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***Resuming the Construction and Reporting of Export-Import
Unit Value & Quantum Indices in Ethiopia***

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Abstract

The construction and reporting of export-import unit value and quantum indices practically stopped since 1983 (for imports) and since 1994 (for exports) for various reasons. A number of attempts were made to resume the compilation and reporting of these indices, although could not be implemented so far. Two attempts were made after the system of international trade classification was changed in Ethiopia from SITC to HS in 1994: one by a former staff of Economic Research Department and another one by the Central Statistics Authority (CSA). Although were not officially endorsed for regular reporting, the present study draws lessons from these studies.

The conclusion to be derived out of this paper is that both the methodology and data used are sufficient to resume the calculation and reporting of these indices for export trade whereas data needs to be improved to continue reporting them for import trade. It is acknowledged that there need to be a change in the base year as 1997 (the base year considered in the study by CSA) is now sufficiently old. Accordingly the base year in this study is taken to be 2000. There is also the need to improve data quality in all aspects, which is in fact a continuous process.

Export unit value and quantum indices in Ethiopia over the period 2000 to 2004 indicate that unit value of export is generally declining while quantity is increasing. Generally, this tells us that the export sector is not on the gainful path.

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1. Background

According to Bekele (1977:1), collection of information on import prices and derivation of the indices started on May 30, 1947 by the former State Bank of Ethiopia. The indices have been revised several times since then for a number of reasons. Among these reasons changes in the relative importance of commodities imported; the substitution of some imported items with local produced ones; excessive aggregation; and a change in the system of commodity classification are worth mentioning. The process of revision, however, has never been easy and every time some constraints have been observed, the details of which will be briefly reviewed in this paper.

Due to problems that will be duly acknowledged no data is available on import unit value and quantum indices since 1983 and on export unit value and quantum indices since 1996. Available information indicates that the construction of import unit value and quantum indices was discontinued because of heterogeneity in the items constituted. The export unit value and quantum indices were ceased to be constructed for two reasons; first, the Customs Authority changed its system of commodity classification from Standard International Trade Classification (SITC) code to that of Harmonized System (HS) code, and second, the base year was as old as 1975. The present study acknowledges these problems as reported by previous reports.

The importance of these indices in making policy impact analysis on a number of domestic economic development indicators vis-à-vis the rest of the world is not to be overstated. First of all, change in the terms of trade (TOT) is to be measured using these indices. The TOT, despite the varied definitions and modes of calculations attached to it, measures the performance of the external sector of an economy vis-à-vis the external sectors of the foreign counterparts. In an increasingly globalized economic order prevalent today, measuring the performance of the domestic economy in comparison to other parts of the world is extremely important. Furthermore, the term of trade is one of the fundamentals, which affect the equilibrium path of the real exchange rate, which is

taken in the literature as an indicator of international competitiveness of a country in the international market.

In addition, the impact of policies related to exchange rate, import/export taxes and duties, other real sector development, interest rate and the monetary sector is to be seen in the development of the TOT, among others. TOT could also be used by the business community in their investment decision as it could serve as relative price between the domestic economy and the rest of the world.

The importance of constructing these indices was, therefore, given due attention and a number of attempts were made to commence the issuing of these indices. Feleke (1989) indicated that the IMF sent technical expert in 1984, immediately upon discontinuation of the construction of import unit value index in 1983, to give support. In fact, the expert made relevant study at the time and forwarded some recommendations. But, it didn't end up with resuming the construction of the import unit value index for some reasons. According to Feleke (1989) a number of attempts were made to act as suggested by the technical staff of the IMF. But, all the attempts failed basically for two reasons. First, the exercise employed to make the items homogeneous, as recommended by the technical staff of the IMF, ended up with insignificant coverage, which was less than 70 percent on average. It is indicated in the study that in the theory of index numbering a coverage less than 75 percent can not be taken as representative. The second reason of failure was lack of appropriate data. It was noted that the records available at the then Exchange Control Division (ECD) of the National Bank of Ethiopia were not after the SITC classification. So, there was a problem of classifying import items as per the SITC and proceeding without appropriate classification would mislead those who use the indices. Therefore, the construction of import unit value and quantum indices failed to resume.

Two years later, Muche (1991) attempted to construct import unit value indices using data that came from the Customs Authority. He took 1016 different import items that

constituted on average about 94 percent of total imports for the years 1986-89. He adopted all the three index number constructing methods, viz. Lasperyes', Paasche's and Fishere's. He took 1986 as the base year and constructed the import price index for the years 1987 to 1989. However, those indices were not officially adopted.

Later in 1995 similar attempt was made by Feyera on both export and import unit value and quantum indices, although was not officially endorsed. Despite a number of attempts done by the Economic Research Department of the National Bank of Ethiopia, no output of practical significance has come about since then. However, the Central Statistics Authority (CSA) did a thorough study on the resumption of issuing those indices and did for the period from 1997 to 1999, which are now halted also.

The Economic Research Department of the National Bank of Ethiopia, giving due attention to the missing international trade indices, established a task force under itself to resume the reporting of these indices. The task force, however, couldn't proceed as a task force for various reasons and hence this report is an outcome of initiative taken by the Economic Research Department of NBE. The report is organized as follows: section two further deals with the review of previous attempts made in some detail and why they are not applicable at present. Section three is devoted to country experiences. The next section, section four, is the core section that gives the details of the current attempt. The challenges ahead, scope and coverage, data and methodology, the sources of data and constraints and problems involved are all included in this section. Finally, summary, conclusions and recommendations are given in section five. The constructed export unit value and quantum indices are all presented as annex tables.

