



Ninth ARTNeT Capacity Building Workshop for Trade Research "Trade Flows and Trade Policy Analysis"

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Analyzing trade policy

Content

- a. Overview and learning objectives
- b. Analyzing trade policy
- c. Databases

a. Overview and learning objectives

- How to present a tariff profile that summarizes the salient features of a country's tariff structure
- How to aggregate tariffs into simple and weighted averages and what biases are possibly created by aggregation
- How to define and calculate Effective Rates of Protection
- How to measure and interpret tariff escalation
- How to calculate Non-Tariff Measures (NTM) import coverage ratios and what biases are possibly involved in their calculation
- How to calculate the ad-valorem tariff equivalent of a Quantitative Restriction (QR) using the price-gap method
- How to assess the overall trade restrictiveness of a trade policy stance
- How tariff and NTM data is presented in the main databases available

b. Analyzing trade policy

- Trade policies are the policies that governments adopt toward international trade
- They may involve a variety of different actions and the use of a number of different instruments
- Two broad categories: tariffs and non-tariff measures (NTMs)

Tariffs

- Tariffs are taxes on imports or exports of goods, levied at the border
- A tariff raises the price of the imported (exported) product above its price on the world (domestic) market
- 2 types:
 1. *Ad valorem*. Expressed as a percentage of the value of the imported (exported) good (usually as a percentage of the CIF value)
 2. *Specific*. Stated as a fixed currency amount per unit of the good
 - Example: Australia's 2005 schedule includes a tariff of \$1.22/kg on certain types of cheeses and the United States charges \$0.68 per live goat
- Combinations of *ad valorem* and specific tariffs
- Mixed tariffs are expressed as either a specific or an *ad valorem* rate, depending on which generates the most (or sometimes least) revenue
 - For example, Indian duties on certain rayon fabrics are either 15 percent *ad valorem* or Rs. 87 per square meter, whichever is higher
- Compound tariffs include both *ad valorem* and a specific component
 - For example, Pakistan charges Rs. 0.88 per liter of some petroleum products plus 25 percent *ad valorem*

a. *Ad valorem* equivalent (AVE) of specific tariffs

- *Ad valorem* tariffs are much more widely used than specific tariffs, because they are easier to aggregate and to compare and are thus more transparent
- One way to compare them, however, is to calculate their *ad valorem* equivalent

$$\tau_{AVE} = 100 \frac{\tau_{specific}}{p}$$

Where p is the international price per unit of the good

- The challenge is to compute p . It can be calculated by dividing trade values by volumes (to get unit values), but the result often varies across time and countries and systematic biases are likely
 - Since poorer countries export, on average, goods of lower quality and hence price, even if they face the same specific tariff as higher priced exports, their exports face higher protection in AVE terms than these higher priced exports

a. *Ad valorem* equivalent (AVE) of specific tariffs (ct'd)

- World Bank WITS proposes four methods to compute unit values in AVE estimation
 1. Using import unit values for the reporter calculated at the national tariff line level (8-10 digits). If those are not available, replace them with import unit values for the reporter calculated at the HS-6 digit level. If neither 1. or 2. are available, use import unit values for OECD countries
 2. Using only import unit values for OECD countries
 3. Using the methodology for the calculation of AVEs of agricultural non *ad valorem* duties referred to in the draft modalities for agriculture that are currently negotiated at the WTO
 4. Using the methodology for the calculation of AVEs of non agricultural non *ad valorem* duties referred to in the draft modalities for non agricultural market access currently under negotiation at the WTO
- Market Access Maps (MACMAP) also calculates AVEs but uses unit values computed as the ratios of values to volumes for five specific reference groups

b. Other distinctions

1. Most Favored Nation (MFN) tariff rates vs. preferential tariff rates

- MFN tariffs are the ones that WTO Members commit to accord to imports from all other WTO Members with which they have not signed a preferential agreement
- Preferential tariffs are the ones accorded to imports from preferential partners in FTAs, customs unions or other preferential trade agreements, and are more likely than others to be at zero

