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Determinants of Export Commodity Concentration and Trade Dynamics in Ethiopia.

Ethiopian Economics Association

Ethiopian Economics Policy Research Institute

(EEA/EEPRI)

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I.   Introduction

In recent years the Ethiopian economy has significantly changed prompting different views as to the nature of the change. For the first time in the country's history prices and outputs moved in similar direction, both growing in double digits. The agricultural sector seems to be giving way to the service sector with the industrial sector maintaining its old share in the economy. There is a lot of speculation as to why this is happening and on the possible future direction of where the economy is going. Agricultural focused policies seem to be changing owing to the fact that productivity of small holder agriculture has not increased significantly. The industrial sector has not grown much in share as expected when growth comes. The usual transformation from the Agricultural sector to industry and then to services has not materialized, thereby bringing a number of questions.

Following this change in the economy, of course, the usual export promotion trade strategy needs to be revisited. If, as initially planned, the agricultural sector could produce the surplus it was expected, the export promotion strategy would have worked. In a situation where 20 percent growth in exports is equivalent to only 4 percent growth in imports of the same year and where import is growing at an average of 20 percent per annum, narrowing trade deficit becomes difficult. If, in the next ten years import continues its 20 percent growth, exports would have to grow by more than 40 percent per annum to experience a surplus after 10 years. At the current rate, however, the gap between the two couldn't help but widen.

Looking at the structure of imports and exports though it is easy to see that export couldn't grow by an average of 40 percent and we couldn't afford imports growing less than 20 percent. First of all, imports are mainly composed of capital goods which are important to maintain growth. In addition, imports have essential components like fuel and pharmaceuticals which we can't do without. Therefore, it would really be damaging if we think of reducing the level of imports. On the other side, we have exports mainly composed of agricultural products whose production response is relatively rigid because of natural reasons. It is not possible to just supply an increased amount of a certain commodity on a relatively short period of time. Given that there are supply response problems with exports it would be challenging to make it grow by 40 percent every year.

This calls for the rethinking of incentives and way forward. There is a move by the government in the new Growth and Transformation Plan to try and shift the trade and industrial policy to import substitution industrialization strategy. This policy move came as a response to an ever increasing trade deficit and a relatively under-developed industrial sector. Import substitution industrialization strategy is normally motivated by the need to restrict the inflow of goods into

domestic markets thereby to protect domestic industries. This would help in saving more foreign exchange and also help in earning some if it goes well.

In order to see on what base this policy will be implemented on, it is important to see the dynamics of direction of trade especially in the past few years.

The motive of this paper is, therefore, to highlight the major changes in the structure and direction of Ethiopia's trade over the past few years. Along the way construction of export concentration index is undertaken. This helps to see the diversification of trade both commodity wise and geographically. Also an attempt is made to identify the major determinants of export concentration in Ethiopia. Identifying the determinants helps to design policies that would encourage export diversification.

II.   Literature Review

2.1 Trade Theory

The Ricardian theory of trade indicates that countries producing as per their comparative advantage would benefit more from trade. This benefit comes from the differences in the productivity of labor in different countries making some countries efficient in the production of one good and other countries in other goods. This theory of course assumes only one factor of production that is perfectly mobile across sectors (Krugman and Obstfeld, 2003).

The specific factors model improves on the Ricardian theory to explain why countries tend to protect some sectors from international trade claiming that factors are not easily substitutable among sectors. This, therefore, means that while trade benefits the factors of production engaged in the export sector it hurts those factors engaged in the production of import competing sectors. This means trade will have implications on distribution of income (ibid).

Another theory relating causes of trade with resources is the Heckscher –Ohlin theory of trade. This theory states that countries should produce and export those products whose factors of production are abundantly available. Similar to the specific factors model the owners of abundant resources benefit and owners of the less abundant resource lose. Because this model assumes the shifting of resources to produce the different goods this would result in the convergence of factor process also known as factor price equalization in the model (Thompson, 2006).

Intra-industry trade is another theory explaining the motives of countries to trade. This theory asserts that countries don't specialize in the production and export of certain goods. Rather they export and import goods of the same type in the same industry. This as explained by Krugman (2003) is due to increasing returns to scale and imperfect competition. This assertion goes in contrast to the neo-classical analysis of constant returns to scale and perfect competition assumptions to analyze trade.

Prebisch and Singer (1950) studied the long-term behavior of terms of trade of primary products. They assert that in the long-term the prices of primary products in international markets decline thereby worsening the terms of trade for developing countries depending on primary exports. This implies an inward looking approach contrary to the classical theory of trade. This theory implies that instead of specializing in the sector with comparative advantage or resource abundance, they should diversify their production in favor of non-primary goods. This notion has been a subject of debate regarding trade and still remains so. There have been a number of empirical studies that try to prove or disprove this hypothesis (Sarkar, 1994).

2.2 Trade Diversification

There is a wide array of literature that centers on export diversification. In most of the literature the models estimate the Herfindahl –Hirschman Index of measuring export diversification as a function of a number of explanatory variables.

Agosin et. Al. (2009) used 40 years data on 130 countries to estimate the determinants of export diversification. They use two-step GMM estimation on three groups of explanatory variables. The first group of variables includes reform related ones like trade openness and financial sector developments. The second group of variables includes structural determinants of exports like factor endowments and distance. The third group consists of macro-economic factors that affect exports like exchange rate volatility, terms of trade, interaction of human capital with terms of trade. They find that trade openness encourages specialization and therefore is negatively related to export diversification. On the other hand, financial development and higher schooling have a positive relation while exchange rate overvaluation and terms of trade improvement have a negative impact. This study is robust as it explores a number of measures and methods to estimate the determinants.

Ferdous (2011) studies the determinants of export diversification in East Asian Countries. The study took eight years and eight countries panel data of the region. The explanatory variables used include, official exchange rate, trade openness indicators like tariff, and GDP. Fixed effects

estimation was used to estimate the equation. The study focuses on relating regional trade integration and export diversification. The results indicate that greater integration promotes export diversification. Devaluation of the exchange rate also helps diversification by encouraging exporters from other sectors.

Cabral et. Al. (2010) estimate the political economic determinants of export diversification and export sophistication in Sub-Saharan Africa. The economic determinants in the model include, level of development, endowment, growth, education and labor force. The geographic variables include distance and land locked-ness while the institutional variables include governance, control of corruption and spending on education. The study employed an instrumental variable fixed effects model. The study finds that governance is very important for export diversification in Sub-Saharan Africa.

In the Ethiopian case, Berhanu (2002), constructed the geographic and commodity concentration indices using Gini index of concentration. Using these indices the paper constructed the composite concentration index for exports. The paper also estimates determinants of exports for Ethiopia for the period 1970/71 to 1999/00. This paper was the first and complete attempt to construct export diversification. However, it didn't analyze the determinants of export concentration. The paper descriptively assesses the opportunity and challenges for successful diversification of exports.