2. Earlier attempts made on resuming the construction of external trade indices in Ethiopia

2.1 Before the system of trade classification was changed from SITC to HS

Available information indicates that the Ethiopian Customs Authority changed its System of reporting international trade data from the System of International Trade Code (SITC) to that of Harmonized System (HS) in January 1994. The fundamental problem with the SITC classification was lack of homogeneity in the items grouped under the same code and high level of aggregation. It is not difficult to understand the possible distortion of external trade indices constructed under such circumstances. Therefore, import unit value indices stopped being reported in 1983 long before the system was changed from SITC to HS. Export unit value and quantum indices, however, continued being reported until 1996, as there were and still are very few and almost similar export items in the country. The reporting of these indices was also discontinued in 1996 as the base year was as old as 1975. Owing to such problems different experts attempted to restart computing those indices, the basic features of which are briefly presented in the subsequent sections.

2.1.1 An attempt by the IMF expert

Immediately upon the interruption of constructing import unit value indices the IMF sent a technical expert by the name Gustaff F. Loeb to Ethiopia in 1984 for technical assistance. The expert came with the objective of finding out what the problem was and seek solution/s to the problems. So, the technical expert studied what the problems were and gave recommendations for improvement, some of which were:²

- (a) Update the base year for export indices to 1980 and revise it every five years (base year for the previous index was 1975);
- (b) Use a detailed commodity classification of SITC, i.e. the six-digit rather than the three-digit as it used to be the case in the past;

² Feyera Milkessa, Export and import unit value and quantum indices, Economic Research and Planning Department (ERPD)/NBE, December 1995; p. 4

- (c) Limit the compilation of import indices to a quarterly rather than a monthly frequency; and
- (d) Use direct survey of import prices for SITC sections 6-8 (on account of their heterogeneity) to complement calculation of the indices based on customs statistics for SITC sections 0-5, which were supposed to be more homogeneous.

Muche (1991:1) stated that the expert didn't proceed with the actual construction of the indices for shortage of time. It could be said that the recommendations, therefore, simply remained on a paper until today. In fact a number of changes have been made between then and now so much so that many of the recommendations are obsolete by now.

2.1.2 Attempts made by the Economic Research and Planning Department (ERPD) staffs

Feleke (1989:22) indicated that other attempts were made by the staffs of the ERPD at various times to resume the construction of the international trade indices, especially import unit value and quantum indices. Thus a first attempt was made by disaggregating the three SITC groups, namely groups 6, 7 and 8. Commodities were selected based on two criteria for inclusion. First, an item should appear in the list for a certain number of times for it to be considered and second, its unit value should not exhibit a variation of more than 50 percent in any two successive periods. The problem with this attempt was that the coverage was so low as 64.3%, 65.1% and 67.3% respectively in 1981, 1982 and 1983.

It was therefore felt that another attempt had to be made to increase the coverage. So, it was done for the second time by disaggregating commodities by country of origin. The rules of selecting the items for inclusion were the same as they were for the first attempt. However, no significant difference in terms of coverage was obtained in this attempt. Indices with that low level of coverage wouldn't be acceptable in the theory of index numbers, which commonly accepts 75% as the minimum.

Later in 1989 Feleke attempted to do it for the third time. He disaggregated the data in SITC group 7 by using data obtained from the then Exchange Control Department (ECD) of the National Bank of Ethiopia. For groups 6 and 8 he used the same 6-digit disaggregated level as was the case during the second trial. The basic problem he faced during that exercise was that data obtained from the ECD was not consistent with the SITC classification. Unfortunately, the coverage was further reduced as a result of the third attempt.

The final attempt before the system was changed from SITC to HS was made by Muche (1991). What he did was he selected some 1016 different import items considered to be regularly appearing in the import list, and accounted, on average, for 93.8 percent of total imports during 1986 – 1989. The method of selecting the items included in the regimen and level of disaggregation was not clearly indicated in his study.

Despite all those attempts none of them was officially endorsed for regular reporting. Moreover, the system of international trade classification adopted by the Ethiopian Customs Authority was changed from SITC to HS in 1994. This meant, therefore, additional problem for constructing the indices as earlier attempts made based on the SITC classification would remain to serve as inputs for any new attempt. Although the basic principles like the importance of disaggregation, regularity and high coverage are still valid the basic difference in the system of classification warranted a completely new attempt to construct the indices.

2.2 Attempts made after the system was changed from SITC to HS

Two attempts made to construct the import/export unit value and quantum indices after the change of the system are worth mentioning.

2.2.1 Attempt made by Feyera, 1995

Feyera Milkesa, a previous staff of the ERPD, did a comprehensive work on the construction of those indices. Actually, he started the study before the system was

changed from SITC to HS. It was after he completed the process of selecting the items to be included in the construction of those indices that the system was changed. Therefore, the items had to be reviewed in relation to the HS classification and that was done. The criteria adopted for selecting import items were as follows. A commodity:

- i. that appeared for two months in a quarter was taken as a candidate for the selection in the corresponding quarter; and
- ii. that appeared for seven quarters out of the twelve quarters of the three selected years was selected.

For constructing export indices:

- i. A commodity that appeared for a month in a quarter was selected as that quarter candidate for selection; and
- ii. A commodity that appeared for five quarters out of the twelve quarters of three selected years was selected.

