Identification of quantity outliers in Trade Map

Workshop on the updated and new recommendations for International
Merchandise Trade Statistics (IMTS 2010)
and their implementation in countries of the Sub-Saharan region
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ITC

Trade Map tables before the detection of quantity outliers

List of supplying countries for beer imported by St Kitts & Nevis

Exporters	2003	2004	2005	2006	2007
	Imported quantity, Tons	Imported quantity, Tons	Imported quantity, Tons	Imported quantity, Tons	Imported quantity, Tons
World	294	183	242	114,480	319
Saint Lucia	195	97	122	114,358	196
United States of America	15	29	46	49	77
Netherlands	0	7	20	21	22
Netherland Antilles	3	9	20	23	8

In 2006, St Kitts & Nevis' import quantity was multiplied by 500 and the unit value divided by 400.
It represents 2,800 liters per inhabitant !

Exporters	2003	2004	2005	2006	2007
	Imported unit value, US Dollar/Tons	Imported unit value, US Dollar/Tons	Imported unit value, US Dollar/Tons	Imported unit value, US Dollar/Tons	Imported unit value, US Dollar/Tons
World	1,684	1,645	1,545	4.05	1,721
Saint Lucia	1,841	1,825	1,721	2.35	1,653
United States of America	3,267	1,690	1,565	1,571	1,896
Netherlands		1,429	1,150	1,286	1,409

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List of leading importers of Maize (corn) - HS: 100590 nes

Importers	2004 Imported quantity	Unit	2005 Imported quantity,	2006 Imported quantity	Unit	2007 Imported quantity	Unit	2008 Imported quantity	Unit
World	78,554,992	Tons	82,832,416	90,009,888	Tons	106,264,920	Tons	178,669,776	Tons
Malaysia	998,251	Tons	940,874	1,047,803	Tons	956,061	Tons	76,132,072	Tons
Japan	16,477,737	Tons	16,654,296	16,881,440	Tons	16,626,044	Tons	16,458,445	Tons
Mexico	5,509,177	Tons	5,731,645	7,595,729	Tons	7,942,989	Tons	9,135,639	Tons
Republic of Korea	8,370,783	Tons	8,533,054	8,669,483	Tons	8,578,868	Tons	9,020,808	Tons
Spain	2,706,601	Tons	4,272,497	4,227,288	Tons	6,663,709	Tons	5,353,911	Tons

In 2008, Malaysia's import quantity was multiplied by 79 and the unit value divided by 56

Importers	2004 Imported unit value	Unit	2005 Imported unit value, US Dollar/Tons	2006 Imported unit value	Unit	2007 Imported unit value	Unit	2008 Imported unit value	Unit
World	162	US Dollar/Tons	140	151	US Dollar/Tons	207	US Dollar/Tons	160	US Dollar/Tons
Malaysia	161	US Dollar/Tons	145	153	US Dollar/Tons	224	US Dollar/Tons	4	US Dollar/Tons
Japan	178	US Dollar/Tons	155	153	US Dollar/Tons	231	US Dollar/Tons	338	US Dollar/Tons
Mexico	129	US Dollar/Tons	117	145	US Dollar/Tons	191	US Dollar/Tons	258	US Dollar/Tons
Republic of Korea	171	US Dollar/Tons	142	146	US Dollar/Tons	213	US Dollar/Tons	312	US Dollar/Tons
Spain	176	US Dollar/Tons	149	162	US Dollar/Tons	231	US Dollar/Tons	287	US Dollar/Tons

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List of supplying countries for maize imported by Malaysia

Exporters	2004 Imported quantity, Tons	2005 Imported quantity, Tons	2006 Imported quantity, Tons	2007 Imported quantity, Tons	2008 Imported quantity, Tons
World	998,251	940,874	1,047,803	956,061	76,132,072
Thailand	298,045	54,726	26,503	91,468	41,083,552
Myanmar	45,398	25,687	23,794	43,194	34,322,740
India	250,431	3,803	28,505	138,925	509,940
Brazil					85,909
Argentina	242,888	500,733	652,569	378,824	55,533
USA	26,466	2,105	21,000	65,007	29,161

Thailand and Myanmar are the two partner countries affected by quantity outliers

Exporters	2004 Imported unit value, US Dollar/Tons	2005 Imported unit value, US Dollar/Tons	2006 Imported unit value, US Dollar/Tons	2007 Imported unit value, US Dollar/Tons	2008 Imported unit value, US Dollar/Tons
World	161	145	153	224	4
Thailand	156	153	174	237	1
Myanmar	136	137	151	140	1
India	168	195	171	241	268
Brazil					278
Argentina	156	137	151	227	352
USA	167	357	168	225	337

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Methodology applied to identify quantity outliers in Trade Map

- The test is done on the time series from 2001 to 2009, for each product, reporter, partner and flow.
- Based on the Chebyshev theorem, a quantity or a unit value is declared as an outlier if it is outside the following range:

$$]q_1 - p \cdot (q_3 - q_1); q_3 + p \cdot (q_3 - q_1)[$$

- Q1 and Q3 are the first and third quartiles. Based on empirical tests, we have assigned 2.5 to P
- To reduce the number of outliers, we have added a zone of acceptance of 25% to the above range

$$](q_1 - p \cdot (q_3 - q_1)) * 0.75 ; (q_3 + p \cdot (q_3 - q_1)) * 1.25 [$$

- If the distribution is heterogen, it is not possible to test low quantities or low quantity units because Q1-2.5(Q3-Q1) ≤ 0. For this reason, we also qualify as outliers quantities or unit values which are below 1/5 of the first quartile.

