The use of Superlative Index Links in the Swedish CPI

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Purpose of the Presentation

- Present the **approach** of the national Swedish CPI
- Present the **construction** of the CPI
- Explain the use of **superlative index links** in the CPI
Background and Approach

- New index construction in 2005 following a Government Commission
- Cost-of-living index as a target (as before)
- Superlative index formula (Walsh) for macro level aggregation
- Avoid potential substitution bias
- Takes advantage of the modern theory of superlative indices
- A more clear theoretical foundation
- Fully comparable over time
Uses of the Index

• For compensation and as a general measure of change in the cost of living of households
• For transforming nominal value changes into volume changes (deflator)
• For macro-economic policy
The Chained CPI

\[ I_{1980}^{2012, \text{jan}} = I_{1980}^{1980, \text{dec}} \times I_{1980}^{1981, \text{dec}} \times I_{1981}^{1982, \text{dec}} \times \ldots \times I_{2002}^{2003, \text{dec}} \times I_{2003}^{2004, \text{dec}} \times I_{2004}^{2005, \text{dec}} \times \ldots \times I_{2009}^{2010, \text{dec}} \times I_{2010}^{2012, \text{jan}} \]

- Annual links chained over December until 2005 (Laspeyres-type)
- Transition using the average price level of 2004
- Annual links chained over the full year after 2005 (Walsh)
- A final link measures change in price level up to the current month, from average price level of year before preceding year (Laspeyres)
The annual links in the Swedish CPI refers to the average price level of the year considered from the preceding year and are calculated using a *Walsh-index formula*

\[
I_{1980}^{2012, jan} = \cdots I_{2008}^{2009} \times I_{2009}^{2010} \times I_{2010}^{2012, jan}
\]

CPI basket of goods and services of an annual link reflects a *blend of consumption patterns* of the year concerned and the preceding year.
The final link is calculated using a *Laspeyres-index formula* and measures the change in price level from the average price level of the year before the preceding to the price level of the current month.

\[
I_{2012,\text{jan}}^{2012,\text{jan}} = \ldots I_{2008}^{2008} \cdot I_{2009}^{2009} \cdot I_{2010}^{2010}
\]

\[
I_{2012,\text{jan}}^{2012,\text{jan}} = \frac{P_i^{2012,\text{jan}} \cdot Q_i^{2010}}{P_i^{2010} \cdot Q_i^{2010}}
\]

CPI basket of goods and services of a final link reflects the consumption patterns of the year before the preceding year.
Elementary Aggregate Indices

- Price collection follows prices during a period of 13 months, from December of the preceding year to December of the year concerned.
- An index denoted \( I_{2011,\text{dec};g}^{2012,m} \) is computed for each product group \( g \).
- Used as building blocks when calculating the chained index.
Using the elementary aggregate indices as building blocks the two final links in the chained index is computed for each product group $g$.
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\[
I_{2010;g}^{2012, jan} = \frac{I_{2010, dec; g}^{2010, dec}}{\frac{1}{12} \sum_{m=1}^{12} I_{2009, dec; g}^{2010, m}} \ast I_{2011, dec; g}^{2011, dec} \ast I_{2012, jan; g}^{2012, jan}
\]
Revision of the Index Links

- The Swedish CPI is formally established as it is published each month.
- Revised index links of the form $I_{2010, dec; g}^{2011, m, rev}$ are computed for each product group annually.
- Revised price data, quality adjustments and weighting material etc.
- The revised index links are included in the two final links of the chained CPI

$$I_{1980}^{2012, jan} = \cdots I_{2008}^{2009} \ast I_{2009}^{2010} \ast I_{2010}^{2012, jan}$$
Weighting the CPI

- In order to obtain the index links that is used in the chained index, sub-indices for product groups $g$ has to be weighted together
- **Consumption values** are used as weighting mechanism, rather than consumed quantities
- Weights are updated annually
- For the CPI during 2012 the latest data on consumption that is needed in the computations is for 2010 and earlier
For product group \( g \) with consumption value \( U \) and where \( \sum W_g = 1 \)
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Summary

- New index construction for the national Swedish CPI in 2005
- COLI as a target (as before)
- The CPI is an chain index with annual links
- The annual links are computed by a superlative index formula, *Walsh index*
- Stronger theoretical foundation for the COLI target