Pros and Cons of various collection methods

Session 2: External trade indices

Unit value indices vs price indices: Pros and Cons of collection methods

• 1. Sources of information
• 2. Unit value vs specific price indices
• 3. Comparison of indices in the EU
• 4. Way forward
Pros and Cons of various collection methods

1. Data sources

2 main possible sources of information:

• Customs data ➔ Unit Value Indices (UVI)
• Enterprise-based price surveys - Survey of transactions ➔ Specific price Indices (SPI)

Other used practices:

• Specific sources for some products (quotations): electricity, water, petroleum, gas …
• Proxies: PPI, CPI…
• Partner countries (mirror price indices)
Pros and Cons of various collection methods

2. Unit values vs. specific prices

2.1.a Advantages of unit values

- Low cost: basic data already available
- Exhaustive coverage
- Value based on real transaction prices
Pros and Cons of various collection methods

2. Unit values vs. specific prices

2.1.b Problems with unit values

Main issues:

• Lack of detail and heterogeneity of items at the lowest level of the product classification

Example of refrigerators (UNSD “Strategies for the Measurement of External Trade Indices” –1981…)

<table>
<thead>
<tr>
<th>Period</th>
<th>small</th>
<th></th>
<th>Medium</th>
<th></th>
<th>Large</th>
<th></th>
<th>All sizes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>q</td>
<td>p</td>
<td>v</td>
<td></td>
<td>q</td>
<td>p</td>
<td>v</td>
<td></td>
</tr>
<tr>
<td>Initial</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td></td>
<td>3</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td></td>
<td>3</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

→ Overstatement of price increase by unit value of 35%

• Quality changes not taken into consideration
Pros and Cons of various collection methods

2. Unit values vs. specific prices

2.1.b Problems with unit values

Other issues:

- Changes in the product classification (HS)
- Misreporting of values (e.g., transfer pricing not detected by Customs)
- Misreporting of quantities
- Consignments with mixed products
- *Arbitrary definition of outliers detection rules*
- *Sensitivity to outliers detection process*
- [Within the EU: absence of intra-EU customs data, missing quantities, …]
### Pros and Cons of various collection methods

#### 2. Unit values vs. specific prices

##### 2.1.b Problems with unit values: lack of harmonisation between countries

<table>
<thead>
<tr>
<th></th>
<th>UNIT VALUE INDEX</th>
<th>VOLUME INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>Paasche</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>Denmark</td>
<td>Fisher (chained)</td>
<td>Fisher (chained)</td>
</tr>
<tr>
<td>France</td>
<td>Paasche (chained)</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>Germany</td>
<td>Paasche (IVU)</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>Greece</td>
<td>Paasche</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>Ireland</td>
<td>Fisher</td>
<td>Fisher</td>
</tr>
<tr>
<td>Italy</td>
<td>Fisher</td>
<td>Fisher</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Fisher (IVU)</td>
<td>Fisher</td>
</tr>
<tr>
<td>Portugal</td>
<td>Paasche (chained)</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>Spain</td>
<td>Paasche (chained)</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Laspeyres</td>
<td>Laspeyres</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUROSTAT</td>
<td>Fisher (chained)</td>
<td>Fisher (chained)</td>
</tr>
</tbody>
</table>
Pros and Cons of various collection methods

2. Unit values vs. specific prices

2.2.a Advantages of price surveys

- Precise definition of products
- Quality changes can be taken into consideration
- Low volatility of outputs
Pros and Cons of various collection methods

2. Unit values vs. specific prices

2.2.b Problems with price surveys

- Sampling scheme must ensure a good coverage and representativeness (traders, products)
- Size of sample (traders, items) and sampling errors
- Definition of the value (eg. for exports: FOB value, basic price, invoice value…)
- Quoted prices may differ from real transaction prices
- Price of purchase (imports) often more difficult to collect than price of sale
- Higher volatility of import flows
- Estimation of weights
- Resource and cost
Pros and Cons of various collection methods

3. Comparison UVI/SPI on EU data

3.1. The study

• Study carried out by Eurostat on the basis of data provided by 4 Member States computing both kind of indices (prior to the 2005 EU legislation)

• Datasets: Monthly data on Imports with SPIs and UVIs; CPA 3 digits (close to CPC)