III.   Descriptive Analysis

Although Ethiopia's imports and exports have been extensively studied, direction of trade and its dynamics in general has been neglected in the literature. This is especially true for major commodities. But analysis of trade needs to take into account the dynamics of international trade and see what kind of shift, if any, is occurring. This section will discuss the dynamics of direction of trade in Ethiopia.
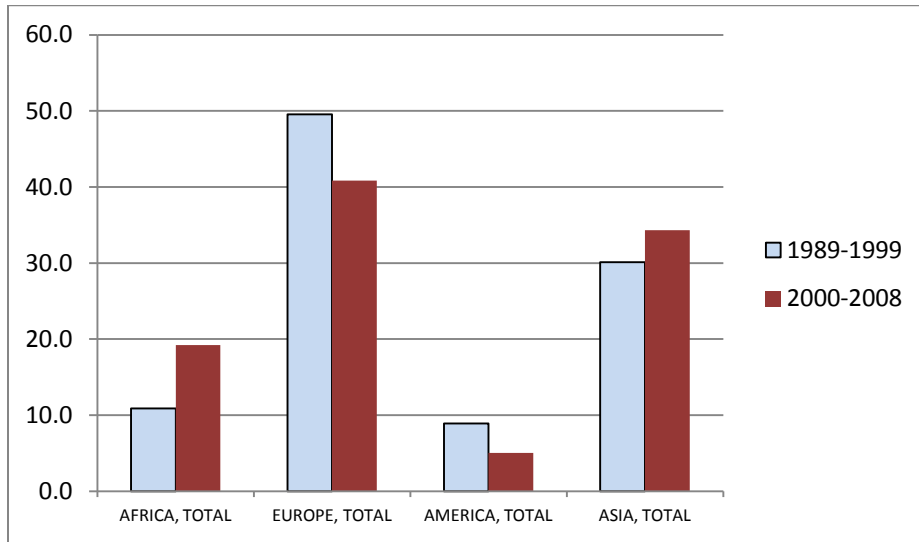
3.1 Exports

It is well known that Ethiopian exports are mainly composed of primary commodities mainly agricultural. Coffee remains the major export commodity with close to 26 percent share in the total exports in 2009/10. Oilseeds follow with 17 percent share. Gold and Chat follow with 14 percent and 10 percent share in total exports. Although coffee has remained the biggest exports there have been some shift in shares of commodities. In 1980 coffee accounted for 62 percent of the total exports and next in line were leather and leather products with 11 percent share in total exports. In 2008/09 the share of coffee came down to 26 percent of total exports. The share of leather and leather products has declined to 5 percent while the share of oilseeds reached as high as 25 percent up from 3 percent in 1980. Flower and Gold are new exports that didn't exist in 1980 but their share reached 9 and 10 percent respectively in 2008/09. The Share of chat has increased from 3 to 10 percent of total exports.

Dynamics of Export Destinations

A significant shift is observed in the destination of exports with respect to continents. Europe remains the biggest recipient of our exports with close to 41 percent share in total exports. Asia follows with close to 35 percent share. Comparing the exports during the years between 2000 – 2008 with 1989-1999 there is a distinct shift of direction of exports from Europe and America to Asia and Africa. The share of Europe declined from almost 50 percent share in the decade from 1989-1999 to 41 percent during the decade 2000-2008. The share of the Americas also declined from almost 10 percent to less than 5 percent. On the other hand the share of Africa increased from 11 to 19 percent while that of Asia increased from 30 to 34 percent.

Figure 1: The share of Destination Continents for Ethiopian Exports

Source: Ethiopian Revenue and Customs Authority

This shift of export destinations reflects a relative diversification of exports with respect to commodities in favor of south-south trade as the shift is occurring from the relatively developed continents of Europe and Americas to the less developed continents of Africa and Asia. This shift is a positive change. It is important to note that the value of total exports to all continents has increased significantly during the last 10 years.

Figure 2: Share of Top Five Destination Countries for Ethiopia's Exports
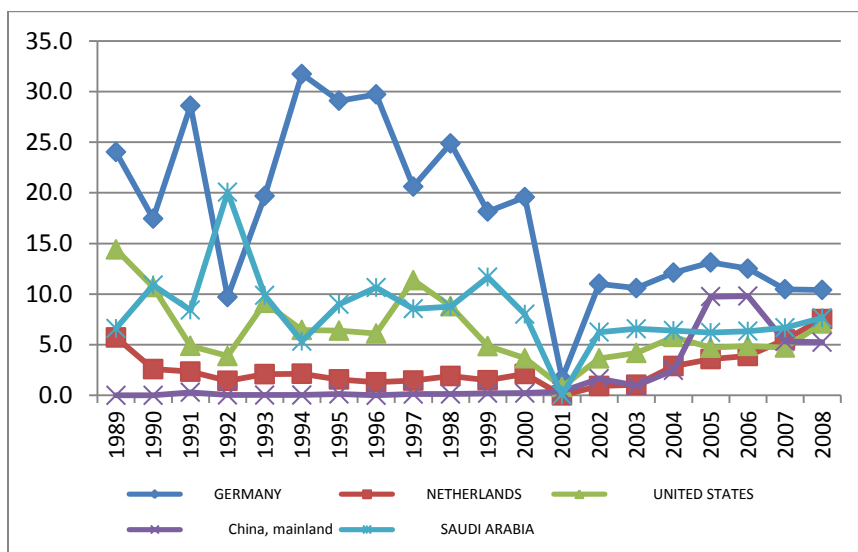
Source: Ethiopian Revenue and Customs Authority

With regards to individual countries the share of some has remained high. A good example of this is Germany, a country that has kept its high share as a destination of our exports. A new comer from Europe is the Netherlands with very rapidly growing export share. From Asia mainland China and Saudi Arabia are the major destinations of our exports. It can be seen that with the exception of Germany the share of the other countries started increasing starting 2003. Needless to say the export destinations are closely linked to specific commodities. As will be seen below the export of specific commodities are really concentrated to specific destinations. This can be seen from the following figure (Figure 3). Since the share of coffee has declined significantly so did the share of Germany in total exports as most of the coffee exports are channeled to Germany. The significant increase in Oilseeds exports has resulted in the increase in the share of mainland China. Similarly, the increase in the export of gold led to the sharp increase in Switzerland's share as a destination of our exports.

