Quantity Measurement

Expert Group meeting on
International Merchandise Trade Statistics
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Quantity Measurement

Introduction
by Markie Muryawan

Importance of quantity

• It may provide a more reliable indicator of international movement of goods because it is free of valuation problems
• It can be used in checking the reliability of the value data
• It is indispensable in the construction of index numbers and for transportation statistics
Recommended Quantity Units

- WCO recommended a single standard unit of quantity for each HS six-digit sub-heading
  - To facilitate the collection, comparison and analysis
- Quantity units obtained from countries by UNSD are, where necessary and possible, converted / estimated to WCO Recommended Units
- UN Comtrade disseminates data with WCO recommended quantity units and tries to complete data series, where quantities are missing.

Quantity Unit Conversion

- There are two kinds:
  - Mathematical conversion, such as inch to meter
  - Specific gravity of the commodity involved
    - Best done at national level
    - FAO example: 1000 coconuts = 1 metric ton (broad-based conversions at international level)
    - Reported quantity in units other than WCO recommended is converted using FAO conversion factors during data processing
  - Countries which use units of quantity other than the WCO recommended units are requested to provide conversion factors.
Quantity Measurement

**FAO Conversion Factors**

*used on internal data processing system*

<table>
<thead>
<tr>
<th>HS2002</th>
<th>Description</th>
<th>From</th>
<th>Conv Factor</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>040110</td>
<td>Milk &amp; cream, not concentrated/sweetened, fat content by wt. not &gt;1%</td>
<td>Volume in liters</td>
<td>0.97087</td>
<td>0.97087</td>
</tr>
<tr>
<td>040120</td>
<td>Milk &amp; cream, not concentrated/sweetened, fat content by wt. &gt;1% but not &gt;4%</td>
<td>Volume in liters</td>
<td>0.99600</td>
<td>0.99600</td>
</tr>
<tr>
<td>040130</td>
<td>Milk &amp; cream, not concentrated/sweetened, fat content by wt. &gt;4%</td>
<td>Volume in liters</td>
<td>0.99102</td>
<td>0.99102</td>
</tr>
<tr>
<td>040220</td>
<td>Milk &amp; cream, concentrated (excl. in powder), unsweetened</td>
<td>Volume in liters</td>
<td>0.10210</td>
<td>0.10210</td>
</tr>
<tr>
<td>040230</td>
<td>Milk &amp; cream, concentrated (excl. in powder), sweetened</td>
<td>Volume in liters</td>
<td>0.10273</td>
<td>0.10273</td>
</tr>
<tr>
<td>040310</td>
<td>Yogurt</td>
<td>Volume in liters</td>
<td>0.10397</td>
<td>0.10397</td>
</tr>
<tr>
<td>040390</td>
<td>Buttermilk/curdled milk &amp; cream/kephir &amp; other fermented/acidified milk &amp; cream</td>
<td>Volume in liters</td>
<td>0.90892</td>
<td>0.90892</td>
</tr>
<tr>
<td>040410</td>
<td>Whey, modified whey, whether or not concentrated/sweetened</td>
<td>Volume in liters</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>040420</td>
<td>Milk prods. of nat. milk constituents, whether or not sweetened, n.e.s.</td>
<td>Volume in liters</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>040700</td>
<td>Birds eggs, in shell, fresh/pred./cooked</td>
<td>Number of items</td>
<td>0.17241</td>
<td>0.17241</td>
</tr>
<tr>
<td>040811</td>
<td>Egg yolks, dried, whether or not cont. added sugar or sweetening matter</td>
<td>Number of items</td>
<td>0.09536</td>
<td>0.09536</td>
</tr>
<tr>
<td>040819</td>
<td>Egg yolks (excl. dried), whether or not cont. added sugar or sweetening matter</td>
<td>Number of items</td>
<td>0.09536</td>
<td>0.09536</td>
</tr>
<tr>
<td>040891</td>
<td>Birds eggs, not in shell (excl. yolks), dried, whether or not cont. added</td>
<td>Number of items</td>
<td>0.09536</td>
<td>0.09536</td>
</tr>
<tr>
<td>040899</td>
<td>Birds eggs, not in shell (excl. yolks), other than dried, whether or not c.</td>
<td>Number of items</td>
<td>0.09536</td>
<td>0.09536</td>
</tr>
<tr>
<td>200511</td>
<td>Orange juice, frozen, unrecent &amp; not cont. added spirit, whether or not c.</td>
<td>Volume in liters</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>200519</td>
<td>Orange juice, not frozen (excl. of 2005 19), unrecent &amp; not cont. added</td>
<td>Volume in liters</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>200520</td>
<td>Tomato juice, unrecent &amp; not cont. added spirit, whether or not cont. ad.</td>
<td>Volume in liters</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>200900</td>
<td>Juice of any single fruiting, exct of 2005 11-2009 79, unrecent &amp; no</td>
<td>Volume in liters</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>200990</td>
<td>Mixtures of juice, unrecent &amp; not cont. added spirit, whether or not co.</td>
<td>Volume in liters</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>210600</td>
<td>Ice cream &amp; other edible ice, whether or not cont. cocoa</td>
<td>Volume in liters</td>
<td>0.28857</td>
<td>0.28857</td>
</tr>
<tr>
<td>220110</td>
<td>Mineral waters (nat nat.) &amp; aerated waters, not cont. added sugar or sweet</td>
<td>Volume in liters</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>220190</td>
<td>Ice &amp; snow</td>
<td>Volume in liters</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>220210</td>
<td>Waters, incl. min. waters &amp; aerated waters, cont. added sugar or sweet</td>
<td>Volume in liters</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Quantity Estimation**

*used on internal data processing system*

1. Specific gravity factors (FAO conversion factors)
2. Missing quantity by commodity and partner country can be estimated from partly reported quantity in the same commodity and unit.
3. Standard Unit Values.
Standard Unit Value

- Quantity can also be estimated using standard unit values (SUV)
- UNSD generates SUV for every year by commodity by flow and by quantity unit
- SUV are created from basic trade data reported by countries, where
  - Outliers are removed
  - Statistical criteria are used to check the SUV reliability

Outlier detection

- UNSD uses the Tukey outlier detection method in SUV generation, where the core 50% unit values (Q3-Q1) are expected to be in a small range.
- UNSD log-transforms the individual unit values (by year, flow, commodity and partner country).
- Outliers are those unit values which are outside of
  - Left threshold = Q1 - 1.5 * (Q3-Q1)
  - Right threshold = Q3 + 1.5 * (Q3-Q1)
- Those thresholds are also used in unit value check during data processing
  - Acceptance range is between left-threshold/2 and right-threshold*2
SUV reliability criteria

1. Trade value must be greater than US$25000
2. Net weight / Quantity must be greater than 0
3. Partner countries must be individual countries not areas, such as world
4. Net weight / Quantity must be reported as is, not estimated
5. The data must come from more than two reporting countries.
6. There must be at least 30 observations in the sample
7. The relative standard deviation must be less than or equal to 1.75, or it must be between 1.75 and 3, provided that its multimodality index is less than 2
8. The relative interquartile range must be less than 2
9. The trade value corresponding to outliers must be less than 10% of the total trade value.

SUV issues

- Not enough reported quantity data
- Not enough data records
- Large unit value range
- What to do with dominant trade?
- Possible systematic differences by export/import, region and partner country
Reported Weight / Quantity in 2006

Potential issues for discussion

• How to increase compliance with WCO recommended units?

• What are best practices of quantity estimation or outlier detections?

• Should it be recommended to publish estimation methods?
Thank You