• Methodology: SPIs as a reference

• Measures: ratio UVI/SPI, discrepancy, variability / instability
Pros and Cons of various collection methods

1100: Crude petroleum and natural gas - Finland
Pros and Cons of various collection methods

1310: Iron ore - Netherlands

Graph showing the SPI, UVI, and UVI/SPI indices over time from January 1995 to October 2001.
Pros and Cons of various collection methods

1500: Food products and beverages Finland: 1995 = 100

SPI
UVI

Regional Seminar on International Trade Statistics, 3-6 November 2014, New Delhi, India
Pros and Cons of various collection methods

2830: Steam generators, except central heating hot water boilers,
Netherlands: 1995 = 100

SPI
UVI
Pros and Cons of various collection methods

3220: TV and radio transmitters & apparatus for line telephony & line telegraphy, Finland: 1995 = 100
Pros and Cons of various collection methods

UVI/SP discrepancy, Finland: standard deviation vs average

Averagediscernices (+ => U > S P)
Standard deviation of discrepancies

Aggregates
Divisions
Groups
Pros and Cons of various collection methods

UVI/SP1 discrepancy, Netherlands: standard deviation vs average

- Aggregates
- Divisions
- Groups

Standard deviation of discrepancies vs average discrepancies (UV > SP)
Pros and Cons of various collection methods

UVI/SPI monthly discrepancy, Sweden: standard deviation vs average

- Aggregates
- Divisions
- Groups
## Pros and Cons of various collection methods

**Normalised average standard deviation of monthly, quarterly, annual and pluriannual UVI / SPI discrepancies by product**

<table>
<thead>
<tr>
<th>Code</th>
<th>Divisions and groups</th>
<th>Month</th>
<th>Quarter</th>
<th>Annual</th>
<th>Whole period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>Coal, lignite &amp; peat</td>
<td>22.4%</td>
<td>18.1%</td>
<td>12.1%</td>
<td>7.5%</td>
</tr>
<tr>
<td>1010</td>
<td>Coal</td>
<td>21.9%</td>
<td>14.6%</td>
<td>8.2%</td>
<td>5.7%</td>
</tr>
<tr>
<td>1020</td>
<td>Lignite</td>
<td>78.2%</td>
<td>40.8%</td>
<td>22.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td>1030</td>
<td>Peat</td>
<td>39.9%</td>
<td>31.7%</td>
<td>21.6%</td>
<td>17.4%</td>
</tr>
<tr>
<td>1100</td>
<td>Crude petroleum &amp; natural gas</td>
<td>24.2%</td>
<td>17.0%</td>
<td>11.9%</td>
<td>3.2%</td>
</tr>
<tr>
<td>1110</td>
<td>Crude petroleum &amp; natural gas</td>
<td>22.0%</td>
<td>16.8%</td>
<td>13.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>1300</td>
<td>Metal ore</td>
<td>50.7%</td>
<td>38.6%</td>
<td>27.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td>1310</td>
<td>Iron ore</td>
<td>61.8%</td>
<td>58.4%</td>
<td>42.9%</td>
<td>4.1%</td>
</tr>
<tr>
<td>1320</td>
<td>Non-ferrous metal ores, except uranium and thorium ores</td>
<td>37.1%</td>
<td>26.9%</td>
<td>18.1%</td>
<td>4.3%</td>
</tr>
<tr>
<td>1400</td>
<td>Other mining and quarrying materials</td>
<td>18.4%</td>
<td>13.0%</td>
<td>7.8%</td>
<td>3.9%</td>
</tr>
<tr>
<td>1410</td>
<td>Stone</td>
<td>33.0%</td>
<td>23.4%</td>
<td>13.9%</td>
<td>30.5%</td>
</tr>
<tr>
<td>1420</td>
<td>Sand &amp; clay</td>
<td>19.6%</td>
<td>13.6%</td>
<td>9.0%</td>
<td>2.3%</td>
</tr>
<tr>
<td>1430</td>
<td>Chemical and fertilizer minerals</td>
<td>33.3%</td>
<td>20.7%</td>
<td>9.7%</td>
<td>5.3%</td>
</tr>
<tr>
<td>1440</td>
<td>Salt</td>
<td>68.0%</td>
<td>48.7%</td>
<td>20.7%</td>
<td>13.4%</td>
</tr>
<tr>
<td>1450</td>
<td>Other mining and quarrying materials n.e.s.</td>
<td>27.4%</td>
<td>19.3%</td>
<td>10.8%</td>
<td>8.4%</td>
</tr>
<tr>
<td>1500</td>
<td>Food products and beverages</td>
<td>5.2%</td>
<td>3.8%</td>
<td>3.2%</td>
<td>1.6%</td>
</tr>
<tr>
<td>1510</td>
<td>Meat &amp; meat products</td>
<td>12.6%</td>
<td>10.3%</td>
<td>6.7%</td>
<td>1.1%</td>
</tr>
<tr>
<td>1520</td>
<td>Fish &amp; fish products</td>
<td>13.9%</td>
<td>12.5%</td>
<td>10.2%</td>
<td>8.0%</td>
</tr>
<tr>
<td>1530</td>
<td>Fruit and vegetables</td>
<td>11.3%</td>
<td>9.2%</td>
<td>6.5%</td>
<td>5.1%</td>
</tr>
<tr>
<td>1540</td>
<td>Vegetable and animal oils and fats</td>
<td>16.6%</td>
<td>13.0%</td>
<td>11.0%</td>
<td>15.4%</td>
</tr>
<tr>
<td>1550</td>
<td>Dairy products</td>
<td>9.1%</td>
<td>6.4%</td>
<td>4.1%</td>
<td>2.7%</td>
</tr>
<tr>
<td>1560</td>
<td>Grain mill products, starches and starch products</td>
<td>10.1%</td>
<td>6.7%</td>
<td>4.4%</td>
<td>3.3%</td>
</tr>
<tr>
<td>1570</td>
<td>Prepared animal feeds</td>
<td>21.3%</td>
<td>16.2%</td>
<td>10.3%</td>
<td>5.5%</td>
</tr>
<tr>
<td>1580</td>
<td>Other food products</td>
<td>9.2%</td>
<td>7.9%</td>
<td>6.6%</td>
<td>3.9%</td>
</tr>
<tr>
<td>1590</td>
<td>Beverages</td>
<td>17.4%</td>
<td>12.6%</td>
<td>6.7%</td>
<td>13.3%</td>
</tr>
</tbody>
</table>
### Pros and Cons of various collection methods