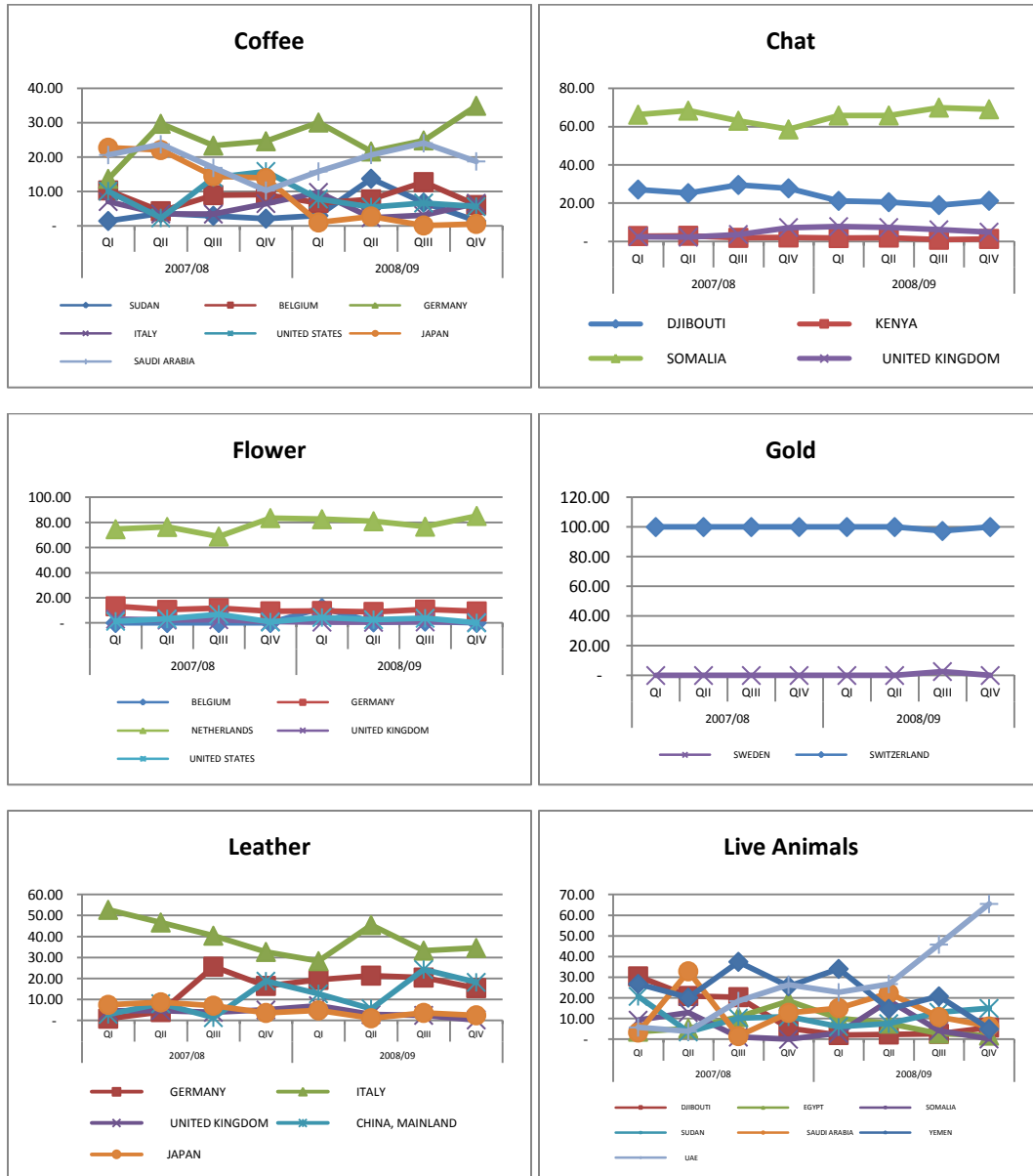Figure 3: Share of Export Destinations in Total Exports for the Past two decades
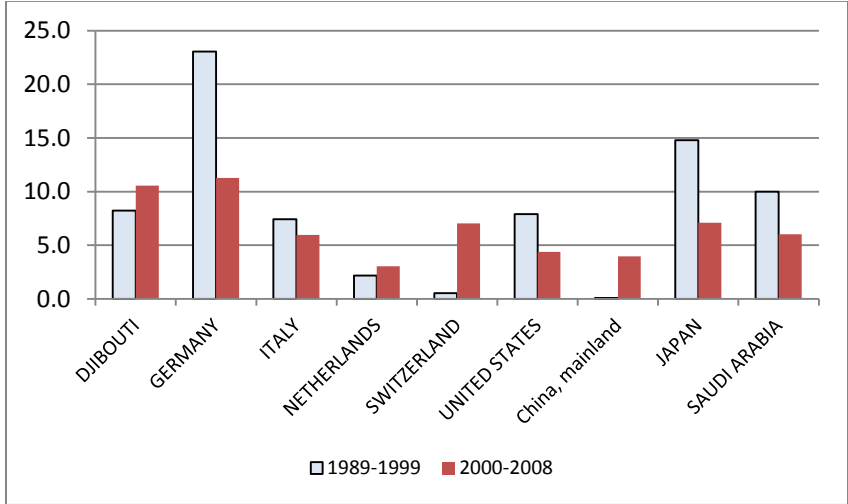
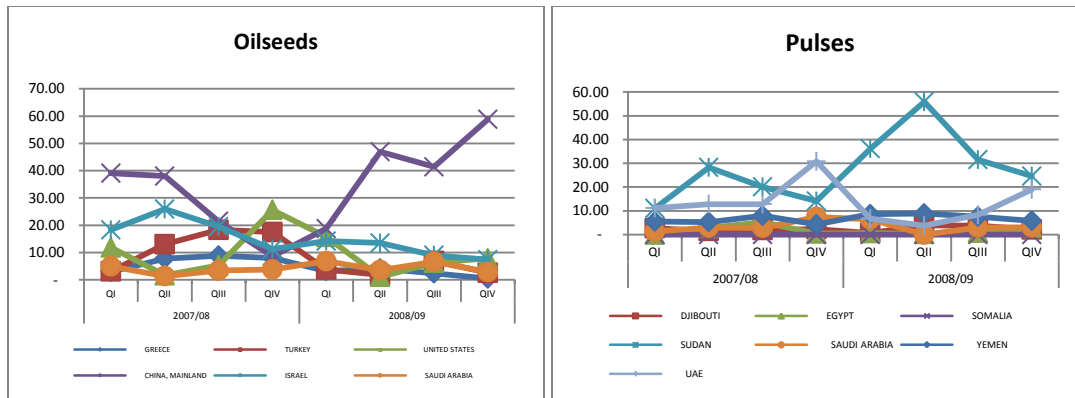Source: Ethiopian Revenue and Customs Authority

As discussed above the change in the export destinations can best be explained with the specific product exports. So it is important to look at specific commodity destinations. As will be seen below the specific commodities are relatively very concentrated with regards to destinations. The Geographic distribution of exports of specific commodities could be considered high. Coffee, leather and leather products and live animals are commodities with relatively low concentration..

Close to 25 percent of our coffee goes to Germany in the past 2 years while Japan follows with 9 percent share. Coffee going to Japan has however, declined from 22 percent in the first quarter of 2007/08 to 0.5 percent in 2009/10. It may be that Japan has shifted to Vietnam as a source of coffee

market. Vietnam started producing and exporting coffee in large scale relatively recently. Although few countries are destinations for coffee exports it is better compared to the other major exports. Looking at the coffee's destination to continents not much has changed.

Figure 4: Share of Destination Countries for Major Export Commodities (2007/08-2008/09)

Oilseeds — Legend: GREECE, TURKEY, UNITED STATES, CHINA, MAINLAND, ISRAEL, SAUDI ARABIA

Pulses — Legend: DJIBOUTI, EGYPT, SOMALIA, SUDAN, SAUDI ARABIA, YEMEN, UAE

Some of the heavily concentrated exports include Chat (70 percent to Somalia), Flower (80 percent to Netherlands) and Gold (100 percent to Switzerland). With Flower and Gold the concentration is understandable in that they are exported to central world markets. After that it may be the case that they will be further distributed to other countries. One question to ask here is; aren't there other markets for these commodities or do they need further processing to be channeled directly to consumer countries? This requires further study into the specific industries. In the case of cut flower for example, Germany is the world's biggest importer while the Netherlands is the world's biggest producer and exporter. It is most likely that Ethiopia's export to the Netherlands is re-exported to final consumer countries. Also with respect to Gold, although the central market is Switzerland, the major importers of gold include, the US, India, Italy and Hong Kong. It would be good to investigate why Ethiopia is not directly exporting gold to these countries. With respect to chat, cultural similarities and proximity has given Somalia an advantage over other countries to purchase close to 70 percent of total chat exports.

The export of leather and leather products has remained stable and less concentrated with an average of 40 percent going to Italy. Similarly, live animal exports has remained stable until recently where the United Arab Emirates started to import a big part of live animal exports accounting for 65 percent.

Oilseeds are going to Mainland China for the most part accounting as high as 60 percent at the end of 2008/09. Because of oilseeds exports the share of China in total export has been increasing significantly. This shows that recently China is becoming a big market in addition to being the largest supplier of goods. China's share in receiving Ethiopian exports has grown from 0.2 percent in 2000 to 5.2 percent in 2008 out of the total. China imports close to 41 percent of the total oilseeds supplied in the world markets. The primary use is to produce edible oil which China then exports back to the world.

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3.2 Imports

The structure of imports has not changed much in the past 30 years. Since 1980 Capital goods have taken a big portion of the total import payments averaging 34 percent although their share has slightly declined over the periods from 37 percent in the period 1980-1990 to 31 percent during the period 2000-2009. Consumer goods come second and have maintained a relatively steady share in total imports (29.5 percent) while the share of semi-finished goods and fuel has slightly increased through the past three decades.

