



UNITED NATIONS
DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION



UNITED NATIONS
ECONOMIC COMMISSION
FOR AFRICA

**International Workshop on Country Practices in Compilation of
International Merchandise Trade Statistics, 12-16 November 2007, Addis Ababa**

Country Presentation
Statistics Mauritius

Item 17: Calculation of Export and Import Price Indices

Methodology for the Construction of the Import and Export Unit Value Indices

Definition

- The Unit Value Index provides an overall measure of price changes of imported/exported goods.

Methods of compiling trade indices

- The calculation of trade indices for Mauritius have, so far, been based on two methods, namely:
 - (i) the unit value index and
 - (ii) the pure price index.
- The method used to derive both types of indices is of the Laspeyres' type and is denominated in Mauritian rupee. The quarterly indices have been published within a time lag of three months.

– The unit value index has been computed by the Central Statistics Office of Mauritius from 1964 to 2003. The C.S.O has thereafter improved its methodology by adopting the calculation of pure price indices, that is, the export price index in 1992 and the import price index in 2003.

– Unit value indices were used as a proxy for the price index. They were computed from customs declaration filed in by traders. Data pertaining to quantity, value, description of goods and country of origin/destination were thus available, enabling the computation of the unit value (based on fob for exports and cif for imports) for each commodity. (Listing)

- The pure price indices are based on the prices of specific items (by brand, country, packaging etc) collected on a quarterly basis through export and import surveys of importers and exporters.

Uses of foreign trade indices

Offer the possibility of breaking down the global value of imports and exports into their price component and subsequently volume component

Measure changes in prices and volumes of imports and exports

- Analyse the effect of price changes on various sectors of the economy
- Calculate the terms of trade. The terms of trade is the ratio of the export price index to the import price index. A rise in this ratio indicates that the terms of trade have moved in favour of the country.
- Analyse the effect of exchange rates on import and export prices
- Provide quarterly measures of the trend in the price of the country's exports and imports
- Provide deflators for national accounts e.g to calculate the growth rate of imported goods in wholesale/retail sector and G.D.F.C.F (imported machinery)
- Make budget revenue projections and macro-economic forecasts as Mauritius imports most of its products.

Construction of the unit value index

- Scope and Classification

The commodity classification used so far for the compilation of import/export price index is the United Nations Standard International Trade Classification (SITC Rev 3) whereby commodities are classified under the locally adopted 7-digit item codes, 3-digit groups, 2-digit divisions and 1-digit sections.

- Selection of items in the basket of goods

This involves the examination of the structure of country's imports and exports and the selection of the most important and regularly traded commodity groups separately for imports and exports.

Initially the unit value index for Mauritius was derived from a sample of SITC products whose import or export values exceeded a designated threshold assuming that products not represented follow the same trend. At a later stage, improvements were made by taking into consideration division, group and country representativity.

The following items were excluded because of irregularity in their trade, heterogeneity of the products and difficulty in computing unit values:

- ships, aircraft, works of art, jewellery and precious stones
- items which show very little trade over the base year
- items in respect of which the base year unit values are out of range
- - items falling in section 9 of the SITC described as “goods not classified elsewhere”.
- Value coverage : the value coverage used for imports was around 70% whilst those for exports were nearly 90%.

Quarterly trade indices computed by the C.S.O

- The CSO has been compiling on a quarterly basis three series of unit value trade indices, viz
 - Domestic export unit value index
 - Imports unit value index
 - Export Processing Zone (EPZ)-(manufacturing free zone) exports unit value index.

Sources of data used for the compilation of the unit value index

External trade statistics are compiled from data obtained from various sources. These are:-

- (i) bills of entry obtained from the Customs Department
- (ii) the State Trading Corporation which provides information relating to imports of petroleum products, rice, flour, wheat and cement
- (iii) the Mauritius Sugar Syndicate supplying us with information on exports of sugar

Choice of base period

- The base year should be a year with rather stable political and economic conditions. Given the constant shift in the importance of goods imported and exported, the best practice is to revise the baskets of goods for calculation of weights every five years.
- The following situations should be avoided in the choice of the base year:
 - A drastic change in the prices of some commodities for the particular year due to external factors like war or natural disasters
 - Changing structure of the economy
 - Change in economic policy-liberalization of economy

Weighting Scheme

- The weights are normally derived from data relating to the year defined as the base year. Weights assigned to each level of the SITC namely item, group, division and section are based on their contribution in import/export in that particular year. The weight for each section is calculated as the ratio of their respective import/export values in the base year over the total value of import/export for that year. The section weights are then redistributed among the selected divisions which are in turn redistributed to the groups represented. example

Calculation of unit value indices

- The most commonly used methods for calculation of trade indices are: Laspeyres, Paasche and Fisher.
- It is worth pointing out that in the case of Mauritius, initially for both imports and exports the overall unit value was calculated as a weighted average of SITC sections derived from a sample of selected SITC products using the Laspeyres method.
- The methodology was later refined by selecting a stratified sample and applying weights calculated on the respective shares of each section, division and group in the total cif/fob value .
- It was further modified taking into consideration in the calculation, countries of origin/destination of the revised indices, thus improving the method of compilation. A country is included if:
 - (i) the value of transactions for a particular item during the base year represents at least 1% of the total value of imports/exports of that item and
 - (ii) the commodity has been traded for at least two quarters during the base year.