Accordingly, 138 three-digit SITC commodities were selected for import indices and 39 three-digit SITC commodities for export indices. The average coverage of selected items for imports during the years 1989, 1992 and 1993 was 97.7 percent while that of exports was 90.7 percent, which both meet the criteria put under the theory of index numbering. In calculating the import indices sections with somewhat homogeneous items (sections 1-15 of the HS classification) were taken individually and other sections with more heterogeneous items (sections 16-20 of the HS classification) were disaggregated at chapter level, i.e. two-digit while for export index construction four-digit code was adopted.

2.2.2 Attempt made by the Central Statistical Authority (CSA)

In a latest work the CSA presented international trade indices for the period covering 1997 to 1999. The construction of the indices was made after the HS commodity codes.

There are thousands of import/export product types that are classified in the 99 chapters or 1253 Divisions of the HS codes. For the purpose of constructing the indices the CSA took a total of 13 and 28 *commodity types* due to their higher share in the total value of exports and imports respectively. It was also indicated that the index was calculated based on division level (four-digits code) for export and chapter level (two-digits code) for imports. Product types with a contribution of one percent and above from the total value of export and import were selected for the calculation of the indices. Accordingly, the coverage was 94 percent for exports and 92 percent for imports. The year 1997 was taken as the base year.

As far as methodology of choice of products, base year and calculation was concerned clear criteria were put in place. Thus, both quantitative like significant sample coverage (more than 80 percent) and proportion of each product in total import and export, and qualitative like the product uniformity, the reliability of data and the regularity of transactions were considered in selecting product to be included. In choosing the base year normality of the year was taken in to account in the sense that no war, drought or economic boom were prevalent and required information was available.

In calculating the indices, weighted Laspeyres formula was used for two reasons. First, it is said to be a simple formula with clear interpretation, which requires knowledge of the elementary indices and weighting factors for the base period. Second, it is said to be recommended by the United Nations for the purpose of international comparisons and aggregation.

Unfortunately, again, the construction of the indices is done only for the period 1997 to 1999. No data is available since then, which means the CSA stopped constructing the indices³.

3. Country Experience

The country experience on the construction of the external trade indices described hereunder is taken from a study made by the Economic Commission for Africa (ECA). The Development Information Services Division (DISD) of the ECA had in its work program for 1998/99 to prepare a non-recurrent publication titled "*Methodological issues in the compilation of international trade indices in African countries: Case studies of selected African countries*". Three countries, Kenya, South Africa and Mauritius were selected in the study. The objectives of the study were two fold; namely to present methodologies which were adopted by the three countries in the compilation of the international trade indices; and to evaluate those methodologies and make recommendations. A summary of experiences in these three countries is here presented as deemed relevant.

3.1 Kenya

3.1.1 General

Two missions were sent from ECA in 1996 and 1997 to assist Kenya in the attempt to re-base the international trade indices. There were two reasons that initiated the need to revisit the international trade indices in Kenya:

- i) The need to review the methodologies adopted in the past; and
- ii) The need to change the base year since it was as old as 1982.

The trade indices of Kenya before the initiative was taken to reconstruct the new series were on 310 commodities based on SITC Rev. 3 classification. The following problems were discussed as they were expected to affect the new indices; viz. variation in the quality of import items from country to country, subsidizing some of the commodities, under-valuation of some import items by importers, heterogeneity of export/import items, lack of specification of quantities, the impact of goods in transit on domestic prices (to

³ The present paper acknowledges that the reason for the CSA to stop constructing the indices was lack of sufficient quality data with respect to the volume of imports.

some extent these are captured by the CPI), and so on. The initial idea was to examine data of 1993, 1994 and 1995 based principally on the unit prices.

The theme of the new effort in Kenya was re-basing or changing the base year from 1982 to a more recent and representative one (1994 was chosen as the latest possible representative base year).

3.1.2 Coverage and selection of items

Two criteria were chosen for the selection of commodities to be included in the computation of the indices.

Table 1: Criteria for inclusion in Kenya

Item	Criteria
Exports	<ol style="list-style-type: none"> 1. Goods Exported at least to five countries, and 2. Value of goods exported not less than 20,000 Kenyan shillings
Imports	<ol style="list-style-type: none"> 1. Goods Imported at least from five countries, and 2. Value of goods Imported not less than 1000,000 Kenyan shillings

Furthermore, a detailed examination on all SITC sections but section 9 was made to identify and avoid problems like quality difference of goods, aggregation and variation in prices. A related important point in the selection procedure of goods was to remove outliers, which were identified by using the unit values. Unit price ratios of goods were compared for the three years (1993, 1994 and 1995) and it was proposed to lie between 0.8 and 1.2 (20% margin) and/or 0.7 and 1.3 (30% margin) for the good not to be an outlier.

All "other" items, which were not specified, were removed from the original listing of both imports and exports. In the case of section 8, however, a number of items were selected as long as their unit prices for the last three years were in the right direction as per the outlier test.

On the sample coverage for exports and imports, the following were done. For imports 47 out of 63 SITC groups (i.e, 74.6%), 116 out of 277 SITC division (i.e., 41.9%) and 308 out of 1123 original listing (i.e., 27.4%) were sampled. For exports 151 out of 358 original listing (i.e., 42.2%) were sampled on a preliminary basis. No sample was taken out of section 7 in this case because of the problem of specification due partly to heterogeneity and was left for another investigation. Note that data was for 1994.