Figure 5: Share of Major Import Categories in Total Imports (1970 – 2009)
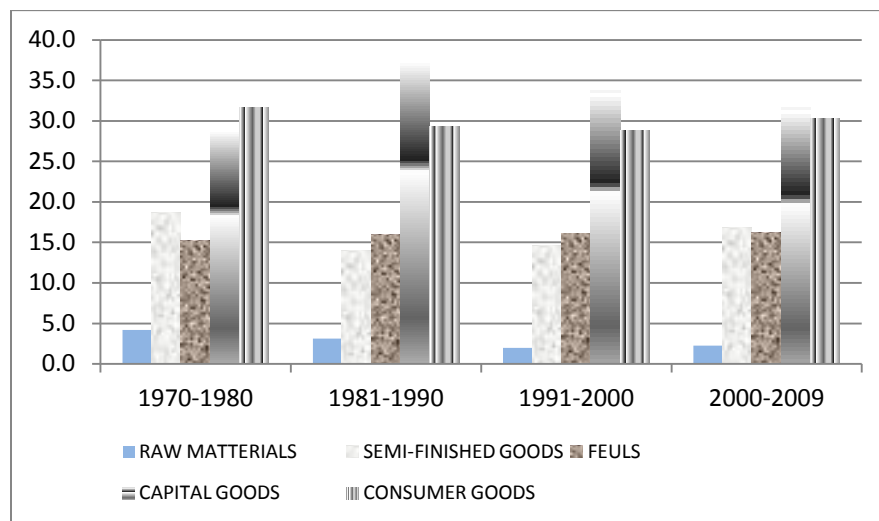
Source: Ethiopian Revenue and Customs Authority

It can be observed that the share of raw material import has declined from 3.1 during 1980-1990 to 2.2 during 2000- 2009 possibly due to the fact that the industrial sector has remained stagnant reducing the share of raw material imports.

Dynamics of Origin of Imports

Similar to the case of exports Ethiopia has made a significant shift of import sources over the past three decades from Europe to Asia. This is because of the dramatic increase in imports from China.

Figure 6: Sources of Ethiopia's Imports (by continent)
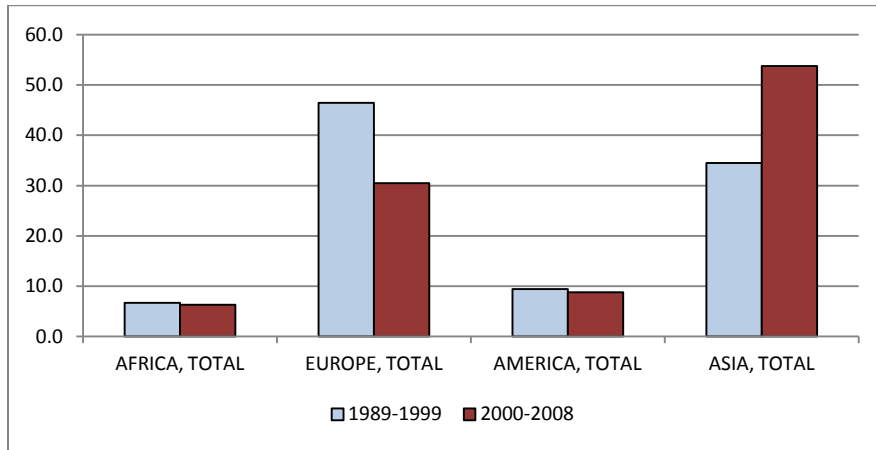
Source: Ethiopian Revenue and Customs Authority

As can be seen from the figure above the share of all continents in supplying Ethiopia's imports has declined except Asia. The biggest decline is that of Europe whose share has dropped from a high of 46 percent of total imports during the period 1989-1999 to 30.5 percent during the period 2000-2008. The share of Africa and America declined by less than 1 percentage point but their share was small in the first place. The share of Asia has increased from 34 percent in the previous decade to 53 percent in the just ended decade.
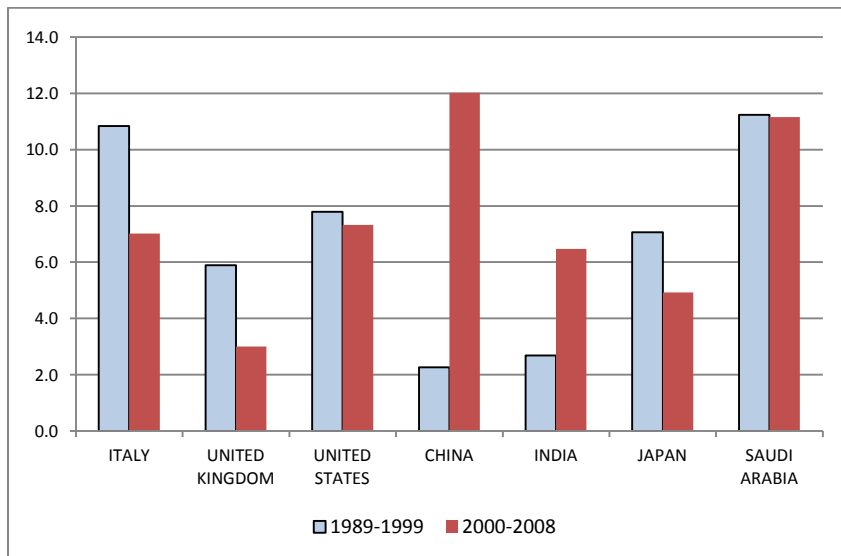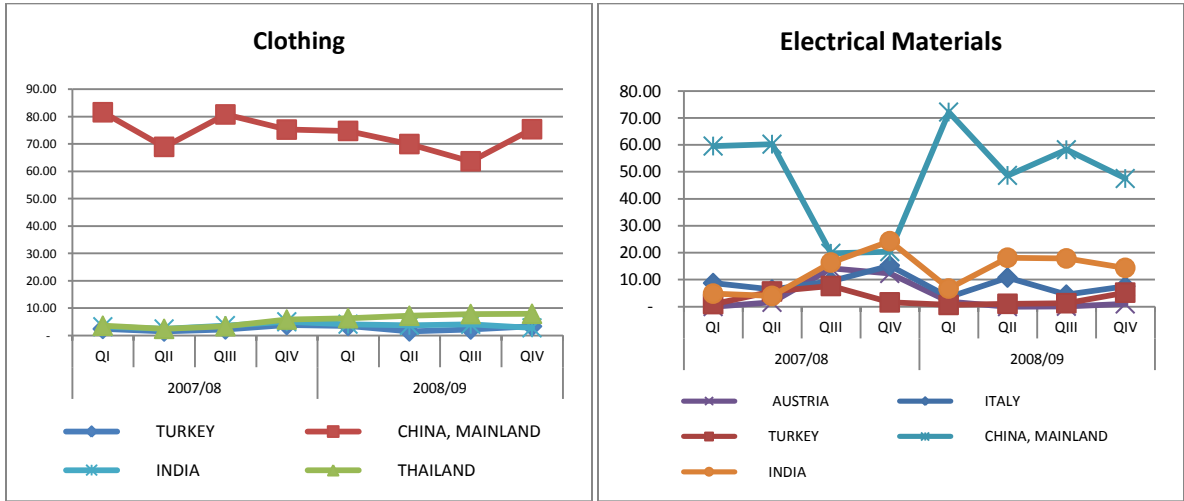
Figure 7: Source of Ethiopia's Imports (by Country)

