ESCAP-WB Trade Cost Database: Explanatory Note for Users[1]
(August 2015)

The purpose of this note is to facilitate the use of the database by both trade facilitation and logistics researchers and practitioners. While it includes a quick introduction to the comprehensive trade cost concept and formula, kindly refer to Arvis et al. (2012), "Trade Costs in the Developing World: 1995-2010", ARTNeT Working Papers, No. 121 / December 2012 (AWP No. 121)[2] for further methodological details.

Comprehensive Trade Cost: Definition

There have been many attempts to develop trade costs measures. Much effort has focused on direct measurement of various trade cost components, such as international transport costs (using actual shipping costs of a standard container to various destinations or more aggregate CIF/FOB trade data), or costs of moving goods from the factory to the deck of a ship at the nearest sea port (including, e.g., cost of preparing trade documentation, customs clearance, goods transport and handling to the port). However, these approaches do not provide a comprehensive measure of international trade costs - and combining the different measures and indicators into a comprehensive measure is hardly feasible.

The bilateral measure of trade costs featured in this database is truly comprehensive in the sense that it includes *all costs involved in trading goods internationally with another partner (i.e. bilaterally) relative to those involved in trading goods domestically (i.e., intranationally)*. It captures trade costs in its wider sense, including not only international transport costs and tariffs but also other trade cost components discussed in Anderson and van Wincoop (2004), such as direct and indirect costs associated with differences in languages, currencies as well as cumbersome import or export procedures.

Following Novy (2012), bilateral comprehensive trade cost is defined as follows:

$$\tau_{ijkt} \equiv \left(\frac{t_{ijkt} t_{jikt}}{t_{iikt} t_{jjkt}} \right)^{\frac{1}{2}} - 1 = \left(\frac{x_{iikt} x_{jjkt}}{x_{ijkt} x_{jikt}} \right)^{\frac{1}{2(\sigma_k - 1)}} - 1 \qquad \text{; at sector } k\text{, time } t \qquad \textbf{(1)}$$

where τ_{ij} denotes geometric average trade costs between country i and country j
t_{ij} denotes international trade costs from country i to country j
t_{ji} denotes international trade costs from country j to country i
t_{ii} denotes intranational trade costs of country i
t_{jj} denotes intranational trade costs of country j
x_{ij} denotes international trade flows from country i to country j
x_{ji} denotes international trade flows from country j to country i
x_{ii} denotes intranational trade of country i
x_{jj} denotes intranational trade of country j
σ_k denotes sector-specific elasticity of substitution between goods in the sector[3]

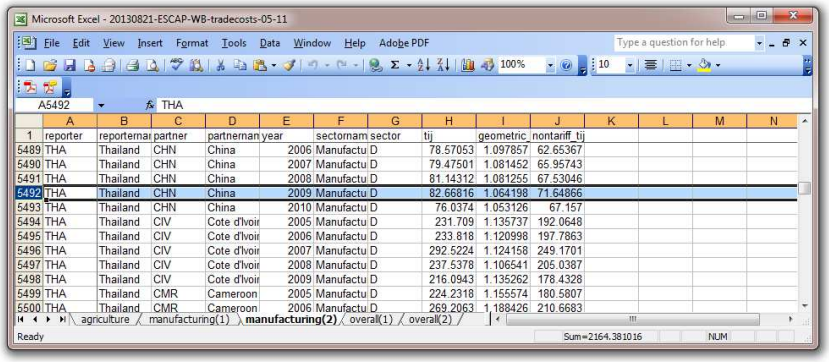
[1] Full list of references can be obtained from AWP No. 121.
[2] This paper is also published as the World Bank's Policy Research Working Paper No. 6309 (see http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-6309)
[3] Anderson and van Wincoop (2003) initiated the idea of micro-founded measure of trade costs while Jack, Meissner, and Novy (2008) solves algebra result. Anderson and van Wincoop (2003) assume that each country is specialized in one good. Thus elasticity of substitution could be considered as elasticity of substitution between foreign and domestic goods as the setting is aimed to measure average trade friction. Chen and Novy (2009) study trade costs at disaggregated sectoral level. σ_k becomes elasticity of substitution between varieties within sector k

Interpretation of Comprehensive Trade Costs ("tij[4]") in the Database

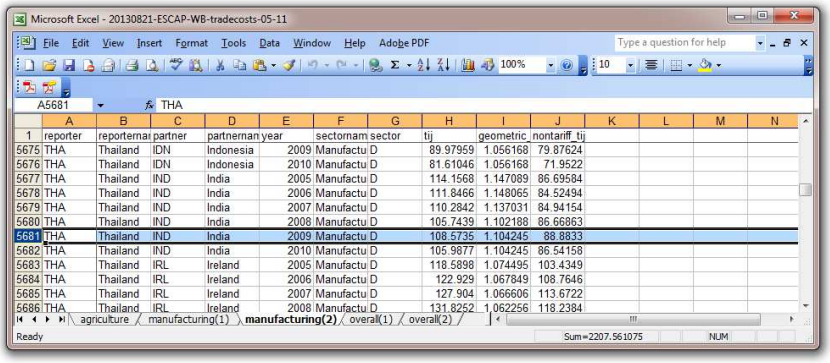
Bilateral comprehensive trade cost, as defined above, is a measure of costs associated with both importing and exporting goods between two countries i and j.[5] Values of τ_{ij} (i.e. variable name "tij" in the database) can be used as a trade cost indicator, e.g., to find out which are the lowest trade cost partners of a given country. The value of tij is provided in ad valorem equivalent form.