On the issue of whether to include re-exports in the construction of export unit value index, ratio of domestic exports to total exports was calculated for the years 1993-1995 and was concluded that there is no problem whether to take total exports or domestic exports except for section 7, i.e. machinery and transport equipment. Even in the case of section 7 the issue became whether the re-exports were about 50% of total exports. If it is a short-term one it was preferred to consider only domestic exports-otherwise it does not matter⁴.

3.1.3 Re-basing from 1982 to 1994

One of the major reasons for constructing new series of indices was that the base year was too old to represent the current bundle of traded goods. The base year was thus changed from 1982 to 1994. Two reasons were provided for why 1994 was chosen. First, the external sector of Kenya was liberalized in 1993 and second, there was nothing particularly unusual in terms of the behavior of imports and exports statistics and the exchange rate was normalized in 1994. Nothing has been said about the need to change the base year in so many years interval of time.

3.1.4 Data and Methodology

(a) Data

The customs data was proposed for use for it costs by far less than import/export survey. Data on SITC section 9 was not included due to lack of specification of items or due to the nature of items included therein.

(b) Methodology

The Lasperyes, Paasche and Fischer index formula were proposed for use in the calculation of the re-based trade indices. In compiling the trade indices a separate Lasperyes index was constructed for total imports, exports and re-exports by section and for the overall index the geometric mean of the Laspeyres and paasche's indices (Fischer ideal index) were constructed. A chain method for linking the indices was also recommended for use. Also, if possible, the 1994 indices should be spliced with the previous 1982 based indices.

Assignment of weight for imports was done at the section, division and group levels. But for exports it was yet to be done.

3.1.5 Other issues

A number of problems, which could affect the new index numbers, were discussed and solutions were given in most cases. Thus, maize was to be split into seed maize and maize for food; live animal imported for the zoo were recommended to be excluded; subsidies were believed to be taken care of by the domestic market forces and problems of variation in unit prices for various reasons like quality change and consumer preferences were to be solved by removing outliers.

Other problems were just recognized. Such problems include:

- i) Food items only imported when there is short supply in the country and the opposite applies to exports;
- ii) For brandy, wines & cigarettes several brands are imported/exported;

⁴ A detailed look at section 7 provided that the items under that section were tractors, mechanical shovels, food processing machinery, packing and wrapping machinery, machinery parts, loud speakers passenger vehicles of cylinder capacity, parts and accessories or motor vehicles, etc.

- iii) In the case of palm oil customs seem not to provide correct quantity of import thus affecting unit price; and
- iv) In some other commodities there was lack of specification resulting in lack of comparability and in some cases like textiles no standard for measurement units (kgs, sq. meters, numbers, etc...).

3.2 Mauritius

3.2.1 General

The mission to Mauritius, which was in 1998, had the objective of assessing and evaluating the methodology adopted there for the compilation of foreign trade indices. The theme of the study was to construct *fully developed set of trade indices*. As described here under the experience differs from what was in Kenya in some important ways. First, there are not only two unit value indices but four, i.e., three types of export unit value indices and one import unit value index, all of which were produced quarterly. Second, they had the series in foreign trade unit value indices both after the SITC classification and the HS system. A summary of the basic findings of the mission about such and other relevant issues is presented below.

During the mission's visit Central Statistical Office (CSO) of the country was compiling the three series of unit value trade indices; i.e. for domestic exports, for imports and for the Export Processing Zones (EPZs).

3.2.2 Types of foreign trade indices

The four types of indices in Mauritius were:

- ◆ Import unit value index (1992 = 100);
- ◆ Domestic exports unit value index (1992 = 100);
- ◆ Export Processing Zone (EPZ) unit value index for exports (1992 = 100); and
- ◆ Export Price index (EPI) (1993 = 100)

3.2.3 Coverage and selection of items

In constructing the *import unit value index*, only 68% of total import values were covered because of the reported considerable economic and structural changes facing the Mauritius economy, which resulted in a greater diversity and increase in the number of products imported that are subject to frequent changes in specification and so on. The following items were excluded from the list of imports, which were defined as goods brought in directly for home consumption and imported into customs bonded warehouses:

- All items with an annual c.i.f value below Rs 10 million;
- Works of art, wood maquetry, jewellery and precious stones and other products for which quantities are not given, thus making it impossible to calculate unit price; and
- Air craft, marine vessels and parts on account of irregularity.

In constructing the *domestic export (defined as goods of national origin) unit value index*⁵ about 91% of total export values were covered and the following items were excluded:

- All items with an annual customs value below Rs 10 million
- Section 1.3 and 4 of the SITC (Rev.3) which include commodities which are rarely exported; section 9, which by its very nature of grouping commodities and transaction not classified elsewhere and none of which had an annual value of Rs 10 million or more, as recommended by international organization (These four section together represent less than 0.1% of the total exports); and
- Works of art, wood maquetry, Jewellery and precious stones for which quantities are not given, thus making it impossible to calculate unit price.

In constructing *the EPZ export unit value index*⁶ 86% of total exports of the EPZ was covered and the following items were excluded:

- All items with an annual customs value below Rs. 10 million;
- Sections 1 to 5 and 9 of the SITC (Rev.3) which include commodities which are rarely exported or those falling under "*commodities and transactions not classified elsewhere*" and none of which had an annual value of Rs. 10 million or more. These six section together represent less than 1% of the total exports; and
- Works of art, wood maquetry, Jewellery, precious stones and other commodities for which quantities are not given, thus making it impossible to calculate unit value.

