

Chapter 1

Calculation of Trade Indices Using the IO 24 Sector

Classifications:

Creating a Trade Index Database

KUROKO Masato

This chapter discusses calculations of trade indices using the Asian International Input-Output Table 24 sector classifications by IDE (IO24 below), and provides details of the procedures used in these calculations. Before beginning this discussion, we will look at trade indices estimated and published by government organizations, taking Hong Kong and Japan as examples. The procedures for calculation utilized in this chapter are largely modeled on the procedures for formulation of trade indices utilized by the Japanese Ministry of Finance.

The procedures for calculation of trade indices using IO24 of calculating the unit value indices can be broadly divided into the following:

- 1) Calculation for basic tables
- 2) Calculation of trade indices for IO24
- 3) Calculation of general trade indices

1. Trade indices of Hong Kong and Japan

The Hong Kong Special Administrative Region (HKSAR) publishes value index, unit value index and quantum index for imports, domestic exports and re-exports. Unit value index is found by dividing value by quantity. A specification price survey of imports and exports has been conducted since 1982 to increase the reliability of the unit values. The sur-

vey targets heterogeneous items with relatively large trade values and fluctuating unit values and the results are incorporated in the calculation of unit value indices.

The unit value index is a kind of chained Laspeyres index. Every year, weights are recalculated on the basis of the trade values of the preceding year. As compared with formulas employing fixed weights, this has the benefits of making it possible to generate a longer series of data with a more up-to-date weighting scheme.

The Japanese Ministry of Finance publishes value index, quantum index and unit value index. The Fischer formula is used to calculate the unit value index. Every fifth year is designated as a base year to revise the target commodities, and indices are then calculated for the newly selected products. To look at an example, the criteria established for determining target commodities in the base year 1995 consisted of the following points:

- a) Each commodity should generate more than 1/100,000 of the total value of imports and exports.
- b) More than 32 months of import and export records should be available for the 36 months making up the three-year period surrounding the base year (1994-1996).
- c) The basket items, a collection of heterogeneous

items, should be excluded from the commodities determined by items 1 and 2.

Trade indices are aggregated and published for each of the six trading partner countries and regions. These are total world, U.S., EU, Asia, Asian NIEs, ASEAN, and China.

2. Calculation for basic tables

(1) First the data which forms the basis of calculations must be formulated. Here it is possible to use the data utilized in the world trade matrix found in the SDS 84 published last year. This data is comprised of eleven reporting countries and regions; China, Japan, the four Asian NIEs, the ASEAN 4 countries and the U.S. SITC R1, R2 and R3 commodity categories are modified to correspond with IO24. Partner countries are defined as the 21 countries and regions used in SDS 84. Data files are divided by reporting country and SITC Revision.

(2) Data files are loaded into database tables.

(3) Quantity units are converted. For example, 'B3' represents 1,000 square meters; quantities using these units are multiplied by 1,000 to express them as 'B0', or one square meter. This remedies the problem of heterogeneity of quantity units preventing calculation of indices.

(4) Unit values are calculated. Unit values are calculated by dividing value by quantity. Data with no quantity units or a quantity of zero are excluded.

(5) A period (commencing and finishing year) is defined for calculation of indices for each trading partner/direction of trade/IO24 group, and separate tables are compiled.

(6) On the basis of the tables formulated in (5), A common period for each partner countries/ direction of trade group is determined to enable calculation of indices. The central year in this period is taken as the

base year for calculation of indices. Separate base years are determined for each partner country/ direction of trade group because some countries may not have reported data for a sufficient number of years; if the base year was fixed and data could not be obtained for this year, indices could not be formulated.

(7) The base years determined in (6) are then used to set the base years to be used in actual calculations for the tables in (2). The period for the calculations discussed here is five years; the base year used in actual calculations is determined from the central year in the period.

(8) At this stage it is determined whether specific commodities will be utilized for each partner country / direction of trade group. The criteria for this determination uses the Ministry of Finance index calculation formulae as a reference, and is established uniquely as follows:

a) More than three years of trade data should be available for the five-year period with the base year used in calculations as the center, to enable calculation of indices between base years.

b) If data shows that unit values increase to more than ten times or decrease to less than one-tenth their original figure of previous year more than once in the five-year period, the commodity concerned should be excluded.

(9) As a basis for formulation of each unit value index, price in comparison period is multiplied by quantity in base period ($P_t Q_0$), and price in base period is multiplied by quantity in comparison period ($P_0 Q_t$).

3. Calculation of trade indices for IO24

(1) Data for each partner country / direction of trade / IO24 / reporting year / commodities is compiled from the tables formulated in 2.

(2) Laspeyres and Paasche indices are calculated, after which Fischer indices are calculated. The representative ratios by value and number of data are then determined. These are percentages expressing the ratio of value and number of utilized data to the total data set.

(3) Having calculated indices for each five-year period above, indices for shared base years are now calculated. All indices are linked, with the base year determined in (5) and (6) in 1. above used as a yardstick.

(4) A summary table of calculation results is formulated.

4. Calculation of general trade indices

(1) IO24 percentage distributions are calculated for each partner country / direction of trade / reporting year group as a weight table to be formulated. This weight table is used to calculate general indices. The weight table includes only the partner country / direction of trade groups which can determine the common base year in (6) in 2. above.

(2) The weight table formulated in (1) and the indices table for each IO24 formulated in 3. are joined, and a general index table is formulated.

(3) Laspeyres and Paasche indices are calculated, after which Fischer indices are calculated. The representative ratios by value and number of data are determined.

(4) Because indices were calculated above for each five-year period, indices for shared base years are now calculated.

(5) A summary table of calculation results is formulated.

Conclusion

In term of data processing, plain text files were used as master data and were processed using PL/I programs in the SDS 84. For these calculations, a relational database system was used to store the master data, and this was processed with a program employing SQL statement. This enables simple expression of complex processing procedures, and increases processing efficiency.

Future study will be required to enable solution of the following problem points.

(1) For these calculations, the calculation periods determined for each IO24 in 2. (5) and (6) were used as a basis for determination of the calculation periods for general indices; these results were used to determine base years. The reason base years are not fixed and these procedures are conducted is the fact that there are many cases in which partner country data does not cover a full five years, making it impossible to calculate indices if base years are fixed. This procedure is very different to the one utilized by the Ministry of Finance in calculating indices, and was chosen because of the crudeness produced by the granularity of the data used in these calculations, in contrast to the Ministry indices. It is, therefore, difficult to use the results to quickly compare indices for the same partner country where base years vary.

(2) Unnatural fluctuations in some indices still exist despite the criteria used to select commodities.

(3) In these calculations links were not made between different SITC revisions.

(4) It is difficult to determine how to improve the ability to conduct international comparisons of indices. In these calculations commodities were determined for each reporting country and weights were calculated on that basis, but the data in its present form cannot be used to make international comparisons between reporting countries.