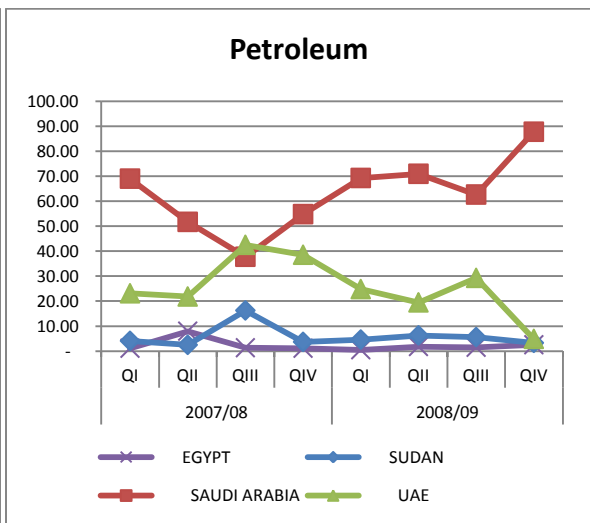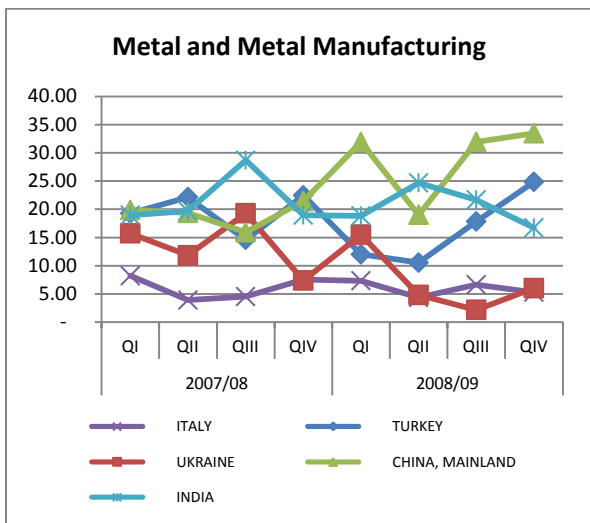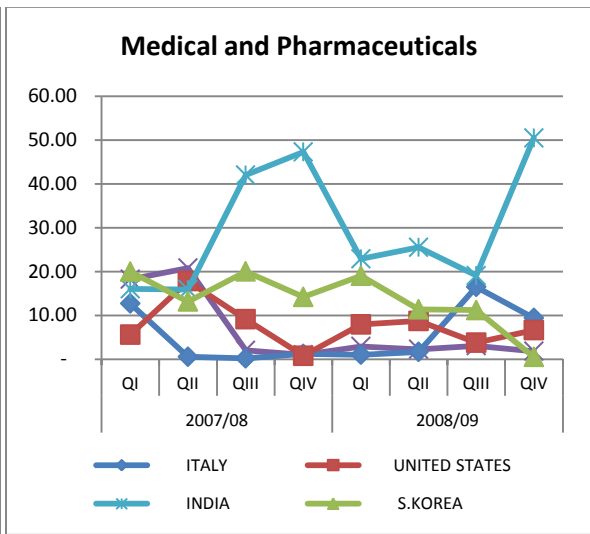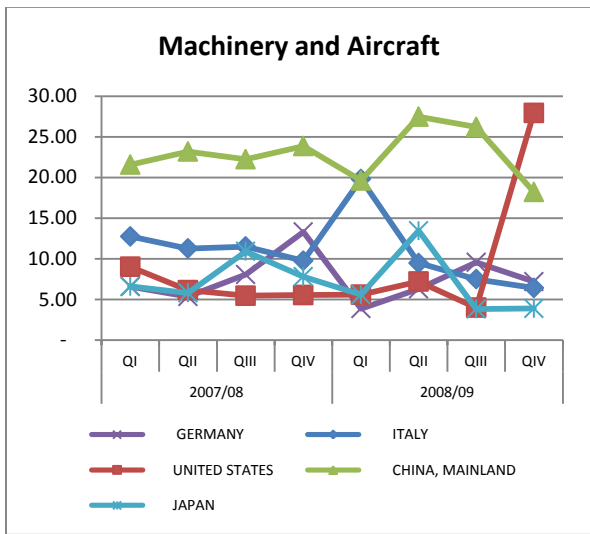Source: Ethiopian Revenue and Customs Authority

The figure above shows the shift in import origins comparing the past two decades (1989-1999 and 2000 -2008). As can be see the share of China and India has increased significantly. The share of China in supplying imports increased from 2.3 percent in the previous decade to 12 percent in the period 2000-2008. This increase in share came by taking the share of Italy (from 10 to 7 percent), United Kingdom (from 6 to 3 percent) and Japan (from 7.1 to 5 percent) during the periods in consideration. The increase in the China's share resembles closely its share in global trade. In 1980 China's share in global exports was 1.9 percent. By 2008 the share has increased to 11.3 percent of total global exports.

Like that of exports it helps to understand the specific commodity import origin in order to understand the dynamics. Sources of specific products are very much concentrated. Starting with the essential imports, petroleum, pharmaceuticals and fertilizer; the country relies on few countries for these imports. On average more than 60 percent of the petroleum import is made from Saudi Arabia followed by UAE (25 percent). 30 percent of pharmaceutical imports are from India and 23 percent of fertilizer imports are from Russia.

Other major imports with a bigger share in total exports are Machinery and Aircraft and Road Motor Vehicles. China is the biggest source for machinery imports and Japan for road motor vehicles. China again dominates in supplying clothing and electrical materials. Less concentrated import items include metal and metal manufacturing, food and live animals. The following graphs depict the origins of major imports.

Figure 8: Origins of Major Imports

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Fertilizer

Legend: LIBIA, GERMANY, NETHERLANDS, RUSSIA

Food and Live Animals

Legend: BELGIUM, FRANCE, ITALY, UNITED STATES

Machinery and Aircraft

Legend: GERMANY, ITALY, UNITED STATES, CHINA, MAINLAND, JAPAN

Medical and Pharmaceuticals

Legend: ITALY, UNITED STATES, INDIA, S.KOREA

Metal and Metal Manufacturing

Legend: ITALY, TURKEY, UKRAINE, CHINA, MAINLAND, INDIA

Petroleum

Legend: EGYPT, SUDAN, SAUDI ARABIA, UAE

Road Motor Vehicles

Source: Ethiopian Revenue and Customs Authority

IV. Concentration Indices for Export and their Determinants

In order to maintain a relatively strong international trade base it is important to diversify both exports and imports as much as possible. This is more relevant to exports of developing countries as diversification cushions the impact of shocks in certain production sectors or certain destinations. If a certain commodity dominates the export earnings of a country the shocks occurring in the sector will greatly affect the foreign exchange earnings of the country as a whole. In order to avoid such shocks from affecting the whole country it becomes important to diversify. Similarly, diversifying imports helps a country to ensure the continuity of supply of goods and services to a country. There are some essential imports without which the normal economic activity of the country will be stifled. One good example for this is petroleum to developing countries. If the import of petroleum is concentrated on few suppliers then a shock will greatly create an obstacle to the movement of goods and persons which in turn will greatly affect the growth of the economy. Therefore, it is important to check the concentration of our trade and devise ways to diversify it.

In this study the focus will be on exports as the importance of diversification is more felt there compared to imports. First the different measures of concentration will be covered and the commodity concentration index for export earning is constructed. An empirical exercise identifying the determinants of export diversification is then presented.

4.1 Measures of Concentration

There are various measures of concentration depending on the specific needs. These measures have their own advantages and disadvantages. The most commonly used measures of concentration are presented below from the simplest to the relatively complex ones.

Concentration Curve

The concentration curve measures concentration by ordering the subjects of analysis by shares or sizes and by plotting their relative importance. This measure is usually used to assess concentration of firms in a market. As the figure below shows there is a 45 degree line that is drawn from the origin. This line represents that all firms have relatively similar share or in the case of trade all commodities or destinations have similar share. In other words half of the commodities in number earn half of the total export earnings. By plotting the export earnings of the commodities by their number and earning size and comparing the line with a 45 degree line we can see concentration. This is, the bigger the deviation from the 45 degree line, the more the concentration