In constructing the *export price index (EPI)*⁷ all domestic exports, the main components of which were coming from the EPZ, were covered and re-exports were excluded. The EPI differs from the *export unit value index* in that it measures pure price changes rather than the unit value, which is obtained from data on value and quantity of products traded. Unlike the unit value index the EPI is based on actual price measurements of relatively more homogeneous group of products. It requires elaborate specifications of products and takes account of the main price determining factors such as country of destination, quality, mode of transport and mode of payment. A representative sample of 42 firms was selected on the basis of regularity of their trade and their volume of exports. A total of 119 items (entry-level items ELIs), which represent 32 product groups were priced from the selected enterprises.

⁵ FOB price of the commodity exported was used in the compilation of the index. Note also that export covers both exports and re-exports, which are goods exported in the same condition as imported or after undergoing minor operations, which leave them essentially unchanged.

⁶ Note that the exports of EPZ represented about 72% of total exports and about 85% of the exports of the EPZ fall under section 8.

⁷ The EPI is based on the SITC nomenclature.

3.2.4 Re-basing from 1992 to 1997

Because of constant changes in the structure of the economy it was proposed that base year should change and change in every five years. Therefore, the base year was changed from 1992 to 1997 in order to make the basket of goods covered both in imports and exports more realistically representative ones.

3.2.5 Data and Methodology

(a) Data

The data to be compiled by the CSO is obtained from the customs returns filed by exporters and importers and were supplemented with direct information from other organization involved in foreign trade. Data compilation goes from customs department to Central Information System Division (CISD) of the Ministry of Telecommunication and Information Technology for computer processing and then to the CSO. (Data is after the Harmonized system). Constant check and re-check is made to ensure the quality of data using the unit value of each transaction.

For constructing the EPI, data on prices were collected directly from co-operating firms on a monthly basis and average price for the year was considered to get the base year's price (i.e. for 1993).

(b) Methodology

Data compilation is based on the General Trade System (GTS) in which goods entering (imports) and leaving the country (exports) are recorded using the national boundary as the statistical frontier.

In compiling data imports of a value not exceeding Rs. 1,000, transshipment, re-warehousing, returned goods, postage stamps, bank notes and coins, empty containers, personal effects, goods imported by foreign embassies and duty free shops, goods returning after repairs abroad, and fish and other sea products landed in Mauritius for the high seas by Mauritius vessels were all excluded from the list of imports. Similarly, all

exports of a value not exceeding Rs 1,000, returned goods, postage stamps, bank notes and coins, empty containers, goods sent abroad for repairs, personal effects and goods exported by duty free shops were excluded from the list of exports. Countries of origin/destination were taken into account for the first time in the calculation of the revised indices, thus improving the method of compilation. A country was thus included if the value of transaction for that particular item during the base year (1997 in this case) represents at least 1% of the total value of imports/exports of that commodity and the commodity has been traded for at least two quarters during the base year.

Commodities were coded according to the HS nomenclature. But, for the purpose of economic analysis, the commodities are also classified according to the SITC (Rev.3). In order to cater for national needs the HS and the SITC Rev. 3 have been extended to eight and seven digits respectively.

The Laspyere fixed weight formula was used in calculating the various unit value indices. As such, P_1Q_0 and P_0Q_0 was calculated and summed over all countries to give the values for the commodity. Then, the group, the division & the section levels and the overall indices were calculated accordingly. In the case of the EPI construction a modified Laspyeres formula based on the weighted average of price relatives is used.

Thus, in terms of weighting, the weights at the various levels of aggregation were made proportional to the 1997 values of the section, division and groups as the case may be in calculating the indices for domestic exports and the EPZs. In the case of imports the weights at the various levels were made proportional to the c.i.f values of the section, division and group levels. For constructing the EPI, the weights were derived from the 1993 domestic exports; i.e. weights assigned to each section and group were based on their exports values in 1993. Each product or group of products selected for pricing purposes represents all products that fall within that weight group.

$$I_{ot} = \frac{\sum W_i * P_{it} / P_{io}}{\sum W_i}$$

Where: I_{ot} is the index for the period t compared to base period o,

W_i is the weight of the i^{th} element,

P_{it} is the period t price of the i^{th} element, and

P_{io} is the base price of the i^{th} element.

3.3 South Africa

3.3.1 General

The objectives of the mission to South Africa in 1990 were to assess and evaluate the methodology adopted by South Africa for the compilation of international trade indices. The theme of the study of the mission was *towards re-engineering the compilation of trade indices*.

There are some specialties to South Africa as opposed to the cases in Kenya and Mauritius. First, it is a member of the South African Customs Union (SACU), which included Botswana, Lesotho, Namibia and Swaziland besides South Africa itself. Therefore, no customs documents are filled for goods passing between these countries. Second, there is a relatively better computerization both in the recording of customs data and calculation of the trade indices.

3.3.2 Data and Methodology

(a) Data

The main sources of trade statistics are the documents, which exporters and importers file with customs authorities prior to importing or exporting commodities. All imports or exports of commodities are required to be reported irrespective of value. Thus, commodity, country of origin and destination, quantity, and value of exports or imports are collected.