#### Normalised average standard deviation of monthly, quarterly, annual and pluriannual UVI / SPI discrepancies by product

<table>
<thead>
<tr>
<th></th>
<th>Green:</th>
<th>2 to 4 %</th>
<th>Black:</th>
<th>Red:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3200</strong></td>
<td>Radio, television and communication equipment &amp; apparatus</td>
<td>22,0%</td>
<td>17,0%</td>
<td>13,3%</td>
</tr>
<tr>
<td>3210</td>
<td>Electronic valves &amp; tubes &amp; other electronic components</td>
<td>40,5%</td>
<td>29,8%</td>
<td>21,5%</td>
</tr>
<tr>
<td>3220</td>
<td>TV &amp; radio transmitters &amp; apparatus for line telephony &amp; line telegraphy</td>
<td>33,4%</td>
<td>24,9%</td>
<td>20,7%</td>
</tr>
<tr>
<td>3230</td>
<td>TV &amp; radio receivers, sound or video apparatus &amp; associated goods</td>
<td>22,7%</td>
<td>15,3%</td>
<td>11,4%</td>
</tr>
<tr>
<td><strong>3300</strong></td>
<td>Medical, precision and optical instruments, watches &amp; clocks</td>
<td>17,5%</td>
<td>12,1%</td>
<td>7,4%</td>
</tr>
<tr>
<td>3310</td>
<td>Medical &amp; surgical equipment &amp; orthopaedic appliances</td>
<td>29,1%</td>
<td>19,0%</td>
<td>11,1%</td>
</tr>
<tr>
<td>3320</td>
<td>Precision instruments, except industrial process control equipment</td>
<td>24,5%</td>
<td>16,5%</td>
<td>9,2%</td>
</tr>
<tr>
<td>3340</td>
<td>Optical instruments &amp; photographic equipment</td>
<td>39,1%</td>
<td>25,3%</td>
<td>15,1%</td>
</tr>
<tr>
<td>3350</td>
<td>Watches and clocks</td>
<td>70,4%</td>
<td>47,0%</td>
<td>23,5%</td>
</tr>
<tr>
<td><strong>3400</strong></td>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>7,8%</td>
<td>5,4%</td>
<td>3,5%</td>
</tr>
<tr>
<td>3410</td>
<td>Motor vehicles</td>
<td>8,8%</td>
<td>5,6%</td>
<td>3,8%</td>
</tr>
<tr>
<td>3420</td>
<td>Bodies (coachwork) for motor vehicles; trailers &amp; semi-trailers</td>
<td>19,9%</td>
<td>12,9%</td>
<td>8,9%</td>
</tr>
<tr>
<td>3430</td>
<td>Parts &amp; accessories for motor vehicles &amp; their engines</td>
<td>14,5%</td>
<td>11,2%</td>
<td>6,3%</td>
</tr>
<tr>
<td><strong>3500</strong></td>
<td>Other transport equipment</td>
<td>52,1%</td>
<td>29,1%</td>
<td>18,6%</td>
</tr>
<tr>
<td>3520</td>
<td>Railway &amp; tramway locomotives &amp; rolling stock</td>
<td>95,8%</td>
<td>72,1%</td>
<td>35,9%</td>
</tr>
<tr>
<td>3530</td>
<td>Aircraft and spacecraft</td>
<td>126,6%</td>
<td>70,1%</td>
<td>47,5%</td>
</tr>
<tr>
<td>3540</td>
<td>Motorcycles and bicycles</td>
<td>18,9%</td>
<td>12,6%</td>
<td>7,2%</td>
</tr>
<tr>
<td>3550</td>
<td>Other transport equipment n.e.s.</td>
<td>39,3%</td>
<td>29,2%</td>
<td>24,5%</td>
</tr>
</tbody>
</table>
3.2. Results (1)

