Laspeyres-type what?! a European notion of Laspeyres, Lowe and Young

Jens Mehrhoff, Eurostat
15th Meeting of the Ottawa Group
Eltville am Rhein, 10 – 12 May 2017
The European Harmonised Index of Consumer Prices (HICP)

- **Target formula for the HICP:** Laspeyres index with annual weights

\[
p_{L}^{0,t,mt} = \frac{\sum_{i=1}^{N} p_{i}^{mt} \cdot q_{i}^{t-1}}{\sum_{i=1}^{N} p_{i}^{0t} \cdot q_{i}^{t-1}} = \sum_{i=1}^{N} \frac{p_{i}^{mt}}{p_{i}^{0t}} \cdot \frac{p_{i}^{0t} \cdot q_{i}^{t-1}}{\sum_{j=1}^{N} p_{j}^{0t} \cdot q_{j}^{t-1}},
\]

where December of the preceding year \( t - 1 \) ("0t") is the **price reference period** and the year \( t - 1 \) is the **weight reference period**.
The European Harmonised Index of Consumer Prices (HICP)

- **Sub-index weights**: as representative as possible for consumers' expenditure patterns in the *previous calendar year* (at 5-digit ECOICOP sub-class level).
- **Weights data source**: preliminary national accounts data on *consumption patterns of year t – 2*.
- **Usual strategy**: make the *best estimate of consumers' expenditure patterns in the weight reference period* year *t – 1* based on preliminary national accounts data on consumption patterns of year *t – 2*. 
The European Harmonised Index of Consumer Prices (HICP)

- **Price-updating:** to reflect the prices of the price reference period $0t$; **thus derived weights** denoted by $w_i^{0t,t-1}$.

- **Laspeyres–type index:**
  $$p^{0t,mt} = \sum_{i=1}^{N} \frac{p_i^{mt}}{p_i^{0t}} \cdot w_i^{0t,t-1}.$$

- **Weights:** do not correspond to observable expenditure shares, called **mixed-period weights**.
"Laspeyres-type index" label imprecise

- **Deriving the weights:** from the observed annual expenditures shares of year $t - 2$

$$v_{i}^{t-2} = \frac{(p_{i}^{t-2} \cdot q_{i}^{t-2})}{\sum_{j=1}^{N}(p_{j}^{t-2} \cdot q_{j}^{t-2})}$$

in two ways.

1. **Use $v_{i}^{t-2}$ as the best approximation** for the true but unknown weight $w_{i}^{t-1}$.
2. The **expenditure shares are inflated by the price change** between year $t - 2$ and year $t - 1$. 
"Laspeyres-type index" label imprecise

- If goods and services are substitutes at such a rate that the expenditure on one product relative to another one is independent of the relative prices (Cobb-Douglas preferences), option 1 is the preferred approach → Young price index.

\[
    w_i^{t-1} := v_i^{t-2} = \frac{(p_i^{t-2} \cdot q_i^{t-2})}{\sum_{j=1}^{N}(p_j^{t-2} \cdot q_j^{t-2})}
\]
"Laspeyres-type index" label imprecise

- If goods and services are perfect complements, i.e. there is no substitutability between them and they are consumed in fixed proportions (Leontief preferences), the best approximation is the price-updated weight of option 2 \( \rightarrow \text{Lowe price index} \).

\[
    w_i^{t-1} := \frac{v_i^{t-2} \cdot p_i^{t-1}}{p_i^{t-2}} = \frac{\left( p_i^{t-1} \cdot q_i^{t-2} \right)}{\sum_{j=1}^{N} \left( p_j^{t-1} \cdot q_j^{t-2} \right)}
\]
The forthcoming *Methodological Manual of the HICP*

- The manual explains **preferred methods, illustrated by examples** of good practice.
- The **considerations here** are part of **chapter 8 "Index calculation"** of the forthcoming manual, which will be published in early 2018.
  - The draft of the full chapter is available for download from the conference website.

- **Contact**
  ESTAT-HICP-MANUAL@ec.europa.eu