For Official Use **STD/STESEG(2003)37**

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development

18-Jun-2003

English - Or. English

STATISTICS DIRECTORATE

STD/STESEG(2003)37
For Official Use

OECD Short-Term Economic Statistics Expert Group

STESEG TASK FORCE ON DATA PRESENTATION AND SEASONAL ADJUSTMENT

PRESENTATION OF RETROSPECTIVE FIXED BASE INDEXES

Paris, 26 - 27 June 2003

Prepared by Anna Ciammola, ISTAT - Directorate for Short Term Business Statistics

Submitted to the Expert Group under item 4 of the draft agenda

JT00146329

English - Or. English

PRESENTATION OF RETROSPECTIVE FIXED BASE INDEXES

ISTAT – Directorate for Short Term Business Statistics*

1. Introduction

The analysis and treatment of Short Term Statistics (STS) are frequently hampered by breaks in time series or shortness of the series length, in particular when fixed base indexes are involved. In turn, users need long time series to carry out seasonal adjustment, calendar effect correction, business cycle analysis and forecasting. The main causes of the breaks are:

1. change of the base year[1], that besides the updating of the weighting system[2] usually involve changes in the sample of respondents and in the sample of products;

2. the introduction of a new economic activity classification.

Indices computed at the most detailed levels of the activity classification are more vulnerable to discontinuation than indices aggregated at higher levels and the calculation of index series over a prolonged time span generally reduces the number of detailed series available. A long time series of fixed base indexes is usually compiled converting the indices released in the previous base (for example 1995=100) into indices expressed in the more recent base (for example 2000=100) by a simple transformation (called “rebasing”) and linking them with the new indices.

The aim of this brief note is to treat the presentation of time series including rebased (fixed) index numbers and it is organized as follows: section 2 deals with methodological issues and sketches two equivalent approaches to the rebasing; section 3 discusses the dissemination and presentation aspects, arising from a small survey over the practices of several National Statistical Institutes (NSIs); section 4 draws same preliminary conclusion.

2. Compiling rebased (fixed) index numbers

Rebasing is the act of establishing a new base year/month for the index and recalculating the index numbers to reflect the new base; according to Eurostat’s STS Regulation, the rebasing should take place within three years from the end of the base year.

---

* The note has been draft by Anna Ciammola

[1] As Eurostat’s STS Guidelines point out, the term base year is used “to describe the year with rescpect to which the value of all other reference periods are compared. In a series of index numbers it is the year that takes the value 100”. Note that the Handbook on price and values measures in National Accounts (NA) contains a different definition of base year.

[2] The EC STS Regulation requires that a new weighting system is introduced at least every five years and coordinated with changes in the base years.

The criterion used by NSIs to rebase index numbers is that any conversion into a different reference base period must leave month-to-month and year-to-year percent variations (computed on the rebased indices) identical to the ones characterising the original series, even though the rebased index level changes. Both the approaches described in this section, the direct and the aggregative one, fulfil the above criterion.

Direct approach

The indices at each level of the activity classification, coming from a linear combination of the indices at lower levels, weighted by the original weighting system, are rebased independently. The result of this independent rebasing is that the additivity property of fixed-base indices is lost, which implies that indices at more detailed level of activity cannot be aggregated to produce indices at higher and higher levels by means of the original weighting system.

Indirect or aggregative approach

This approach is computationally more expensive than the previous one and it is performed through the following steps:

1. rebasing of the elementary indices (i.e. at the most detailed level of product breakdown);
2. updating of the previous weighting systems [3];
3. aggregating the rebased elementary indices by means of the updated weights.

As regards the approach to be adopted by NSIs, the Eurostat STS Guidelines refer to the Handbook on price and volume measures in NA, that recommends the first approach. This is performed by many European NSIs (for instance Italy, Belgium, Austria, Denmark, Ireland have utilised this kind of approach after the recent migration to base 2000), even though the same Institutes may have different practices for different indicators.

Rounding policy

Rounding is performed to prepare index number for publication and generally the data are rounded to the first decimal place (figure). Concerning the stage at which index figures are rounded, national practices are very different: some NSIs base their calculations on unrounded data that are rounded only at the final stage (as BLS does for compiling the producer price index) for dissemination purposes; others round data at each step, from the elementary indices till the most aggregated ones. This last practice cannot be

[3] Updating of the original weights is carried out to give higher (lower) importance to a certain economic sector or product, when the average level of its index, not rebased, over the new year base is greater (smaller) than the average level of the most aggregated index, not rebased, over the same time span. Computationally a weight is updated by means of the following transformation:

$$^{95,u}Ws = {}^{95}Ws \times ({}^{95}Is_{00} / {}^{95}I_{00})$$

where s is a sector or a product, ^{95}Ws is the weight assigned to s in 1995=100, $^{95,u}Ws$ is the updated weight, $^{95}Is_{00}$ is the average over the year 2000 of the index for s (computed in the base 1995=100), $^{95}I_{00}$ is the average over the year 2000 of the most aggregated index (computed in the base 1995=100).

