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Cross-cutting issues part 3 “Maintaining Representative Turnover and SPPI: Re-stratification, Resampling, Rebasing, and Updating Weights” in France

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The views expressed in this paper are those of the author alone and do not necessarily represent the position of Insee or any other organization with whom the author may be affiliated.

1 Sampling

1.1 Cut-off on turnover “B2all” by CPA 4-digits...

As in manufacturing PPI, the sampling technique relies mainly on a cut-off technique based on turnover, as a proxy for “production”. The parent population is provided by the annual Structural Business Survey, which always details the turnover by activity and product (CPA 4-digits).

At first step, the “B2all” turnover in the given class of products is taken into consideration, whatever the main activity.

The threshold of the cut-off is basically 50 enterprises, but the coverage rate is taken into consideration:

- we can stop at 80% coverage rate with at least 13 enterprises;
- or we can stop at 70% coverage rate with at least 18 enterprises.

The samples are drawn at the beginning of every year on the classes selected for “rebasing” or “implementing” during the year.

They are provided by the methodologist to the head and the deputy head of “SPPI” section, with some extra-information and above all some supplementary enterprises, which they will perhaps choose to add to the sample of a given class of products.

1.2 ... with information on “B2B”, “B2C” and “B2E” and supplementary enterprises, with possibility to adjust samples

In most market services (excluding transports), the French Structural Business Survey (ESA services) asks for a breakdown of turnover between “businesses” and “households” on one side, and between France and foreign countries on the other side.

Figure 2: French SBS information on turnover sectoring

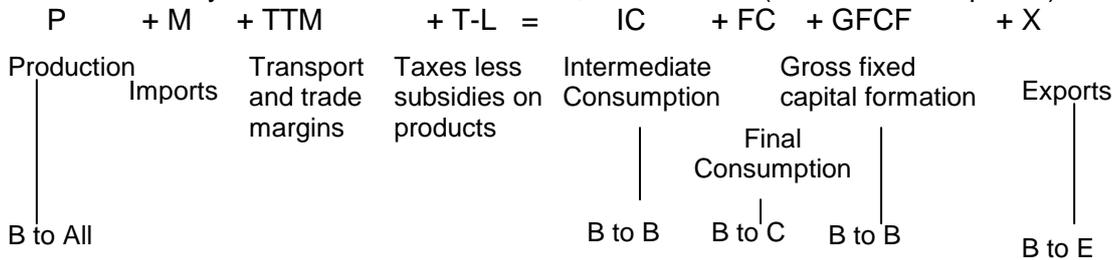
Répartition du chiffre d'affaires	%	
Entreprises du groupe ¹ auquel vous appartenez	<input type="text"/>	Intra-group B to B
Entreprises hors du groupe auquel vous appartenez (y compris entreprises publiques : SNCF, EDF)	<input type="text"/>	Extra-group B to B
Administrations (y compris collectivités locales, hôpitaux...)	<input type="text"/>	General Government
Particuliers, hors services rendus à leur domicile (y compris associations, syndicats de copropriétés,...)	<input type="text"/>	B to C, excluding in their dwellings
Particuliers, services rendus à leur domicile	<input type="text"/>	B to C, in their dwellings
TOTAL	100%	

Répartition du chiffre d'affaires	%	
Clientèle nationale	<input type="text"/>	B to B or B to C
Union européenne	<input type="text"/>	B to E, European union
Hors Union européenne	<input type="text"/>	B to E, outside European union
TOTAL	100%	

3 Weighting

3.1 Accounting identities at each level

In commodity flows of National Accounts, we can read (here in current prices):

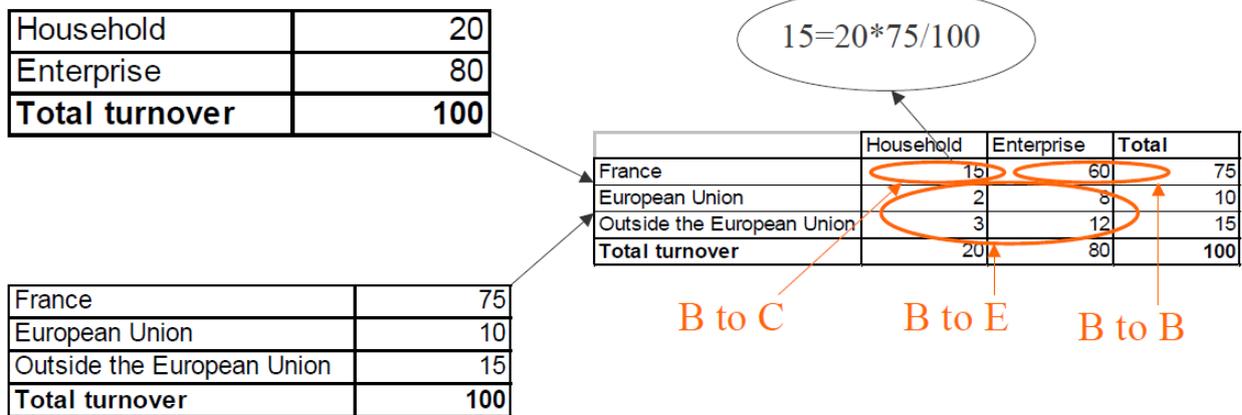


Simple hypotheses are made on imports (normally intended for intermediate consumption) and other resources in order to get an equality between “B2all” production amount and “B2B”, “B2C” and “B2E” of domestic origin.

