

Empirical Examples on Compilation and Computation Methodologies-Spain case

Workshop on Turnover Indices

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Overview

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Indices computation. Elementary indices

Once we have collected the data, we have to calculate the indices: elementary indices and aggregate indices.

- **Elementary indices** are calculated according to the following theoretical formula

$${}_{2010}I_{e,i}^{my} = \frac{\sum_j t_{j,i}^{my}}{\frac{\sum_{m=1}^{12} \sum_j t_{j,i}^{m2010}}{12}}$$

where ${}_{2010}I_{e,i}^{my}$ is the elementary index, referring to the year 2010, of basic aggregate i , in the month m of year y , $t_{j,i}^{my}$ is the turnover of establishment j , in the stratum i , $\frac{\sum_{m=1}^{12} \sum_j t_{j,i}^{m2010}}{12}$ is the value, in monetary terms, of the average turnover the base year 2010, of the group of establishments j -th corresponding to the stratum i -th. In practice, the formula used is

$${}_{2010}I_{e,i}^{Jan10} = \frac{\sum_j t_{j,i}^{Jan10}}{\frac{\sum_{m=1}^{12} \sum_j t_{j,i}^{m2010}}{12}}$$

Indices computation. Elementary indices

In practice, the computation process should consider the possibility of new establishments opening and others closing down. Therefore, for homogeneous time comparisons, the information used in the calculation of the elementary indices is that provided by the establishments that have provided the data for two consecutive months

$${}_{2010}I_{e,i}^{my} = {}_{2010}I_{e,i}^{m-1y} \cdot \frac{\sum_j t_{j,i}^{my}}{\sum_j t_{j,i}^{m-1y}}$$

where ${}_{2010}I_{e,i}^{my}$ is the elementary index, in base 2010, of stratum i -th, in month m of year y , ${}_{2010}I_{e,i}^{m-1y}$ is the elementary index, in base 2010, of stratum i -th, in the previous month, $t_{j,i}^{my}$ is the turnover in month m of year y of establishment j -th in the i -th stratum and $t_{j,i}^{m-1y}$ is the turnover in the previous month.

Indices computation. Elementary indices

There is a software program to compute automatically these elementary indices. The way to obtain the comparability is through internal **validation codes**:

- VC = 0 in case of definitively closed down or new establishments that still have not sent any data. Units with this VC are not included in the computation;
- VC = 1 if the unit has provided data for two consecutive months and it is included in the computation;
- VC = 2 if the data series has been truncated. Units with this VC are not included in the computation.

Jan	Feb	Mar	Apr
34560	78157	283880	315268

The units included in the computation are those with VC = 1 in the reference and previous month and also those units having a VC = 2 in the previous month and VC = 1 in the reference month.

Indices computation. Elementary indices

We have also defined **update codes**, mainly to obtain information for Quality Indicators:

- UC = 1 data provided by the establishment;
- UC = 3 new establishment on the first month;
- UC = 4 closure on the first month;
- UC = 7 manual imputation;
- UC = 8 automatic imputation;
- UC = 9 consolidated closure.

We have to take care with the divisor in the quotient. It is possible that some establishment has null turnover some month. In that case what we do is to substitute it with 1. This way we do not have to divide by 0.

Indices computation. Aggregates indices

The indices, base 2010, of any functional aggregation (section, division, economic sectors by economic destination or region) is obtained as the aggregation of the elementary indices of the required aggregation multiplied by the corresponding weights:

$${}_{2010}I_A^{my} = \sum_{i \in A} {}_{2010}I_{e,i}^{my} \cdot {}_{2010}W_i^{CNAE09}$$

where ${}_{2010}I_A^{my}$ is the index Base 2010 of aggregate A in month m and year y , ${}_{2010}I_{e,i}^{my}$ is the elementary index Base 2010 of elementary aggregate i corresponding to aggregate A in month m and year y .

Weights. Formulas

The weights of each elementary aggregate represents the relation between the turnover of the industrial activity/ies that comprise the elementary aggregate, and the total turnover of the industries covered by the population scope (sections B and C of CNAE-09)

$${}_{2010}W_i^{CNAE09} = \frac{\text{Turnover of the activities of elementary aggregate in base year 2010}}{\text{Total turnover of extractive \& manufacturing industries in base year 2010}}$$

The breakdowns calculated are:

- Division/subdivision * NUTS2. By aggregation we obtain the weights for: NUTS2, Divisions, Sections, General.
- Division/subdivision * Markets. By aggregation we obtain the weights for: Markets, Divisions, Sections, General.

Weights. Sources

The source of weights is the Structural Annual Industrial Survey. This survey collects information on the main structural characteristics of companies in the industrial activity. Turnover is one of the variables required and it is broken-down by economic activity unit on a local level.

The Structural Survey 2015 was collected since April 2016 and was edited after the end of the collection. The dissemination will take place in June 2017. So the timeliness is $t+18$ months for the weights.

Once the weights are available is time to carry out the rebasing process. All indices must be rebased on the new base year within three years after the end of this new base year.

Rebasing. Previous works

Some previous works that have to be carried out when rebasing are:

- Update the sample. In addition to the annual updates, when rebasing divisions not included have to be checked and consolidated;
- Decide which strata will be included in the aggregate index. Elementary indices could become null due to the closure of establishments and new elementary indices can arise due to new establishments. Eurostat's exemptions based on the economic size of the activity are:
 1. Activity considered as not existing: weight $\leq 0.05\%$
 2. Missing series: minor issue only when series missing are of "low weight" $\leq 0.5\%$
- Once the elementary indices are decided, it is time to analyse its weights.

Overlapping: Data in Base 2010 ($W_{2010}^{CNAE-2009}$) are calculated until reference month December 2017. When rebasing $W_{2015}^{CNAE-2009}$ are used to obtain new 2015 indices that have average 100 (base year) and new 2016 and 2017 indices (rates can change).

Recalculation: Indices of the previous years, from 2002 to 2014, are recalculated keeping fixed the annual rates.

2014	2015	2016	2017	2018
I_{B10}	I_{B10}	I_{B10}	I_{B10}	
I_{B15}	I_{B15}	I_{B15}	I_{B15}	I_{B15}
$AR_{15-14, B15} = AR_{15-14, B10}$		$AR_{16-15, B15}$ new	$AR_{17-16, B15}$ new	$AR_{18-17, B15}$ new

Rebasing. Final works

The final works consists mainly in:

1. Decide any changes in dissemination and announce in advance the rebasing.
2. Dissemination of data since the new base year to the reference month, for example January 2018.
3. Dissemination of weights in new base.
4. Update and dissemination of methodology and metadata reference report in new base.



The rates calculated and disseminated are:

- Annual rates: $AR = \left(\frac{{}_{2010}I_A^{my}}{{}_{2010}I_A^{my-1}} - 1 \right) * 100$
- Monthly rates: $MR = \left(\frac{{}_{2010}I_A^{my}}{{}_{2010}I_A^{m-1y}} - 1 \right) * 100$
- Year-to-date rates: $YTDR = \left(\frac{\sum_m {}_{2010}I_A^{my}}{\sum_m {}_{2010}I_A^{my-1}} - 1 \right) * 100$

Bibliography

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