Figure 9: The Concentration Curve
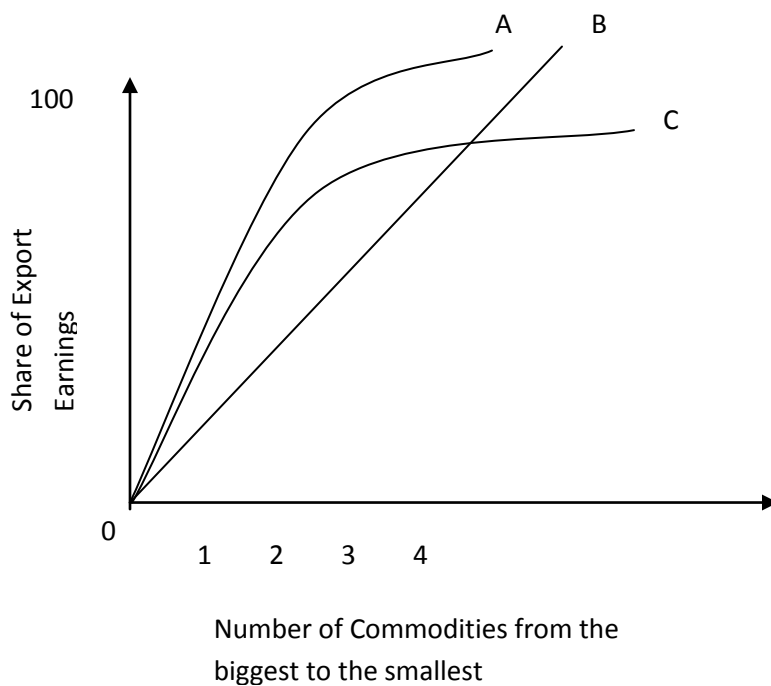
The above curve shows the commodity concentration of exports of hypothetical countries. Country A has export that is highly concentrated as fewer commodities provide a large share of export earnings. Country B has export that is well diversified as the share of all commodities to export earnings is equal. Country C has export that is partly concentrated (until the fourth commodity) and then the share of the rest of the commodities decline. One advantage of the concentration curve is that it provides a graphical presentation. This is convenient for some audiences. But the concentration curve shows the share of the biggest members rather than considering all commodities.

Concentration ratio

The concentration ratio is the mathematical equivalent of the concentration curve. This is because it considers the share of the first few commodities to assess the concentration levels of the export sector. Mathematically it is expressed as;

$$CR = \sum_{i=1}^{x} S_i$$

Where CR is the x commodity concentration ratio

Si - is the percentage export earning share of the ith commodity

The measure ranges from 0-100. If the CR is close to 0 it means that the largest X commodities are earning a small share of the total export earnings. A CR of close to 100 means the largest X commodities are responsible for almost the entire export earnings showing a high concentration. Like the concentration curve this measure only considers the largest commodities.

Herfindahl-Hirschman index

This is the most commonly used measure of concentration since it combines both simplicity and efficiency. The Herfinhahl-Hirschman Index (HHI) is calculated by taking the sum of the squares of the shares of all commodities in the total export earnings. The more concentrated the export is the more the square of the shares approaches one. If there is only one export commodity for example the share will be one and the summation of the square of one will be one. On the other hand the less concentrated the market is the smaller the share of the largest firm which will mean that the square will even be smaller as the share is less or equal to one. Therefore, the sum of the square of the shares will be very small and close to zero. This means the market is not concentrated.

Mathematically expressed;

$$HHI = \sum_{i=1}^{n} S_i^{2}$$

Where S_i^{2} - is the square of the export earning share of commodity i, measured by dividing the export earning of that commodity to the total export earning

N – is the total number of export commodities

As described above one of the advantages of this measure is that it takes into account all of the commodities in calculating the concentration of the sector. In addition, it is relatively easier to calculate. One of the criticisms on the method is the choice to square the shares rather than raising it to cube or another exponent.

Hannah and Kay index

This measure generalizes the Herfindahl- Hirschman Index in that rather than squaring the share the weighting factor can be chosen. Therefore, the share is weighted by a weighting factor α which can take any value. Hannah and Kay, however, suggest that the value of the index should be between 0.6 and 2.5 but the choice of weighting factor is left to the investigator. The result indicator is not specifically put, but a small number in the index means high concentration.

So the Hannah and Key index is expressed as

$$HK = (\sum_{i=1}^{n} S_i^{\alpha})^{1/(1-\alpha)}$$

One of the advantages of this concentration index is that it is flexible. The investigator has the opportunity to change the weighting factor. This method can also be used to bridge between concentration and inequality within a market.

Entropy index

Another concentration measurement is the Entropy index. Like the Hannah Kay Index the share of the commodity is weighted. Here the weighting factor is the logarithm of the inverse of the share. When an export commodity has a monopoly in export earnings then the weighting factor becomes zero which means the entropy index will be showing monopoly. When the commodity has a very small share the weighting factor will be very large, therefore resulting in a large entropy index. Therefore, a large entropy index shows a less concentrated market.

$$E = (\sum_{i=1}^{n} S_i \log(1/S_i))$$

This measure has that advantage that the weighting term helps to decompose the concentration among different sub-groups. For our specific case it is possible to decompose between the concentrations of different categories of export commodities.

4.2 Export Concentration in Ethiopia

Using the above concentration indices described above the commodity concentration index has been constructed. Figure 10 presents the results of the construction index for the past 30 years.

Figure 10: Commodity Concentration Indices for Export Earnings in Ethiopia
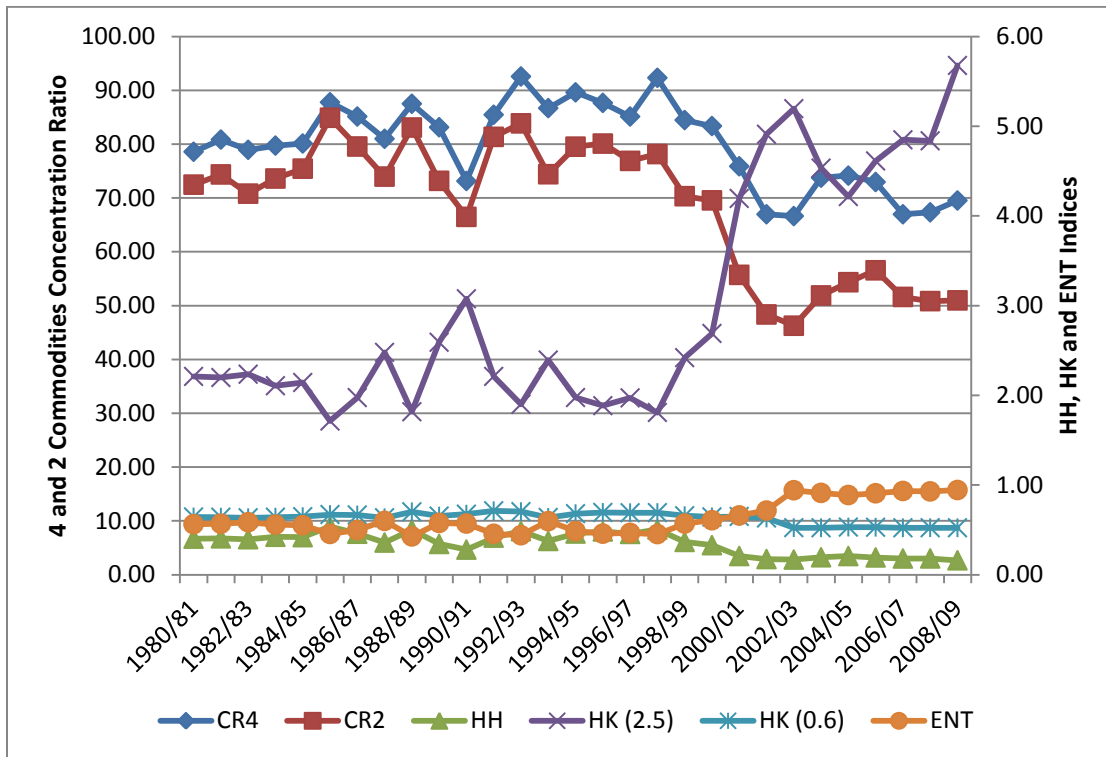
Source: Ethiopian Revenue and Customs Authority and Own Computation

As can be observed in the above figure the commodity concentration of export earning has significantly declined especially since 2000. This is confirmed by the indices presented above. The Hannah Kay (HK) and Entropy (ENT) indices are increasing from 2000/01 onwards implying declining concentration which is equivalent to declining concentration ratio (CR) and Hirfindahl – Hirschman Index (HHI). This result actually makes sense as we observe new export commodities like flower are coming into the market and the share of some of the major commodities like coffee has declined. In addition the share of some of the pre-existing commodities like oilseeds has also increased taking part of the earning monopoly away from coffee.