Both imports and exports are valued free on board (f.o.b.) basis. Imports valued in cost, insurance and freight (c.i.f.) basis are also available. To promote the comparability of international merchandise trade statistics, international recommendations of the UN state that imports be valued on c.i.f. basis while exports on f.o.b. basis.

Their statistics are based on the "Special Trade System" in which imports, which pass through a customs bonded warehouse, are included only at the time they are cleared for home consumption rather than at the time they enter the warehouse.

The commodity classification system that they use is the HS, at eight-digit level, six normal digits and two additional ones to take care of their special needs.

The initial processing of trade data is done by the South African Revenue Services (SARS). All import data are captured electronically at the port while export data are sent to Pretoria for data capture. Imports and exports of other SACU members are also captured in Pretoria.

(b) Methodology

They used the Laspyeres (fixed weight) formulae for the calculation of volume indices and Paasche (moving weight) formulae for the calculation of the unit value (price) indices. The terms of trade index was calculated as a ratio of unit value index of exports to the unit value index of imports expressed as a percentage.

Regarding the calculation, they used software developed on statistics South African mainframe computer. All that was required was therefore to enter data and let the computer do the calculation. The detailed methodology of the way the index was calculated including weights, which were established at the initial setting up of the index was not available. The programs at SSA were also converting the data from HS to SITC for the purpose of calculating the indices and other analytical purposes.

3.3.3 Others Issues

Four major stake holders for the trade statistics are:

- i. The South African Revenue Services (SARS), customs and excise;
- ii. Statistics South Africa (SSA);
- iii. South African Reserve Bank (SARB), and
- iv. Department of Trade and Industry, Government of South Africa.

There is a lag of different magnitude in the exchange of data and publication of trade statistics: one day for transaction of exports between ports and Pretoria: 3-4 weeks from the reference month for the publication of preliminary monthly trade figures; and about 2-4 months for the publication of the final figures.

Two monthly publications of the SARS on trade statistics are there; one for South Africa and one for the other SACU members. Final annual figures are produced with a time lag of about 1-year.

Problems encountered for the delay of the preparation of data included delay in the receipt of data from customs and excise; turn over of staff; and lack of adequate knowledge of the methodology involved in the technical calculation of the indices.

The indices were calculated monthly and annually and that the indices of volume and unit value were seasonally adjusted and available for the SITC categories. The base year was 1988.

The mission suggested that if indeed the calculation of trade indices was to be undertaken by Statistics South Africa (SSA), the whole methodology would have to be re-engineered.

3.3.4 Other organization involved in trade statistics

(a) SARB

Trade data analysis is handled by the BOP Division of the SARB after getting data from customs & excise, and SARS in electronic format on monthly basis and in HS codes.

Trade data is not converted into any other classification by the SARB but when errors or inconsistencies are reported, they are queried with the SARS. The methodology used for calculating the various indices was not described in detail.

(b) Customs and Excise

It collects trade data through the bills of entry completed by importers and exporters; process the data and produce reports which is to be supplied to the SSA, SARB, Industry Development Cooperation, etc. One problem explained was that customs collect the bills of entry for revenue purposes and hence they tend not to pay too much attention to the details on exports since there is not customs duty on exports. About inter - SACU trade it was said that data on trade would be available as of January 1999 and onwards.

3.3.5 Recommendation given

- The stake holders should come together and clearly outline responsibilities;
- SSA should take the lead in establishing a task force on trade statistics, the membership of which should include SSA, SARS, SARB and Ministry of Trade and Industry; and
- Due to unavailability of detailed methodology on the compilation of South African trade indices for the period 1988 to January, it was recommended that work on the compilation of trade indices should be re-engineered.

3.4 Lessons to be derived out of country experience

Despite the existence of peculiarities in each country's external and internal sectors of their economy a number of lessons could be derived out of the reviewed country experiences. It would be worthwhile to see in detail the advantages and disadvantages of adopting methods applied by those countries. However, in none of the cases is it indicated why they chose the methodologies adopted. The lessons obtained, therefore, are derived based on general applicability of the principles. These are listed below:

- (a) Outliers have to be identified by using appropriate methodology and be avoided (Kenya and Mauritius);
- (b) Decomposition of some sections in to commodity level is warranted in the case of heterogeneous sections (Kenya);
- (c) Attempt has to be made to have sufficient time series data on the international trade indices using appropriate and consistent methodology (Kenya and Mauritius);
- (d) It would be a good idea to construct two different export unit value indices namely traditional and newly coming export items (Mauritius);
- (e) How to consider import items that go to bonded manufacturing warehouse (BMW), a recently applied system in Ethiopia, should be thoroughly thought of and decision be made about that (Mauritius and South Africa);
- (f) It would be important to have the indices both in the SITC and HS system of codification (South Africa);
- (g) It seems worthwhile that the fixed weight Laspeyere's formula be used in constructing all the indices. But, a good justification has to be given why it is preferred as other countries have used Paasche's (South Africa, for unit value indices, for example), and Fisher's Ideal Index (Kenya, for instance); and finally
- (h) A mechanism has to be thought for how all the stakeholders could come together and make a joint effort in constructing the indices.

4. Resuming the construction of international trade indices in Ethiopia

4.1 The Challenge

The basic foundation in the process of constructing index numbers in general is data quality. An informal assessment made by the Central Statistics Authority about the quality of data on imports of Ethiopia gives a careful consideration of using the import data to construct import unit value and quantum indices for Ethiopia. It was found out that obtaining reliable import data to be used in constructing these indices is in fact not

possible at the time of writing this paper. Hence, the present report covers only the export side of foreign trade while the import side will hopefully be considered in the future.