Criteria to identify outliers

1. Only product codes at the 6-digit level that have not changed over the different HS revisions are tested
2. Quantity units have to be the same over the whole period
3. 80% of the quantities over the period (2001-2009) have to be greater than 0
4. No test is done on the lower threshold if the mean of quantities over the period is less than 1000
5. A quantity is declared as « outlier » if one of the two options below is identified:
   1. The quantity is above the higher threshold and the unit value is below the lower threshold
   2. The quantity is below the lower threshold and the unit value is above the higher threshold

Methodology applied for quantity estimation

- When a quantity outlier is identified, the quantity estimation is done only for individual partners.
- If the sum of partners without quantity outliers represents more than 50% of the value for the partner world, we use the average unit value of partners for the selected year to calculate the quantity:

$$quantity_{ijky} = value_{ijky} / unitvalue_{ijy}$$

i: product
j: reporter
k: partner
y: year

- If the sum of partners without quantity outliers represents less than 50% of the value for the partner world, by default we calculate the average of the unit value between the previous year and the following year for the same partner.

$$quantity_{ijky} = value_{ijky} / ((unitvalue_{ijk(y-1)} + unitvalue_{ijk(y+1)})/2)$$

If the quantity outlier is the last year available, we calculate the average unit value of the two previous years and if the quantity outlier is the first year available, we calculate the average unit value of the two following years.

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Presentation in Trade Map of quantities estimated

- The quantity for the partner « world » is always the sum of quantities from individual partners. If a quantity outlier is identified for the partner « world » and not for individual partners, the quantity for the partner « world » is removed and not estimated.

- Estimated quantities in Trade Map are coloured in dark green and the following note is posted to inform users:

  The quantities shown in dark green are estimated by ITC. For further information, please refer to the ITC explanatory note

- In the same way, quantities estimated by UNSD in Comtrade are coloured in light green in Trade Map and the following note is posted to inform users:

  The quantities shown in light green are estimated by UNSD. For further information, please refer to the UNSD explanatory note

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List of supplying countries for maize imported by Malaysia

Exporters	2004 Imported quantity, tons	2005 Imported quantity, tons	2006 Imported quantity, tons	2007 Imported quantity, tons	2008 Imported quantity, tons
World	998,251	940,874	1,047,803	956,061	983,098
India	250,431	3,803	28,505	138,925	509,940
Thailand	298,045	54,726	26,503	91,468	169,405
Myanmar	45,398	25,687	23,794	43,194	90,711
Brazil					85,909
Argentina	242,888	500,733	652,569	378,824	55,533
USA	26,466	2,105	21,000	65,007	29,161

Thailand and Myanmar quantities are estimated - the quantity for the partner « world » is then recalculated

Exporters	2004 Imported unit value, US$/Tons	2005 Imported unit value, US$/Tons	2006 Imported unit value, US$/Tons	2007 Imported unit value, US$/Tons	2008 Imported unit value, US$/Tons
World	161	145	153	224	280
India	168	195	171	241	268
Thailand	156	153	174	237	280
Myanmar	136	137	151	140	280
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United States of America	15	29	46	49	77
Netherlands	0	7	20	21	22
Netherland Antilles	3	9	20	23	8

Saint Lucia quantity is estimated and the « world » quantity is recalculated.

Exporters	2003 Imported unit value, US Dollar/Tons	2004 Imported unit value, US Dollar/Tons	2005 Imported unit value, US Dollar/Tons	2006 Imported unit value, US Dollar/Tons	2007 Imported unit value, US Dollar/Tons
World	1,684	1,645	1,545	1,645	1,721
Saint Lucia	1,841	1,825	1,721	1,681	1,653
United States of America	3,267	1,690	1,565	1,571	1,896
Netherlands		1,429	1,150	1,286	1,409
Netherland Antilles	1,000	2,667	1,650	2,000	3,375

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Detection of outliers on monthly time series

- Before uploading monthly data in Trade Map we assess the data quality of values by applying our test with the quartiles. Regarding the seasonal adjustements, it is still a work in progress and we are testing different methodologies.

- For additional information or potential collaboration on the detection of outliers in monthly time series, you may contact Christian Delachenal delachenal@intracen.org

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