- The Laspeyres type unit value index is derived by weighing the quarterly unit values with base year quantities. For items whose unit values are rejected (outliers) or are missing because they were not traded for that particular period, the unit value changes are imputed from other items falling in the same SITC section.
- Where the unit value is out of range investigations are made from the bills constituting the items to know whether genuine price changes or due to misclassification or wrong reporting or exchange rate effect and corrections are made accordingly.

- Product level
- For each product P1Q0 and P0Q0 is calculated and summed over all countries represented to give the values for the product.
- Group level
- An index is calculated for each group using the Laspeyres fixed weight formula.
 - $I_{G(i)} = \frac{\sum P_1 Q_0}{\sum P_0 Q_0}$
- The sum being extended over all commodities represented in group I

- Division level
- The index for each division is derived as a weighted average of the indices of all groups within that division. The formula is

$$I_{D(j)} = \frac{\sum W_i I_{G(i)}}{\sum W_i}$$

Where $I_{D(j)}$ = Index for division j

- W_i = Weight of group i
- $I_{G(i)}$ = Index of group I

- Section level
- The index for each section is calculated as a weighted average of the indices of all divisions within that section using the formula

$$I_{SK} = \frac{\sum W_j I_{Dj}}{\sum W_j}$$

- Where I_{SK} = index for section k
- W_j = Weight of division j
- I_{Dj} = Index of division j within section k

- The Overall Index

- Finally the overall unit value index is derived as a weighted average of the indices of the various sections. The formula is

- $$I = \frac{\sum W_k I_{k-s(k)}}{\sum W_k}$$

- Where I = Overall unit value index
- W_k = Weight of section K
- I_{sk} = Index of section K

- Advantages of unit value indices

- - Data readily available (inexpensive – no cost sampling or field visit);
- - Data comprise the universe of trade and not simply a sample of importers and exporters;
- - Easier to compute.

- Disadvantages of unit value indices

- Reflect not only changes in commodity prices but also changes in the commodity mix in the commodity group;
- Do not account for changes in the quality of commodities;
- Inaccuracy of Customs records,

- Certain characteristics relevant to statistical operations tend to be overlooked by the Customs Department during clearance of imported goods. These are namely:
 - (i) the proper classification of goods
 - (ii) quantity measures when there is a supplementary unit for the product
- In the case of the unit value index for Mauritian exports, these problems are minor since the range of domestically produced goods is rather limited.
- Changes in trading patterns
- Changes in local trading patterns are not catered for during the computation of unit value indices. A typical example for Mauritius is the gradual shift from imports of wheaten flour to that of wheat with the opening of a wheat mill.

Adoption of the pure price indices of imports and exports

- The pure price index was proposed as a more appropriate method since it would eliminate the unit value bias.
- It took some time to start since it necessitated more resources and manpower for the survey work.
- As from 1993 the CSO started collecting prices for the computation of a new set of price indices, among which was the Export Price Index (EPI)
- A price Unit has been set up for the collection exercise whilst computation and dissemination are done by respective sectoral unit
- Objectives
 - To have more reliable indices
 - To reduce the time lag between the collection of data and compilation of indices
 - To remove the dependence of price indices on customs data

Export Price Index (EPI) & Import Price Index (IPI)

- **Definition**
- The Export Price Index (EPI) is a measure of price change of domestically produced Mauritian products shipped to other countries. It excludes re-exports. The Import Price Index on the other hand, is a measure of price change of imported goods excluding those of the commercial freezone (The Mauritius Freeport).
- The first series of EPI was calculated with the year 1993 as base and reference period. The index was first revised in 1997 and subsequently revised in 2003. Computation of pure price index for imports (IPI) has been implemented much later (in 2003) than the EPI as the range of products that we import is much wider and it requires more resources for the pricing of imported goods (36 commodities are priced for the EPI against 142 for the IPI).
- In so far as scope, classification and coverage are concerned, the same rules apply as for the computation of unit value indices.

Comparison with Unit Value Index

- A modified Laspeyres formula based on the weighted average of price relatives is used to calculate the EPI and the IPI. The price relative of each item forms the most basic level for the compilation of higher aggregate indices whereas for the computation of the unit value index weights are assigned only to groups, divisions and sections.
- The formula is as follows:
- Where
$$I_{ot} = \frac{\sum w_i \times \frac{P_{it}}{P_{io}} \times 100}{\sum w_i}$$
- - I_{ot} is the index for period t compared to base period 0
 - w_i is the weight of the i^{th} element
 - P_{io} is the base price of the i^{th} element
 - P_{it} is the price of the i^{th} element in period t
 - Σ means summation over all selected elements

- **Specificity of price collection**

- Prices are normally collected on a monthly basis and averaged for each quarter. For imports, in case where most imports occur at intervals longer than a month, prices are collected once every quarter and refer to the last consignment.
- For exports, sugar and Molasses produced during a crop year, which normally extends between July and June of the following year, are usually exported during that same crop year. Export prices of these commodities being mostly negotiated prices, the same average yearly price for the crop year is used for the four quarters comprising that crop year. The base price of these commodities for the year 2003 is the average price for crops years 2002/03 and 2003/04.