4.2 Scope and coverage

The trade classification for these indices is after the Harmonized System (HS). The HS is the language of international trade and is used as a basis for the collection of Customs duties and international trade statistics by almost all countries. The literature indicates that currently 179 countries and Custom or Economic Unions (including 104 Contracting parties to the HS Convention), representing 98% of world trade, use the HS⁸. It is therefore one of the most important instruments in world trade. Hence, Ethiopia also changed its trade classification from SITC to HS in 1994, which is in fact, one of the reasons that caused the interruption of the construction of the indices.

Taking into account the normality of the period and consistency with other indices like the CPI, the base year selected for constructing the indices is December 2000. A total of 15 commodity types have been selected in the compilation of the export unit value and quantum indices, which represented 93 percent of the respective value in the base year. Coverage of about 80% is considered as sufficient enough for a group to be taken as representative in index number theory and hence both import and export indices are having good coverage in the process.

Temporally, it is preferred to construct the indices for the period since 2000. The CSA has constructed for the years from 1997 to 1999 and the years 2000 and forward are covered. The indices are constructed on a monthly basis.

Export unit value and quantum indices are calculated on division level (four digit). Various qualitative and quantitative criteria were used to select export product types to be included. After commodities were regrouped into division level, divisions with share of 0.04 percent and over in total export values were selected. This was followed by the

qualitative criterion of being representative in which it is considered that those divisions appeared for 8 times and over during the base year were taken. Finally, those divisions, which passed these two criteria, were further tested by the following four qualitative measures regarding unit values. The basic intention here is to avoid outliers. These measures are:

- a) $\text{Max (unit values)/Min (unit values)} < 8$;
- b) $\text{Max (unit values)/Median (unit values)} < 5$;
- c) $\text{Median (unit values)/Min (unit values)} < 5$; and
- d) $\text{Standard deviation of unit values/unit value average} < 2$.

Based on the above quantitative and qualitative criteria 15 divisions of export items, which accounted for 85.75 percent of total value of exports in the base year (2000) were selected. The items selected for the construction of export unit value and quantum indices are as shown in the following table.

⁸ Obtained from the website.

Table 4.1: Four-digit export commodities selected for export unit value and quantum indices in Ethiopia (2000=100)

Code	Label
0204	Meat of sheep or goats, fresh, chilled or frozen lamb
0702	Tomatoes, fresh or chilled
0703	Onions, shallots, garlic, leeks and other alliaceous vegetables, fresh or chilled
0709	Other vegetables, fresh or chilled artichokes, asparagus, aubergines, mushrooms
0713	Dried leguminous vegetables, shelled
0901	Coffee, coffee husks and skins, coffee substitutes containing coffee
0909	Seeds, anise, badian, fennel, coriander, cumin, caraway, juniper
0910	Ginger, saffron, turmeric, thyme, bay leaves, curry, origanum, dill and other spices
1008	Buckwheat, millet and canary seek; other cereals, wild rice
1207	Other oil seeds and oleaginous fruits, whether or not broken
1301	Lac, natural gums, resins, gum-resins, and balsams
1404	Vegetable products not elsewhere specified or included
1905	Bread, pastry, cakes, biscuits etc, with or without coca; communion wafers, capsule
4105	Leather of sheep or lamb skin (no wool & not 4108 and 4109)
4109	Patent leather and patent laminated leather, metallized leather

Source: website; <http://pacific.commerce.ubc.ca/trade/HS-4.txt>

4.3 Data and Methodology

The data is obtained from the Ethiopian Customs Authority (ECA). As stated earlier, 2000 is selected as the base year in this report. The compilation methodology adopted by the CSA was the weighted Laspeyres for two reasons:

- It is a simple formula with clear interpretation, which requires knowledge of the elementary indices and weighting factors for the base period; and
- It is recommended by the United Nations for the purpose of international comparisons and aggregation.

For these same reasons, the present study adopts the weighted Laspyeres formula in calculating both the import and export unit value and quantum indices.

The formula for the simple Laspeyres price index is given by:

$$L_p = \frac{\sum P_{jn} Q_{j0}}{\sum P_{j0} Q_{j0}}$$

where: L_p = Laspyeres price index

P_{jn} = The unit value of product “j” for the current period “n”

P_{j0} = The unit value of product “j” for the base period “0”

Q_{j0} = The quantity of product “j” for the base period “0”

Q_{jn} = The quantity of product “j” for the current period “n”

Correspondingly, the weighted Laspeyeres price index is to be given as follows:

$$I_{ep} = \frac{\sum P_{jn} * W_j}{\sum P_{j0}}$$

where: I_{ep} = Weighted price index

W_j = Weight of product j at base period “0” and is defined as follows.

$$W_j = \frac{V_{j0}}{\sum V_{j0}}$$

where: V_{j0} = Value of product j at base period “0”

$\sum V_{j0}$ = The sum of all sample product values at base period “0” of product “j”

4.4 Summary of results

The results obtained indicate that export unit value index has been slowly declining over the period 2000 and 2004 while export quantum index has been rising over the same period (see figures 4.1 and 4.2 below).