2. Bound vs. applied tariff rates

- Bound MFN tariff levels, which are listed in a country's tariff schedule, indicate the upper limit at which the government is committed to set its applied MFN tariff
- For a given tariff line, the bound tariff must thus be higher or equal to the applied MFN tariff
- For developed countries, bound tariffs are typically identical or very close to applied tariffs. For developing countries, however, there is often "water" in the tariff (spread between bound and applied rate, "binding overhang")

Binding coverage

- The binding coverage is the share of tariff lines with WTO-bound rates
- Until the Uruguay Round of the GATT, which ended in 1994, countries agreed to bind tariffs only on manufactured goods
- Trade in agricultural products was excluded from the GATT when it was written in the late-1940s
- Even within manufactured products, countries were not obliged to bind all tariff lines
- Reflecting their relative lack of participation in previous trade rounds, developing countries tended to bind fewer tariff lines than industrial countries
- During the Uruguay Round, countries committed to bind tariffs on all agricultural products
- New members of the WTO have been asked to bind all manufactured tariff lines as well
- The binding coverage varies by region. In Latin America, practically all countries bind all tariff lines. In Asia, the binding coverage varies from less than 15 percent in Bangladesh to 100 percent in Mongolia

Tariff-rate quotas

- Tariff rate quotas are made up of a low tariff rate on an initial increment of imports (the within-quota quantity) and a very high tariff rate on imports above that initial amount
- Trade economists typically argue that these non *ad valorem* tariffs are less transparent and more distorting, i.e. that they drive a bigger wedge between domestic and international prices
- In addition, their economic impact changes as world prices change

c. Tariff profiles

1. Average

- Tariff schedules are typically defined at the HS 8 (up to HS12) level of disaggregation
- Tariffs can be aggregated in various different ways: by simple averaging or by using some weighting scheme

- Weighted average:

$$\bar{\tau} = \sum_k w_k \tau_k$$

- Where w is a weight (usually, product k 's import share)
- Drawbacks of each method:
 - Simple averages give the same weight to products that are not imported and to products that are imported in large amounts
 - Weighted averages systematically under-represent high tariffs
- [Kee at al. \(2008\)](#) propose a weighting scheme in which the weights are an increasing function of import shares and elasticities of import demand at the tariff line level

c. Tariff profiles (ct'd)

2. Dispersion

- Tariff averages only provide a partial picture of a given tariff structure
- The dispersion of tariffs around the mean also matters from an economic point of view: in general, the higher the dispersion, the more distortion
- Dispersion can be visualized with a histogram or density estimation
- Other options include the standard deviation σ :

$$\sigma = \sqrt{\frac{1}{K} \sum_k (\tau_k - \bar{\tau})^2}$$

- Or the coefficient of variation (standard deviation / tariff mean)
- Or the proportion of tariff peaks:
 1. Share of tariff items subject to duties higher than 15 per cent
 2. Share of tariff items subject to duties larger than three times the national average

d. Effective protection and tariff escalation

- A tariff provides protection from imports by import-competing producers to raise the price and the production
- However, domestic producers may be using imported inputs which might be subject to tariffs
- Such tariffs on imported inputs would raise the costs of domestic producers and lower their output
- If one is interested in the net “protective” effect of tariffs on producers in a particular sector, all tariffs need to be taken into account
- The effective rate of protection (ERP) measures the net protective effect of the whole tariff structure on domestic producers in a particular sector

$$ERP_k = \frac{\tau_k p_k^* - \sum_l a_{lk} \tau_l p_l^*}{p_k^* - \sum_l a_{lk} p_l^*}$$

Where k indexes final products, l indexes intermediate inputs and p^* are world prices

d. Effective protection and tariff escalation (ct'd)

- In ERP formula, a is the value of input l used in the production of one unit of k (input-output coefficient)
- From IO tables, or, aggregated at 3-digit, from TPP database
- ERP can be negative, even when the import tariff on the final good is positive, because of protection on inputs