The methodologist aims to get the same accounting identity at lower levels, *i.e.* at CPA 4-digits, with the help of SBS turnover and extra-information on kinds of customers at micro-level, every year.

3.2 Top-down calculation of weights until CPA 4-digits, by institutional sector

The accounting identity is modelled at enterprise level with a direct product of shares between B2B and B2C on one side, and France or foreign countries on the other side:



These modelled figures are summed up by CPA 4-digits level and then confronted to the NA amounts at more aggregated level.

The general rule for the calculation of additive weights is a “top-down breakdown”, from NA aggregates to CPA 4-digits levels, first on production “B2all”, second on “B2E” summed up from enterprises information, then on “B2C” and “B2B” by difference (B2C is supposed to be minority in front of B2B, otherwise we do the opposite: adjustment of B2B, then B2C by difference).

3.3 Adjustment with SPPI index for direct chain-linked indices at CPA4 level

Basically, the weights are calculated every year in current prices, with a delay, so that 2011 NA and SBS data are used for weights of year 2013 and 2012 NA and SBS data are used for weights of year 2014 (2 years of delay).

French SPPI are direct chain-linked indices, which means that the price development of each aggregate is obtained this way:

$$I_p^{Q/ref} = I_p^{Q-1/ref} * \frac{\sum_{i \in I} weight^Y i_p^{Q/ref}}{\sum_{i \in I} weight^Y i_p^{Q-1/ref}}$$

In order to get proper mathematical relations, the weights of year Y-2 for year Y are corrected with the price development between the reference period (*i.e.* 2010) and the base period (*i.e.* Y-2) for the concerned product and institutional sector. Otherwise, this price development would be counted twice: in the weights in current prices of year Y-2 and in the component price indices of previous quarter.

If it can help for the understanding of the correction by the price development between the reference and the base periods (quite common for CPI), we provide below the formula we want to establish:

Chain-linked Laspeyres formula between two successive periods:

$$I_p^{Q/ref} = I_p^{Q-1/ref} * \frac{\sum P_Q q_b}{\sum P_{Q-1} q_b}$$

with Q = quarter observed, p = prices, q = quantities, b = base period, ref = reference period

This formula can be developed this way:

$$I_p^{Q/ref} = I_p^{Q-1/ref} * \frac{\sum ((p_b q_b) * \frac{P_{ref}}{p_b}) * \frac{P_Q}{P_{ref}}}{\sum ((p_b q_b) * \frac{P_{ref}}{p_b}) * \frac{P_{Q-1}}{P_{ref}}}$$

and then be rewritten with values and indices instead of quantities and prices:

$$I_p^{Q/ref} = I_p^{Q-1/ref} * \frac{\overbrace{\sum ((p_b q_b) / i_p^{b/ref})}^{\text{Unadjusted weights in value}} * \underbrace{i_p^{Q/ref}}_{\text{Index of lower level}}}{\sum ((p_b q_b) / i_p^{b/ref}) * i_p^{Q-1/ref}}$$

Correction of « chain-linking bias »

3.4 Top-down calculation of weights until elementary price series

The field-surveyors have visited the enterprises and completed, confirmed or corrected the breakdowns of turnovers by products and by institutional sectors:



Direction des statistiques d'entreprises
 Département des statistiques de court terme
 Division des Indices des prix à la production

6-3. TURNOVER BREAKDOWN (M€, excluding VAT) : DATA FOR YEAR 200.

Total turnover, including intra-group transactions (= 1 + 2 + 3 + P)	
<i>Including :</i>	
(1) Turnover from produced good, out of activity	
(2) Turnover from produced services, out of activity	
(3) Turnover from re-sold goods	
(P) Turnover from domestic produced goods for the activity, sold to domestic or foreign markets (= C + H + E)	
<i>Including :</i>	
(C) Turnover from national production, sold to businesses within the country	
(H) Turnover from national production, sold to households within the country	
(E) Turnover from national production (= E1+E9), sold to foreign countries	
Including (E1) to foreign countries, members of Euro-zone	
Including (E9) to foreign countries, non-members of Euro-zone	

Further, they have determined weights of elementary price series collected, according to the detailed “price collection classification”, and by institutional sector (*cf. supra* the first extract of the visit report).

These relative weights will remain for 5 years (until the next rebasing).

But as we want additive weights everywhere, for many consistency reasons (especially between “main aggregation trees” and “secondary aggregation trees”), these relative weights are made additive at each period on CPA 4-digits levels (and sometimes CPA 6-digits levels) with continuation of the top-down technique, within each elementary indicator (B2B, B2C, B2E1, B2E9).

Top-down harmonization of weights, for each elementary indicator (B2B, B2C, B2E1, B2E9)