EXAMPLE: the ad valorem equivalent trade cost of Thailand-China for manufacturing good in 2009 is 82.67% (see Screen Shot 1). In words, the data suggests that, on average, trading manufacturing goods between Thailand and China involves, on average for all tradable manufacturing goods, additional costs amounting to approximately 83% of the value of goods - as compared to when the two countries trade these goods within their borders. Using the same approach, the cost of trade in manufacturing goods between Thailand and India in 2009 is found to be 108.57% (see Screen Shot 2), suggesting that traded goods between Thailand and India are subject to an additional ad valorem (tariff) equivalent trade cost of 26% compared to traded goods between Thailand and China. It is worth emphasizing that this is an average tariff-equivalent for all manufacturing goods, some of which may not be traded (or very little) in practice due to prohibitively high trade costs.

Screen Shot 1: Thailand-China's Data



Screen Shot 2: Thailand-India's Data



[4] The paper uses linear interpolation to fill in missing observation. "tij_interpolated" is tij with filled-in trade costs' missing data.
[5] Unlike in Anderson and van Wincoop (2004), the derivation does not assume symmetric trade costs for both directions.

IMPORTANT NOTE: the absolute value of the trade cost indicators, including in ad valorem form, can vary greatly depending on underlying assumptions regarding the value of the elasticity of substitution σ_k.[6] Therefore, "tij" related data should preferably be used for comparative exercises (e.g. Thailand-China versus Thailand-India) or to analyze changes in trade costs over time[7] or for technical analysis (such as in an econometric model of trade or trade cost). Stand-alone interpretation of single pair data (e.g., tij of Thailand-China is 81%) and comparisons of the absolute values of ad valorem trade cost estimates from different databases or sources should be avoided.

Interpretation of bilateral tariff costs (geometric_avg_tariff)

Since comprehensive trade cost is bi-directional in nature (i.e., include trade costs to and from a pair of countries), the bilateral tariff costs indicator included in the database is also bi-directional and is a measure (geometric average) of the tariffs imposed by the two partner countries on each others imports.

The bilateral tariff cost indicator is referred to as "geometric_avg_tariff" in the database and defined as follows:

$$\text{geometric\_avg\_tariff} = \sqrt{(1+tariff_{ij})(1+tariff_{ji})} \qquad \textbf{(2)}$$

where

geometric_avg_tariff	geometric average of $tariff_{ij}$ and $tariff_{ji}$
$tariff_{ij}$	simple average effective import tariff imposed by country *i* on country *j*
$tariff_{ji}$	simple average effective import tariff imposed by country *j* on country *i*.

EXAMPLE: import tariff of Thailand on China's manufacturing goods is 10.06%, while import tariff of China on Thailand's manufacturing goods is 2.9%. Thus, the value of "ga_tariff_ijji" of Thailand-China is $\sqrt{(1+0.1006)(1+0.029)}$ = 1.064198. Expressed in ad valorem equivalent form, the geometric average of tariffs imposed by Thailand and China on each other is (1.064198-1) = 6.41%.

Interpretation of Comprehensive Trade Costs Excluding Tariff indicator (nontariff_tij[8])

Following Anderson and van Wincoop (2004), comprehensive trade costs excluding tariff ("nontariff_tij" in the database), which encompasses *all additional costs other than tariff costs involved in trading goods bilaterally rather than domestically,* are also calculated as

$$\text{nontariff\_tij} = \frac{\left(\frac{1+(tij/100)}{geometric\_avg\_tariff}\right)-1}{100} \qquad \textbf{(3)}$$

EXAMPLE: Trade cost indicator value for manufacturing goods between Thailand-China in 2009 is 1.8266816 (ad valorem equivalent: 82.66816%). In turn, the bilateral tariff costs ("ga_tariff_ijji") is 1.064198 (ad valorem equivalent: 6.4%). As a result the comprehensive trade costs excluding tariff ("nontariff_tij") is ((1.8266816/1.064198)-1)*100 = 71.65% (See Screen Shot 1).

As trade facilitation related costs are generally understood to exclude tariff, use of "nontariff_tij" when the focus is specifically on trade facilitation and logistics matters is most appropriate.

[6] Based on a review of the literature, elasticity of substitution is set to 8 across all sectors (both agriculture and manufacturing) in the database. See Staff Working Paper 5/2011 for details. Even though trade costs are sensitive to elasticity of substitution, the change of trade costs are not. See Novy (2008) for more details.

[7] Even though trade costs are sensitive to elasticity of substitution, the change of trade costs are not. See Novy (2008) for more details.

[8] "nontariff_tij_interpolated" is calculated by replacing tij with tij_interpolated.