ERP: illustrative calculations

	Domestic sales	Export to preferential market	Export to world market
<hr/>			
Value of a shirt			
At world price	100	100	100
At domestic/applicable price	115	105	100
<i>NRP on shirts (%)</i>	15.0	5.0	0.0
<hr/>			
Value of fabric used			
At world price	60	60	60
At domestic/applicable price	66	66	66
<i>NRP on fabric (%)</i>	10.0	10.0	10.0
<hr/>			
Value added			
At world price	40	40	40
At domestic/applicable price	49	39	34
<i>ERP (%)</i>	22.5	-2.5	-15.0

d. Effective protection and tariff escalation (ct'd)

- Tariff escalation (higher tariff rates for final goods than for intermediate ones) is a mechanism to avoid negative ERPs

Tariff escalation and ERP

	Case 1 (escalating)	Case 2 (neutral)	Case 3 (de- escalating)
Value of a shirt			
At world price	100	100	100
At domestic/applicable price	120	110	105
<i>NRP on shirts (%)</i>	20.0	10.0	5.0
Value of fabric used			
At world price	60	60	60
At domestic/applicable price	66	66	66
<i>NRP on fabric (%)</i>	10.0	10.0	10.0
Value added			
At world price	40	40	40
At domestic/applicable price	54	44	39
<i>ERP (%)</i>	35.0	10.0	-2.5

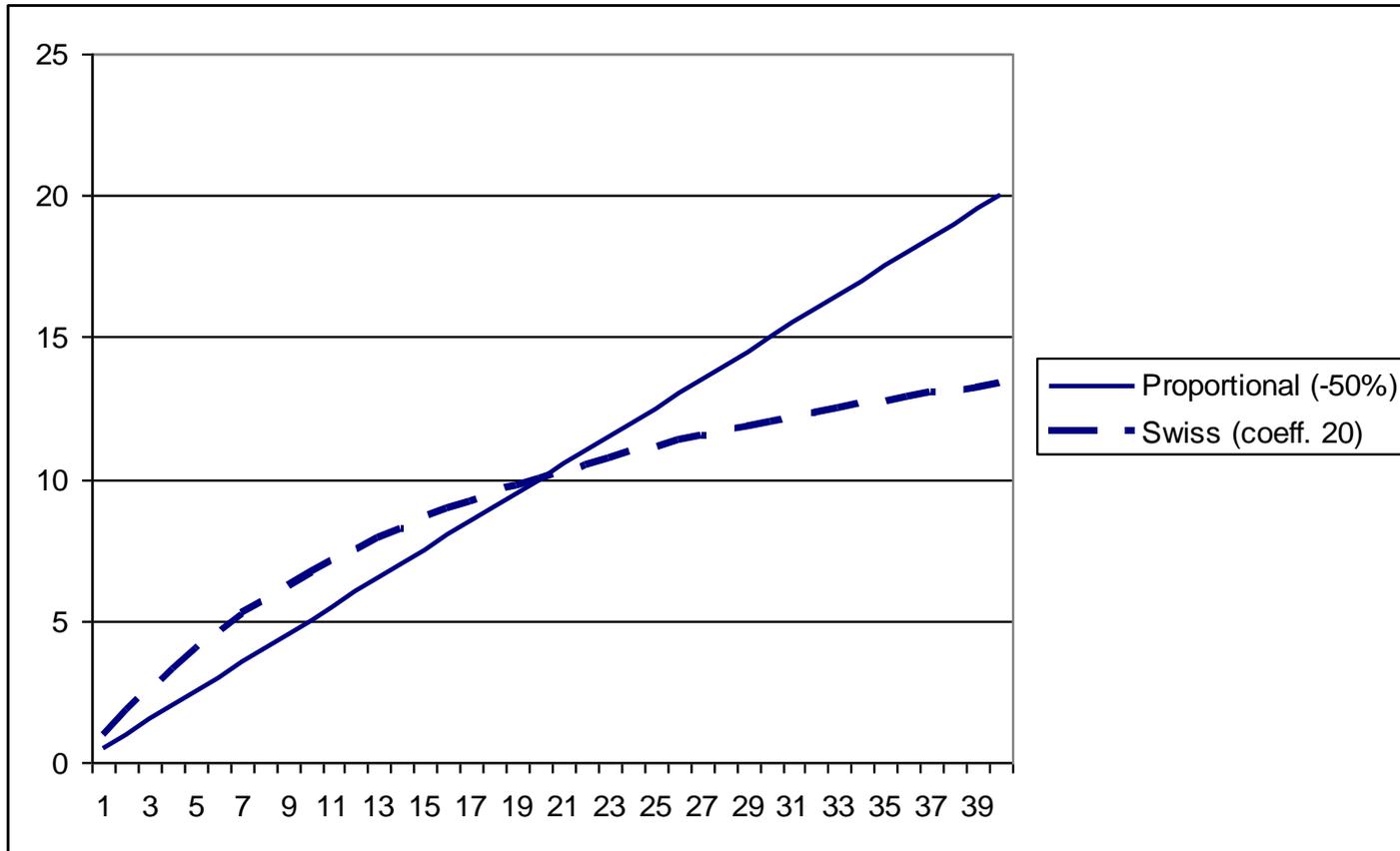
- Other mechanisms include tariff exemptions on inputs (e.g. in EPZ agreements) and duty drawbacks (refund of tariff payments on justification of export of the final good)