The geographic concentration of exports also follows a similar trend with that of the commodities. This is no surprise because as described above in the descriptive analysis our export commodities are specific to destinations. Therefore, when the share of a commodity declines the share of the destination also declines. The geographic concentration of export earnings also shifts from the 2000/01 onwards because of the same reasons described above. There is however a peculiar point

where concentration suddenly declines sharply around 2000/01. This is a time when the share of Germany which was a leading importer of Ethiopian coffee sharply declines. During that time the price of coffee had declined very sharply and the earnings from export have declined accordingly.

Figure 11: Geographic Concentration of Export Earnings for Ethiopia
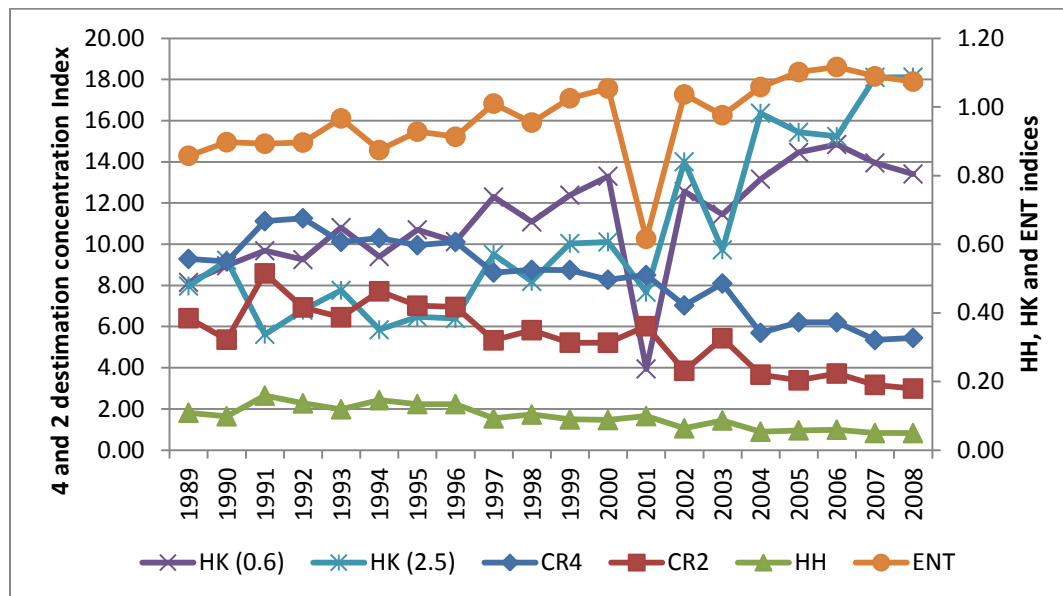
Source: Ethiopian Revenue and Customs Authority and Own Computations

4.3 Determinants of Export Concentration in Ethiopia

Having constructed the concentration indices it is important to see what determines export diversification at least with regards to commodity. As discussed in the literature review a number of studies have estimated the determinants of export concentration. Most of these studies used panel data to identify the determinants of export diversification. In this study as the focus is on Ethiopia, a time series analysis is done on 30 years of data on export diversification and its determinants. It is important to note that there are micro level determinants of export diversification. These determinants explain why firms choose to diversify the goods and services they export. In this study the macro-economic environment relating to export diversification is analyzed. Discussion is made about the intuition of why these variables are included in the model.

The determinants of two of the indices (concentration ratio and Herfindahl Hirshcman) constructed above are estimated in this study. Following Agosin (2009) the determinants of export diversification are assumed to be real output (real GDP), real effective exchange rate, expenditure on education, credit to the private sector as a percentage to GDP. The relationship between these variables and export diversification is fairly straightforward.

The increase in real output is usually expected to increase export diversification because of the availability of more products to export. Most of the studies Agosin(2009), Ferdous (2011) found a positive relationship between real GDP or output indicator with export diversification. Of course, just increasing GDP is not the factor for export diversification but also the diversification in output. For example, if a country moves from an agricultural dominated economy to an industrial one, the prospect of export diversification is enhanced.

Real effective exchange rate (its increase) is expected to encourage export diversification by widening the threshold of price differential at which new commodities would be included. This means as real effective exchange rate increases the relative price of goods will encourage the entry of new products in the export channel.

Expenditure on education is included in the analysis to proxy the endowment component. Endowment is expected to enhance a country's capacity to produce more. In addition, if this endowment is human capital technological advancement in the production process can be achieved. Consistent with endogenous growth model both innovation and invention are driven by a well built human capital. And both of these are very important to export diversification.

Another critical determinant of export diversification is the development in financial sector. Again most studies have included indicators of financial sector development. This is because the access to credit is critical to filter out more efficient and productive engagements. This would encourage those productive investments which in turn would encourage export diversification.

The regular tests for time series variables have been conducted for these variables. Normality and Stationarity was checked for all variables. In order to solve the non-normal nature of some of the variables log transformation was done on them. All of the variables were found to be integrated of order one. After the estimation cointegration was checked for the variables. It was found that the variables are cointegrated. The results of the stationarity tests are found in the Annex.

It is important to note that some of the variables included as explanatory variables could also be affected by export diversification. GDP and Real effective exchange rate are theoretically endogenous in the equation. Export diversification would enhance competitiveness which would in turn induce production. This means both real GDP and real effective exchange rate are affected by export diversification. In order to check this, a Hausmann test for endogeneity has been performed on the suspected Real GDP and Real Effective Exchange Rates.

The Hausmann test for endogeneity was performed by estimating the suspect variables on all the exogenous variables and other determinants and by retaining the residuals. Then by putting the

residual in the original equation and checking its significance. The test is such that if the residual is found to be insignificant the OLS estimates are consistent and if not then we conclude that the variables are endogenous. The original equation to determine the export diversification is expressed as;

Where; CR4 – is the 4 commodity concentration ratio

GDP – is Real Gross Domestic Product

REER – Real Effective Exchange Rate

EDU – Government Expenditure on Education

INVGDP - Capital Formation as a ratio of GDP

The specification in equation 1 was estimated. In order to check for endogeneity, GDP and REER were re-estimated as a function of the other explanatory variables including additional variables.

Equation 2 was estimated to check for the endogeneity of GDP in equation 1 and the residual was then inserted in equation 1 to check its significance. A similar step was taken for REER. In both cases the residual estimates were found to be insignificant. Therefore, endogeneity was not a problem. This is also complemented by VAR estimation.

The VAR model assumes that some of the variables in general are endogenous and estimates number of equations equal to the number endogenous variables and it includes the lagged values of these endogenous variables as explanatory variables in addition to some exogenous variables. Therefore, the specification of the model is presented as;

Where; CR4 – is the 4 commodity concentration ratio

GDP – is Real Gross Domestic Product

REER – Real Effective Exchange Rate

EDU – Government Expenditure on Education

DCPGDP - Domestic Credit to the Private sector as a ratio of GDP

The results of the VAR model along with the estimation results of the other models are shown in the annex. Here only the estimation of the single equation estimation is presented.

Table 1: Estimation Results of the Determinants of Export Diversification (Concentration Ratio)

Variable	Estimate
C	5.968007***
	(0.409547)
LOG(GDP(-1))	-0.09879**
	(0.045968)
DLOG(REER)	-0.21416**
	(0.079618)
DLOG(EDU)	-0.31261**
	(0.128083)
LOG(INVGDP(-1))	-0.16061**
	(0.064613)

Standard Errors in Parenthesis ** Significant at 5% ***Significant at 1 percent

R-squared	0.722985	Mean dependent var	4.372455
Adjusted R-squared	0.647435	S.D. dependent var	0.102593
S.E. of regression	0.060917	Akaike info criterion	-2.552101
Sum squared resid	0.081640	Schwarz criterion	-2.222064
Log likelihood	44.00546	Hannan-Quinn criter.	-2.448738
F-statistic	9.569681	Durbin-Watson stat	1.770332
Prob(F-statistic)	0.000032		

The results and diagnostic tests reveal relatively plausible estimates. The expected negative relationship between most of the variables is maintained. The lagged value of GDP is found to have a negative relationship with export concentration implying that as expected increase in production levels will positively affect export diversification. The coefficient for differenced real effective exchange rate implies that as positive change in real effective exchange rate increases there will be

less concentration or more diversification with respect to commodity. This means as the real effective exchange rate depreciates the concentration ratio will decline implying more diversification. Expenditure on education is included in the model as a proxy for human capital although admittedly it is a relatively far proxy for it. However, as expected, as expenditure on education increases the concentration of exports declines indicating more diversification. The lagged value of investment to GDP ratio has as expected a negative relationship with export concentration.

