Intra-economy and Inter-economy Validation

Technical Meeting on Construction Survey of the ICP 2021 Cycle

22 July 2021, Workshop day 2
Agenda

• Introduction
• Intra-economy validation
  – Prices
  – Equivalent materials
  – Units of measurement and dimensions
  – Relevance Indicators
  – Resource Mixes
  – Consistency checks of similar/related items
• Overview of Inter-economy validation
Introduction (1)

Price data submitted by economies undergo three major validation stages

- **Intra-economy validation**
  - At the national level, NIAs validate the data collected before submitting to RIA

- **Inter-economy validation**
  - RIA conduct regional validation workshops to validate submitted data at the regional level

- **Global validation**
  - ICP GO validates data from ICP participating economies worldwide

NIA = National Inter-Agency, RIA = Regional Inter-Agency, GO = Global Office
Introduction (2)

NIA
Prices and Other Information (Intra-economy)

RIA
Regional PPPs and related indicators with USD as base (Inter-economy)

GO
Global PPPs and related indicators with USA as base (Global)
Intra-economy Validation
Intra-economy Validation (1)

- During the intra-economy validation process, the NIAs, together with national construction experts, verify the completeness and accuracy of the information collected during the survey.
- The NIAs confirm with the national construction experts that the prices reported:
  - Should be those paid by construction contractors to their suppliers.
  - Reflect the buying power of contractors undertaking significant amounts of work.
  - Include all nonrecoverable taxes.
  - Should be for typical construction projects within an economy.
  - Represent national average prices.
Intra-economy Validation (2)

More specifically...

- Materials – usually the prices paid after discounts to manufacturers or intermediaries (agents or merchants), including all nonrecoverable taxes
- Equipment rental – it should be the rental charges paid to hire companies or rates paid for internal hire excluding operating fuel, equipment insurance and life insurance
- Labor – the cost to the contractor of employing the workers
  - Informal payment arrangements for labor are common in construction. Some payment is in the form of wages, subject to taxes and on which employers' costs are incurred, while other payments are in cash— and respondents should bear this in mind when determining what is an "average" wage.
Equivalent Materials (1)

Materials included in the construction survey are selected on the basis of their common use across economies. However, the listed materials may not always be available or used in all economies. In these cases, equivalent materials are selected and priced.

- NIAs should verify with the national construction experts that the alternative material is indeed equivalent to the original material.
- Substitution is clearly indicated in the price survey questionnaire, and that sufficient information is provided on the material.
Unit of Measurement and Dimensions (1)

For each item, prices are to be reported in the preferred unit and quantity. It is crucial to verify that the reported prices respond to the requested unit.

• Prices can be reported in alternative units—that is, based on either the metric or imperial system. However, the NIAs must verify
  – that the alternative unit is clearly indicated, and all relevant information is given and
  – that the alternative unit can be converted into the preferred unit.

• Errors and problems in units are the most common reason for prices that are not comparable across economies. Thus, utmost attention should be paid to this point during the intra-economy validation.
### Conversion factors for items with alternative unit quantities

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Item Name</th>
<th>Preferred Unit</th>
<th>Alternative Unit</th>
<th>Conversion Factor to convert Preferred unit to Alternative Unit</th>
<th>Notes on conversion and conversion factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1501200-1-01</td>
<td>Aggregate for concrete</td>
<td>Cubic meter (m³)</td>
<td>Cubic foot (ft³)</td>
<td>x 35.3147</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cubic yard (yd³)</td>
<td>x 1.307873</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tonne (t)</td>
<td>x 1.92</td>
<td>Assume that aggregate weighs 1.92 t/m³ (but may vary by local material and should be checked).</td>
</tr>
<tr>
<td>1501200-1-02</td>
<td>Sand for concrete and mortar</td>
<td>Cubic meter (m³)</td>
<td>Cubic foot (ft³)</td>
<td>x 35.3147</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cubic yard (yd³)</td>
<td>x 1.307873</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tonne (t)</td>
<td>x 1.6</td>
<td>Assume that sand weighs 1.6 t/m³ (but may vary by local material and should be checked).</td>
</tr>
<tr>
<td>1501200-1-03</td>
<td>Softwood for carpentry</td>
<td>Linear meter (m)</td>
<td>Foot (ft)</td>
<td>x 3.2808</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yard (yd)</td>
<td>x 1.0936</td>
<td></td>
</tr>
<tr>
<td>1501200-1-05</td>
<td>Exterior plywood</td>
<td>Square meter (m²)</td>
<td>Square foot (ft²)</td>
<td>x 10.7639</td>
<td>Straightforward imperial to metric conversion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Square yard (yd²)</td>
<td>x 1.196</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sheet (8 ft x 4 ft)</td>
<td>x 0.3364</td>
<td>Size of sheet is 8 ft x 4 ft is 32 ft² or 2.97 m²; The conversion factor is derived as: 0.3364 = 10.7639 ft² / (8 ft x 4 ft)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>sheet [L (m) x W (m)]</td>
<td>x 1 / (L x W)</td>
<td>Assume that the size of sheet is L x W, substitute values for L and W in the formula to get a revised quantity.</td>
</tr>
</tbody>
</table>
Relevance Indicators