e. Tariff-cutting formulas in trade negotiations

History of approaches

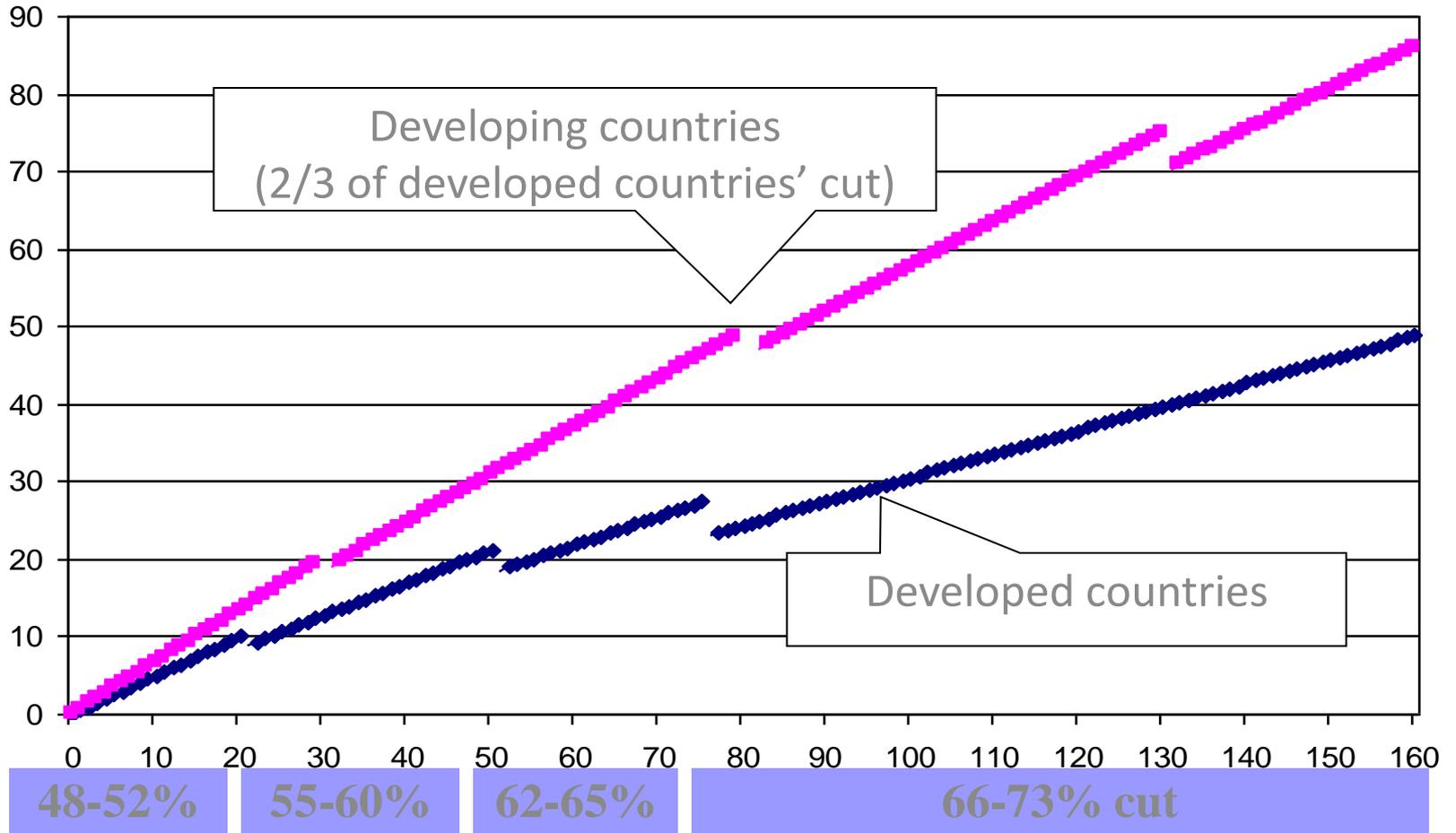
- Pre-GATT: request-and-offer procedure: bilateral and sequential negotiation
- GATT : request-and-offer procedure: best offer given to any negotiating partner extended to all on MFN-basis
- Kennedy Round (1963-67): proportional-cut formula : -35% in average tariffs
 - $t_1=(1-b)*t_0$, where b is % tariff cut
- Tokyo Round: Swiss formula : -30% in average tariffs
 - $t_1=(a*t_0)/(a+t_0)$, where a is both the maximum tariff which is agreed to apply anywhere and a common coefficient to determine tariff reductions
 - As t_0 tends to infinity, t_1 tends to a , the agreed maximum tariff
 - As t_0 tends to 0, t_1 tends to t_0 i.e. no change in tariffs that are already low
- Uruguay: broad tariff reduction goals (-30% in NAgri and 15% at least in agriculture)
- DOHA: swiss formula for NAgri + [tiered formula](#) for Agri + excluded products