A similar estimation has been implemented on HH and Entropy indices. The estimates yield similar result except that in both the equations for HH and Entropy indices the exchange rate variable becomes insignificant.

Therefore, the message seems a bit straightforward in that focusing on increasing and diversifying output along with a properly setout exchange rate and investment policy would enhance export diversification.

V.   Conclusion

This study has descriptively assessed the direction of trade of the country along with the construction of the appropriate concentration index. The paper has also attempted to estimate the major determinants of export concentration or export diversification.

It was found that there is a significant shift in direction of trade in Ethiopia mainly from the west to the east. On the export side, this shift is commendable in that it shows diversification from the developed world to the developing countries of Africa and Asia. This shows a growing south-south trade. Although the geographic trends are looking up, specific commodity destinations are concentrated. The case of chat, flower and gold are good examples of this. On the import side, similar to that of the exports, a significant shift has been noted in the past few years. As expected the share of China has increased significantly to reach close to 15 percent of total imports. Much like exports the specific import categories also originate from few countries showing specific commodity concentration.

Taking the concentration issue further concentration indices have been constructed using six different measures of concentration. Each measure has its own advantages and disadvantages. All the measures depict a similar result for Ethiopia in that concentration is declining with regards to commodity.   Using three of the indices constructed an estimation of the export concentration determinants was made. It was found that lagged value of output, change in real effective exchange rate, change in education spending and lagged value of investment to GDP ratio have been found to be significant determinants of export concentration. Therefore, in order to enhance export diversification encouraging exchange rate and investment policy are required in addition to promoting growth and human capital.

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Annex 1: Estimation Results

Estimation Result of Concentration Ratio

Dependent Variable: LOG(CR4)
Method: Least Squares
Date: 12/19/11   Time: 14:48
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.968007	0.409547	14.57220	0.0000
LOG(GDP(-1))	-0.098791	0.045968	-2.149126	0.0419
DLOG(REER)	-0.214164	0.079618	-2.689886	0.0128
DLOG(EDU)	-0.312607	0.128083	-2.440657	0.0224
LOG(INVGDP(-1))	-0.160614	0.064613	-2.485787	0.0203
R-squared	0.710782	Mean dependent var		4.372455
Adjusted R-squared	0.662579	S.D. dependent var		0.102593
S.E. of regression	0.059594	Akaike info criterion		-2.646922
Sum squared resid	0.085236	Schwarz criterion		-2.411181
Log likelihood	43.38037	Hannan-Quinn criter.		-2.573091
F-statistic	14.74558	Durbin-Watson stat		1.714954
Prob(F-statistic)	0.000003			

Estimation Equation of Herfindahl Hirschman Index

Dependent Variable: LOG(HH)
Method: Least Squares
Date: 12/19/11   Time: 15:07
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.985833	1.386026	5.761675	0.0000
LOG(GDP(-1))	-0.669598	0.155569	-4.304182	0.0002
DLOG(REER)	-0.389004	0.269451	-1.443694	0.1618
DLOG(EDU)	-1.203836	0.433470	-2.777205	0.0105
LOG(INVGDP(-1))	-0.560507	0.218668	-2.563274	0.0171
R-squared	0.809264	Mean dependent var		-1.164815
Adjusted R-squared	0.777474	S.D. dependent var		0.427547
S.E. of regression	0.201685	Akaike info criterion		-0.208635
Sum squared resid	0.976243	Schwarz criterion		0.027106
Log likelihood	8.025204	Hannan-Quinn criter.		-0.134804
F-statistic	25.45706	Durbin-Watson stat		1.325868
Prob(F-statistic)	0.000000			

Estimation Equation of Entropy Index

Dependent Variable: LOG(ENT)
Method: Least Squares
Date: 12/19/11   Time: 15:08
Sample (adjusted): 1982 2010
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.846153	0.924120	-6.326184	0.0000
LOG(GDP(-1))	0.361907	0.103724	3.489127	0.0019
DLOG(REER)	0.247638	0.179654	1.378420	0.1808
DLOG(EDU)	1.031032	0.289012	3.567432	0.0016
LOG(INVGDP(-1))	0.427795	0.145795	2.934224	0.0073

R-squared	0.802278	Mean dependent var		-0.477500
Adjusted R-squared	0.769325	S.D. dependent var		0.279982
S.E. of regression	0.134472	Akaike info criterion		-1.019343
Sum squared resid	0.433982	Schwarz criterion		-0.783603
Log likelihood	19.78048	Hannan-Quinn criter.		-0.945512
F-statistic	24.34567	Durbin-Watson stat		1.819582
Prob(F-statistic)	0.000000			

Estimation of VAR Model on the three variables

Vector Autoregression Estimates
Date: 12/17/11   Time: 17:05
Sample (adjusted): 1983 2010
Included observations: 28 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LOG(CR4)	LOG(GDP)	LOG(REER)
LOG(CR4(-1))	0.629720	0.059506	-0.532150
	(0.22619)	(0.14176)	(0.42866)
	[2.78399]	[0.41977]	[-1.24143]
LOG(CR4(-2))	0.115463	-0.054017	0.418163
	(0.22263)	(0.13953)	(0.42191)
	[0.51862]	[-0.38714]	[0.99111]
LOG(GDP(-1))	-0.506074	0.671972	-0.004311
	(0.26020)	(0.16307)	(0.49310)
	[-1.94496]	[4.12072]	[-0.00874]
LOG(GDP(-2))	-0.040207	-0.345903	0.584500
	(0.27611)	(0.17304)	(0.52325)
	[-0.14562]	[-1.99896]	[1.11706]
LOG(REER(-1))	0.142910	0.074983	0.545703
	(0.11810)	(0.07402)	(0.22381)
	[1.21006]	[1.01306]	[2.43821]
LOG(REER(-2))	-0.036985	0.042010	-0.433415
	(0.10298)	(0.06454)	(0.19516)

	[-0.35914]	[0.65091]	[-2.22082]
C	5.155913	4.825134	-0.275291
	(2.33568)	(1.46381)	(4.42633)
	[2.20746]	[3.29627]	[-0.06219]
LOG(EDU(-1))	0.187297	0.268739	-0.253287
	(0.08414)	(0.05273)	(0.15946)
	[2.22598]	[5.09622]	[-1.58844]
LOG(DCPGDP(-1))	-0.020378	-0.015565	-0.277436
	(0.04700)	(0.02946)	(0.08907)
	[-0.43355]	[-0.52840]	[-3.11470]

R-squared	0.752312	0.992485	0.953900
Adj. R-squared	0.648023	0.989321	0.934489
Sum sq. resids	0.072894	0.028631	0.261789
S.E. equation	0.061940	0.038819	0.117381
F-statistic	7.213690	313.6709	49.14300
Log likelihood	43.58315	56.66632	25.68363
Akaike AIC	-2.470225	-3.404737	-1.191688
Schwarz SC	-2.042016	-2.976529	-0.763479
Mean dependent	4.371740	11.00639	5.116160
S.D. dependent	0.104402	0.375646	0.458608

Determinant resid covariance (dof adj.)	6.85E-08
Determinant resid covariance	2.14E-08
Log likelihood	128.0459
Akaike information criterion	-7.217567
Schwarz criterion	-5.932942