In the case of two changes of base year the transformation becomes:

$$^{90,u}Ws = {}^{90}Ws \times ({}^{90}Is_{95} / {}^{90}I_{95}) \times ({}^{95}Is_{00} / {}^{95}I_{00})$$

where ^{90}Ws is the weight assigned to s in 1990=100.

replicated for the calculation of retrospective indices, as this may affect the month-to-month and year-to-year percentage changes constrained to be equivalent to the ones already published. Rounding to the third decimal figure in the computation of the rebased indices assures the fulfilment of the above constraint. For dissemination purposes, the rebased data are rounded to a decimal figure at the final step. Rebased data have less precision after rounding and the loss of precision due to it is more serious when the rebased index values are smaller than the originally released ones.

3. Presentation and dissemination of rebased indices

Presentation and dissemination practices of the NSIs are very different, though the approach usually performed in the index rebasing is the direct one. This depends on the sector breakdown at which index values are released and the impact of a new activity classification and weighting system on the retrospective indices. These are the matters dealt with in this section.

Introduction of a new activity classification

When the activity classification system is unchanged, the rebasing might be left to the final users and NSIs might maintain the database with the historical weights and indices. This is not the case when a new activity classification is introduced. In fact it may require the calculation of new index values, especially at the lower activity levels, with a substantial impact on the indices already released (the general index, i.e. the most aggregated level, always remains unchanged). In such situations, NSIs have to compute the indices in the previous bases in accordance with the new activity classification and the *splicing* coefficients, that is the averages (in the previous base year) of the retrospective indices over the new base year (at each level of the classification). Then, they can:

1. provide the users with this set of retrospective index values together with the *splicing* coefficients;

2. rebasing the indices and provide the users with spliced series.

The second solution is widely practised by NSIs as it is more user-friendly than the former.

Historical data, rebased historical data, "linking" year and base year

At each re-basing two sets of retrospective indices are available from the first period of the base year onwards (for example, from January 2000 to December 2002, if the indices base 2000=100 are presented starting from January 2003): the old indices rebased by means of one of the two approaches described above and the new indices computed according to the new weighting system, sample of respondents, activity classification and so on. This means that NSIs may:

1. replace the old index values with the new ones over the whole time span (2000-2002 in the example);

2. replace the old index values with the new ones starting from the year following the base (the time span 2001-2002);

3. maintain the old index rebased until December 2002.

In the previous cases, the "*linking*" year, i.e. the year at the beginning of which the old rebased index series are linked with the new index series is, respectively, 2000, 2001 and 2003. For presentation purposes, the importance of the "*linking*" year arises because the year-to-year percent changes are computed comparing the index numbers belonging to different structures. All the above practices are

common to the NSIs: the first one is appreciated especially by time series analysts because it takes away the structural break, introduced at the beginning of the "*linking*" year, from the end of the series; the third one leaves unchanged the index percent changes already published.[4]

Metadata

Dissemination of the data should require the following information:

- the methodological approach adopted for the rebasing;
- the *linking* year;
- the classification level at which index numbers are rebased and disseminated;
- the rounding policy followed in the rebasing, even though rounding should only be carried out at the very last stage for presentation purposes;
- a transition table from the old to the new classification system, if this is introduced;
- the description of the new weighting system and its impact on the aggregation of lower level indices;
- when the direct approach is adopted, a note of caution is useful to alert the final users that any aggregation of rebased indices needs the updating of the weights of the previous bases [5].

4. Conclusions

Since rebasing is simply an arithmetic transformation that does not substantially impact on the index, it cannot be considered a "revision" because the relative movements of the series over time are not affected, the absolute level of any index having no intrinsic meaning other than relating a measurement to the base year.

Rebasing can be performed by means of two approaches, even though only the direct one is widely used by NSIs. National practices regarding the presentation and the dissemination of rebased data are not harmonized and this note points out some aspects that might make the rebasing of fixed index numbers more transparent for the final users and more useful for the analysts of economic time series.

[4]Among the European NSIs that have already adopted the new base 2000=100, the linking years are: 2003 for Ireland (wholesale price index), 2000 (labour indices) and 2001 (industrial production index) for Italy, 2002 for Spain (industrial production index).

[5] If a NSI adopts the direct approach to rebase the indices, it does not provide the updated weights to the final users and the original weighting system cannot be used to aggregate the rebased indices (the additivity property is lost when the rebasing is carried out). For example if the series cover the time span January 1996-December 2002 and the *linking* year is 2000, then the aggregation requires the updating of the old weights for the time span January 1996-December 1999 (according to the footnote 3) and the new original weights for the residual time span.