Figure 4. 1: Export Unit Value Index (Dec. 2000=100)

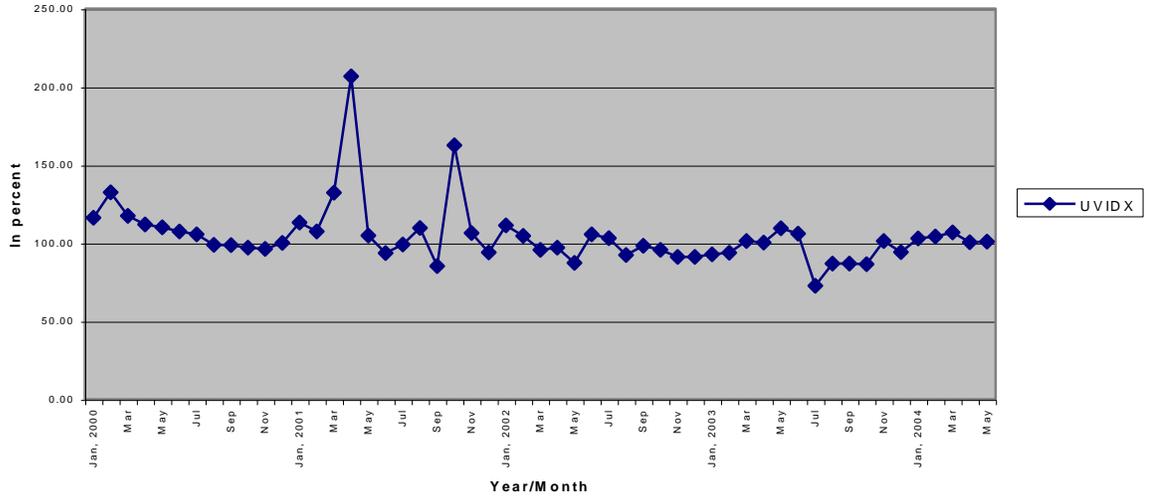
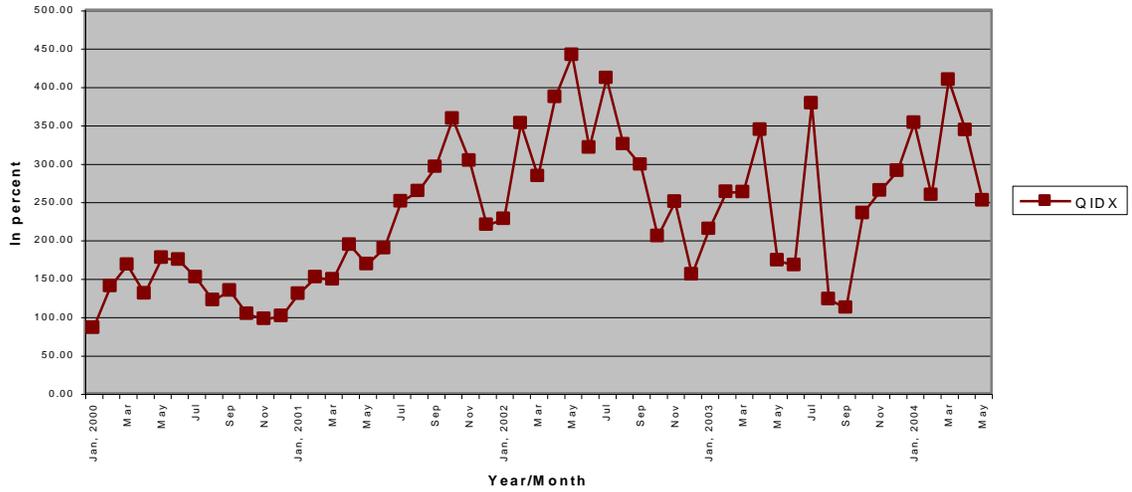


Figure 4. 2: Export quantum index (Dec. 2000=100)



In very crude terms, these trends indicate that there is a pressure on the terms of trade to go against the country. In fact, the trend on the import side should be observed before coming to a conclusive statement about the terms of trade. Despite efforts to increase exports, as observed from the positive trend coefficient on the export quantum index (found to be 3.25), unit value obtained from same exports has been declining, again as observed from negative trend coefficient (found to be -0.44).

5. Conclusion and recommendation

As there had been no official data on import unit value index since 1983 and on export unit value and quantum indices since 1996, a number of attempts were made to resume the official reporting of those important international trade indices for Ethiopia. An IMF expert, past NBE staffs and the CSA involved themselves in those attempts. However, none of those attempts succeeded in resuming the official reporting of those indices for various reasons.

The reasons include lack of sufficient time (for expatriate expert), lack of appropriate data, problem of aggregation, change of custom recording system from SITC to HS and others. The most recent attempt by the CSA, however, is found to be of proper significance for the current period. The methodology adopted is found to be sufficient.

Based on the review of all past attempts to resume the construction of those indices and other country experiences, export unit value and quantum indices for Ethiopia have been constructed for the period 2000 to 2004. The results obtained show that the methodology adopted by the CSA could be used while the base period is changed from 1997 to 2000.

The present study thus recommends the following: first, adopt the fixed weighted Laspeyeres price index in constructing the indices for the reason of simplicity and comparability with other countries (note that it is recommended by the UN); second, the 15 four-digit (division level) export commodity types significantly represent the export values of the country and hence consider these items; third, electronic data is available on monthly basis from Customs Authority and hence construct the indices on monthly frequency, which does not create any problem in terms of labor; and fourth, re-consider at later times the issue of making long time series data available, which could be easily done.

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