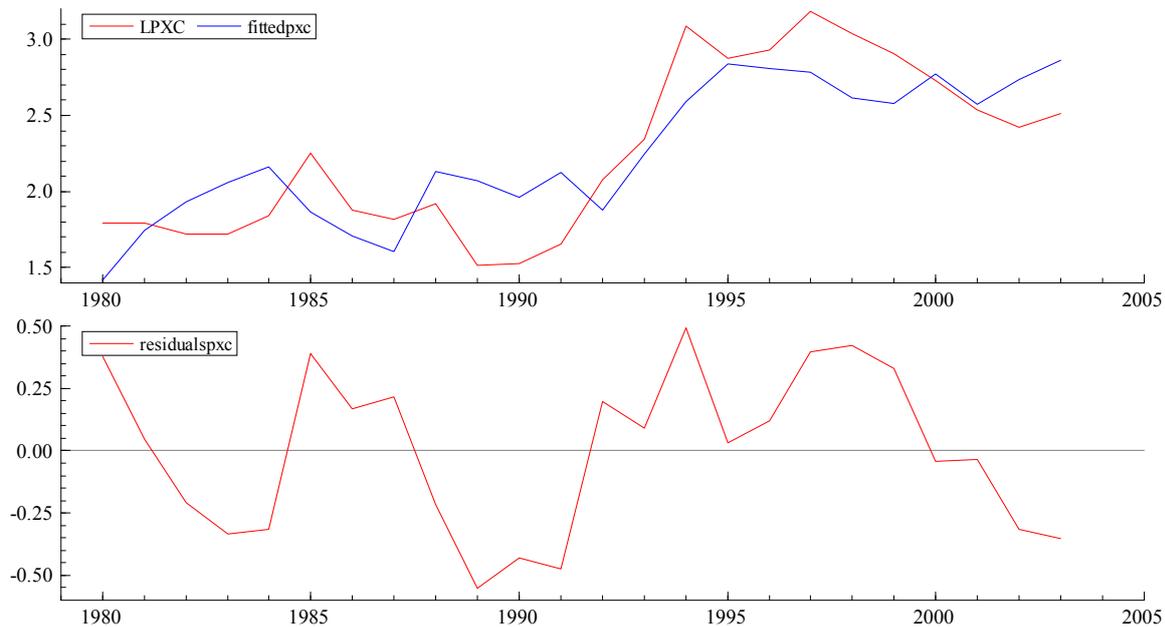
D) Price of coffee

ANNEX-3: The Augmented Dicky Fuller Test (ADF) of the variables

Variables	At level			At the first difference		
	Lag-0	**Lag-1**	**Lag-2**	**Lag-0**	**Lag-1**	**Lag-2**
LX	-2.34	-2.63	-1.96	-4.35	-4.29	-2881
LYW	-1.56	-1.63	-1.61	-4.30	-3.10	-2.56
LP	-3.45	-2.23	-1.82	-7.12	-4.60	-3.43
D_ERI	-1.05	-1.00	-0.95	-4.47	-3.16	-2.582
D_D	-4.58	-3.24	-2.65	-7.35	-5.05	-4.000
L(PX/PXW)	-1.37	-1.36	-1.28	-3.41	-3.18	-2.15
LRF	-3.25	-3.54	-1.49	-5.24	-4.67	-3.75
Lt_1	-1.11	-1.35	-1.23	-4.18	-5.68	-2.69
L(PXG/PD)	-1.77	-1.40	-1.48	-5.34	-3.20	-2.02
LSC	-3.86	-2.19	-1.89	-8.08	-4.67	-3.64
LM	-2.02	-1.22	-1.19	-6.47	-3.68	-4.63
L(PM/PD)	-2.68	-1.74	-1.56	-6.52	-3.99	-4.87
LEGDP	0.31	0.36	1.35	-4.18	-5.68	-2.69
R(export)	-4.57	-3.41	-3.27			
R_1(exports)	-4.68	-3.95	-3.22			
R (import)	-4.70	-3.10	-2.70			
R_1(imports)	-4.78	-3.29	-2.89			
R(SC)	-4.34	-3.19				
R-1(SC)	-4.40	-3.21				
R(PXC)	-5.23	-2.23				
R_1 (PXC)	-5.05	-2.78				