Proportional vs. Swiss formula



- Horizontal axis: t_0
- Vertical axis: t_1

Tiered formula: Agriculture



Non-tariff measures (NTMs)

- NTMs are policy measures, other than ordinary customs tariffs, that affect international trade in goods at the border by changing quantities traded, prices, or both

International classification of NTMs

A	Sanitary and phytosanitary measures
B	Technical barriers to trade
C	Pre-shipment inspection and other formalities
D	Price control measures
E	Licences, quotas, prohibitions and other quantity control measures
F	Charges, taxes and other para-tariff measures
G	Finance measures
H	Anti-competitive measures
I	Trade-related investment measures
J	Distribution restrictions*
K	Restrictions on post-sales services*
L	Subsidies (excluding export subsidies)*
M	Government procurement restrictions*
N	Intellectual property*
O	Rules of origin*
P	Export related measures*

Non-tariff measures (NTMs) (ct'd)

- NTMs may be intrinsically protectionist, but they may as well address market failures, such as externalities and information asymmetries between consumers and producers
- NTMs which address market failures may restrict trade while at the same time improving welfare
- Other NTMs, such as certain standards or export subsidies may expand trade

a. Quantification

1. Price-gap approach

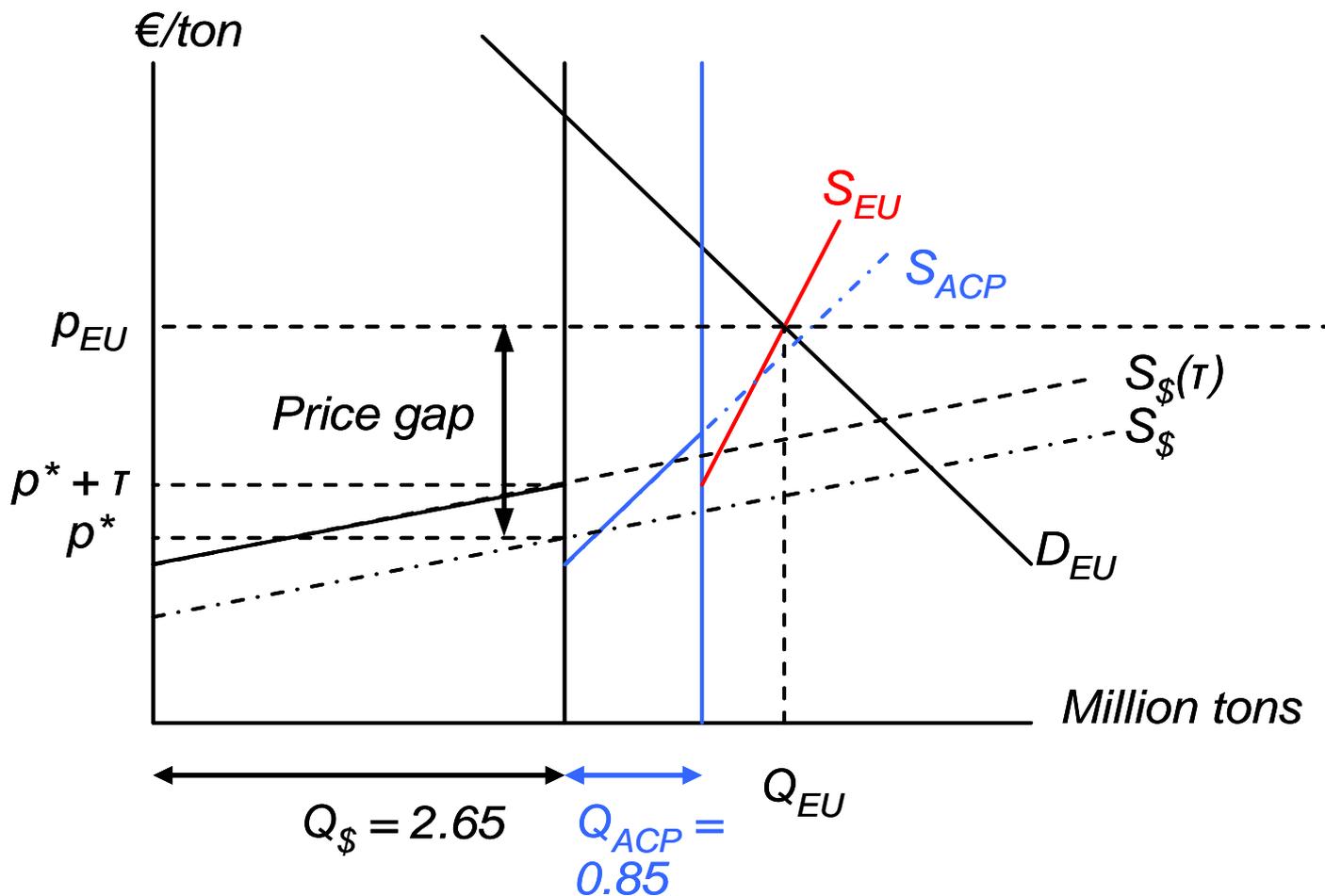
- Aims at deriving a tariff/tax equivalent to the NTM
- Calculates the *ad valorem* equivalent of NTM, i.e. the *ad valorem* tariff rate that would induce the same level of imports as the NTM in question

$$TE_{NTM} = p - p^* - (c + \tau)$$

Where p is the domestic price, p^* the world price, c is transport costs and τ is custom duties

- Price gap is a very simple concept which, however, can be difficult to implement
- Difficulties in its implementation come from the variety of ways of calculating internal and external prices, which give rise to widely divergent estimates

Price-gap method for the EU banana market



a. Quantification (ct'd)

2. Inventory-based frequency measures

- Frequency ratio is the share of tariff lines in a certain product category subject to selected NTMs
- Coverage ratio is the share of imports of a certain category of products subject to NTMs

Potential drawbacks

- The stiffness of the NTM is not taken into account
- Bias: a prohibitive quota reducing imports of a certain category of goods to a very low level mechanically reduces the category's share in total imports, resulting in a low coverage ratio
- Frequency indexes give the same weight to products that are not imported and to products that are imported in large amounts
- NTM inventories may be incomplete and their coverage of measures may differ across measures and countries

