Expert Group meeting on
International Merchandise Trade Statistics
First meeting
New York, 3-6 December 2007

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

used on internal data processing system

- 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.

FAO Conversion Factors

used on internal data processing system

HS2002	Description	From	Conv.Factor	To
040110	Milk & cream, not concentrated/sweetened, fat content by wt. not >1%	Volume in liters	0.970873786407767	kg
040120	Milk & cream, not concentrated/sweetened, fat content by wt. >1% but not >6 ...	Volume in liters	0.99009900990099009	kg
040130	Milk & cream, not concentrated/sweetened, fat content by wt. >6%	Volume in liters	1.0101010101010102	kg
040291	Milk & cream, concentrated (excl. in powder), unsweetened	Volume in liters	1.0101010101010102	kg
040299	Milk & cream, concentrated (excl. in powder), sweetened	Volume in liters	1.0309278350515465	kg
040310	Yogurt	Volume in liters	1.0309278350515465	kg
040390	Buttermilk/curdled milk & cream/kephir & oth. fermented/acidified milk & cr ...	Volume in liters	0.98039215686274506	kg
040410	Whey & modified whey, whether or not concentrated/sweetened	Volume in liters	1.0	kg
040490	Milk prods. of nat. milk constituents, whether or not sweetened, n.e.s.	Volume in liters	1.0	kg
040700	Birds' eggs, in shell, fresh/presvd./cooked	Number of items	17241.379310344826	kg
040811	Egg yolks, dried, whether or not cont. added sugar/oth. sweetening matter	Number of items	4098.3606557377052	kg
040819	Egg yolks (excl. dried), whether or not cont. added sugar/oth. sweetening m ...	Number of items	13698.630136986301	kg
040891	Birds' eggs, not in shell (excl. yolks), dried, whether or not cont. added ...	Number of items	4098.3606557377052	kg
040899	Birds' eggs, not in shell (excl. yolks), other than dried, whether or not c ...	Number of items	13698.630136986301	kg
200911	Orange juice, frozen, unfermented & not cont. added spirit, whether or not ...	Volume in liters	1.0	kg
200919	Orange juice, not frozen (excl. of 2009.19), unfermented & not cont. added ...	Volume in liters	1.0	kg
200950	Tomato juice, unfermented & not cont. added spirit, whether or not cont. ad ...	Volume in liters	1.0	kg
200980	Juice of any single fruit/veg. (excl. of 2009.11-2009.79), unfermented & no ...	Volume in liters	1.0	kg
200990	Mixtures of juices, unfermented & not cont. added spirit, whether or not co ...	Volume in liters	1.0	kg
210500	Ice cream & oth. edible ice, whether or not cont. cocoa	Volume in liters	1.4285714285714286	kg
220110	Mineral waters (nat./art.) & aerated waters, not cont. added sugar/oth. swe ...	Volume in liters	1.0	kg
220190	Ice & snow	Volume in liters	1.0	kg
220210	Waters, incl. min. waters & aerated waters, cont. added sugar/oth. sweeteni ...	Volume in liters	1.0	kg

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**

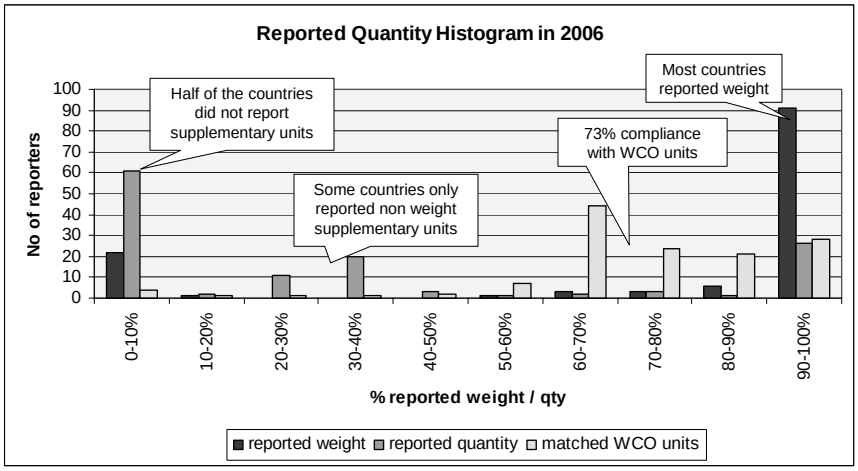
SUV reliability criteria

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