- Stability
  - SPIs more stable than UVIs
  - Monthly UVIs often very unstable
  - More discrepancies on the short-term than on the long-term

- Aggregation level
  - Less discrepancies at aggregated levels
  - Low-discrepancy product groups differ among MS
3.2. Results (cont’d)

• Technological levels – for high tech products
  ➯ more short-term discrepancies
  ➯ long-term systematic upward bias of UVI's

• Eurostat vs. national UVI data:
  ➯ sensitivity to methodology (detail, outliers)
Overall conclusions of the study:

- Any list of product categories for which UVIs are a priori acceptable as proxies for SPIs would be very short, especially as regards monthly data. It would include almost only aggregates and raw materials,
- Apparently, any list of product categories for which short-term UVIs are acceptable proxies for SPIs seems country-specific.
- For a few low-tech products, for which quality changes are slow, UVI changes over the long term (several years) may be acceptable proxies for SPIs.
3.3 Consequences in the EU

- Changes introduced in 2005 in the EU legislation on short term statistics:

- the following variable is added to paragraph 1: “Import prices”

- The information on output prices for non-domestic markets (No 312) and import prices (No 340) may be compiled using unit values for products originating from foreign trade or other sources only if there is no significant deterioration in quality compared to specific price information. The Commission shall determine, in accordance with the procedure laid down in Article 18, the conditions for assuring the necessary data quality.

- Most of EU countries have introduced surveys to measure import/export price indices, at least for industrial goods (hybrid indices).
Pros and Cons of various collection methods

4. The way forward (1)

Strategies for the Measurement of External Trade Indices (UNSD 1981)
Strategies for compiling index numbers (part VI)

1. **Limited Budget**
   a) Unit Value Indexes – detailed Customs data – selection of “stable” items - data screening

2. **Average Budget**
   a) Unit Value Indexes – sophisticated data editing
   b) Commodity specialists – possible use of a variety of sources to fill the gaps

3. **Large Budget**
   a) sophisticated Unit Values and Price surveys (dual or combined strategy)
   b) Commodity specialists
4. The way forward (2)

• a. More detailed specification for UVI?
  – Country of origin or destination
  – Point of export / import
  – Size of shipment
  – Individual trader
Pros and Cons of various collection methods

4. The way forward (3)

• b. Different formulas?
• c. Improving data editing?
  – Lack of benchmark
  – The risk of discarding all large price changes, even real ones…
  – Cooperation between countries?
• d. Hybrid solutions… (EU countries)
• e. What about services?
Pros and Cons of various collection methods

• Thank you