• National experts indicate whether a material is commonly used in the construction projects in an economy. They do so by indicating the relevance of items separately for each basic heading.

• In classifying material items as relevant or not relevant, the NIAs should check for completeness, that is each available item has relevance indicated in each BH.
Resource Mixes

Percentages for resource mixes should be provided for each BH

- NIAs need to ensure that
  - the information is complete for each element and;
  - the BH percentages add up to the totals

<table>
<thead>
<tr>
<th>Basic Heading (BH)</th>
<th>Construction Input</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Materials</td>
<td>Equipment Rental</td>
</tr>
<tr>
<td>Residential Buildings</td>
<td>50</td>
<td>15</td>
</tr>
<tr>
<td>Non-Residential Buildings</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Civil engineering Works</td>
<td>40</td>
<td>35</td>
</tr>
</tbody>
</table>
Consistency of prices for similar or related items (1)

- NIAs also need to check the collected prices for consistency
- There are certain items whose prices are expected to be more costly than other items
- In some cases these may not be always true, NIAs will have to confirm these cases and provide remarks, if needed
Consistency of prices for similar or related items (2)

Examples of consistency checks – Materials

- Price for “Exterior Plywood” is expected to be higher than “Interior Plywood”
Consistency of prices for similar or related items (3)

Examples of consistency checks – Equipment Rental

• Price per hour for “Tracked Tractor with Operator” is expected to be higher than “Tracked Tractor without Operator”
Consistency of prices for similar or related items (4)

Examples of consistency checks – Labour

- Price per hour for “Skilled” worker is expected to be higher than “Unskilled” worker
Inter-economy Validation
Inter-economy Validation (1)

- During the inter-economy validation, the NIAs and RIAs check the completeness and correctness of the data submission and conduct validation of the price data and metadata across economies
- After initial review of the submitted data, the next step is to validate the data using Dikhanov validation table

Dikhanov tables

- an approach developed by Yuri Dikhanov of the World Bank and first introduced and implemented in the 2005 ICP.
- are based on the country-product-dummy (CPD) method used to estimate PPPs at the basic heading level.
Inter-economy Validation (2)

Dikhanov tables

• Make use of residuals from CPD regression at the
  – basic heading level; and
  – higher level aggregates (whole household consumption, government compensation, construction, and machinery and equipment, etc.)

• Identify outliers among the PPP ratios and provide measures of price variations for products and economies.

• CPD residuals are generated for each item for which prices are submitted by the economies

• Each CPD residual value has a corresponding interpretation in terms of actual collected price as a percentage of the model-predicted price.
## Inter-economy Validation (3)

<table>
<thead>
<tr>
<th>CPD Residual Values</th>
<th>Interpretation</th>
<th>Color Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between $-0.25$ and $0.25$</td>
<td>Actual price is 78% to 128% of predicted price.</td>
<td>None</td>
</tr>
<tr>
<td>Between $-0.75$ and $-0.25$; or $0.25$ and $0.75$</td>
<td>Actual price is 47% to 78%, or 128% to 212% of predicted price.</td>
<td>Yellow</td>
</tr>
<tr>
<td>Between $-2.0$ and $-0.75$; or $0.75$ and $2.0$</td>
<td>Actual price is 14% to 47%, or 212% to 739% of predicted price.</td>
<td>Red</td>
</tr>
<tr>
<td>Less than $-2.0$ or greater than $2.0$</td>
<td>Actual price is less than 14%, or more than 739% of predicted price.</td>
<td>Black</td>
</tr>
</tbody>
</table>

CPD = Country-Product-Dummy.  
Inter-economy Validation (4)

- RIA will request NIAs to check the submitted average prices of products flagged in **yellow**, **red** and **black**.
- NIAs should confirm or revise the average prices after further review and verification of the items.
- NIAs should resubmit the verified average prices to RIA.