Coverage ratio: illustrative calculation

HS code	Import value (US\$ 1000)	Import share (%)	NTB	Description
87	58'827'533			Vehicles other than railway or tramway rolling stock
8701	1'975'665	3.36	0	Tractors (other than tractors of heading 87.09).
8702	264'003	0.45	0	Motor vehicles for the transport of ten or more persons, including the driv ...
8703	18'400'000	31.28	1	Motor cars and other motor vehicles principally designed for the transport ...
8704	5'658'077	9.62	0	Motor vehicles for the transport of goods.
8705	418'058	0.71	0	Special purpose motor vehicles, other than those principally designed for t ...
8706	435'047	0.74	0	Chassis fitted with engines, for the motor vehicles of headings 87.01 to 87 ...
8707	172'346	0.29	0	Bodies (including cabs), for the motor vehicles of headings 87.01 to 87.05. ...
8708	28'600'000	48.62	0	Parts and accessories of the motor vehicles of headings 87.01 to 87.05.
8709	211'767	0.36	0	Works trucks, self-propelled, not fitted with lifting or handling equipment ...
8710	622'752	1.06	0	Tanks and other armoured fighting vehicles, motorised
8711	628'913	1.07	1	Motorcycles (including mopeds) and cycles fitted with an auxiliary motor
8712	62'290	0.11	0	Bicycles and other cycles (including delivery tricycles), not motorised.
8713	54'315	0.09	0	Carriages for disabled persons
8714	363'429	0.62	0	Parts and accessories of vehicles of headings 87.11 to 87.13.
8715	28'653	0.05	0	Baby carriages and parts thereof.
8716	932'218	1.58	0	Trailers and semi-trailers
HS 87 Cov. ratio (%)			32.35	

- As illustrated, the coverage ratio is equal to 32.35% (share of imports of HS code 87 subject to NTM in total imports of HS code 87)
- The frequency index would be equal to $2/16 = 0.125$, i.e. 12.5%

Trade policy stance: Trade Restrictiveness Indexes

- Can we measure the trade restrictiveness of a country's trade policy regime using synthetic indexes?
- Two important aggregation hurdles
 1. Aggregation of different forms of trade policies
 - A single measure of the trade restrictiveness of a 10 percent tariff, a 1000 tons quota, and a \$1 million subsidy must be found
 2. Aggregation across goods with very different economic importance
 - All the information from several thousand different tariff lines must be summarized in one aggregate measure
 - Commonly used aggregation procedures include simple average, import-weighted averages and frequency or coverage ratios. None of them has a sound theoretical basis
- Anderson and Neary ([1992](#), [1994](#), [1996](#), [2003](#), [2007](#)) and [Kee et al. \(2009\)](#) solve for these two problems with trade restrictiveness indexes (TRIs)

Trade policy stance: Trade Restrictiveness Indexes (ct'd)

1. First problem solved by transforming all the information on non-tariff barriers into AVE (impact on the domestic price of imported goods)
 2. Second problem solved by using theoretically sound aggregation procedures
- One single indicator cannot provide a measure of the trade distortions a country imposes on itself and at the same time the trade distortions imposed on its trading partners

Trade policy stance: Trade Restrictiveness Indexes (ct'd)

3 indexes answering different questions:

1. Trade distortions imposed by each country's trade policies on itself
 - a. TRI (trade restrictiveness index) is the equivalent uniform tariff that would keep real income (or welfare) constant
 2. Trade distortions imposed by each country's trade policies on its trading partners
 - b. OTRI (overall TRI) is the equivalent uniform tariff of country M that would keep imports of country M at their observed levels
 3. Trade restrictions imposed by the rest of the world on each country's export bundle
 - c. MA-TRI (market access TRI) is the equivalent uniform tariff faced by exporters of country X in the rest of the world that would keep exports of country X at their observed levels
- We follow Kee et al. (2009)

a. TRI

- The TRI can be approximated by the squared root of a weighted average of the squares of the level of protection at the tariff line level (which include AVEs of NTBs)
- The weights are an increasing function of import shares, import demand elasticities and levels of protection

b. OTRI

- The OTRI is also a weighted average of the applied levels of protection
- The weights are functions of import shares and import demand

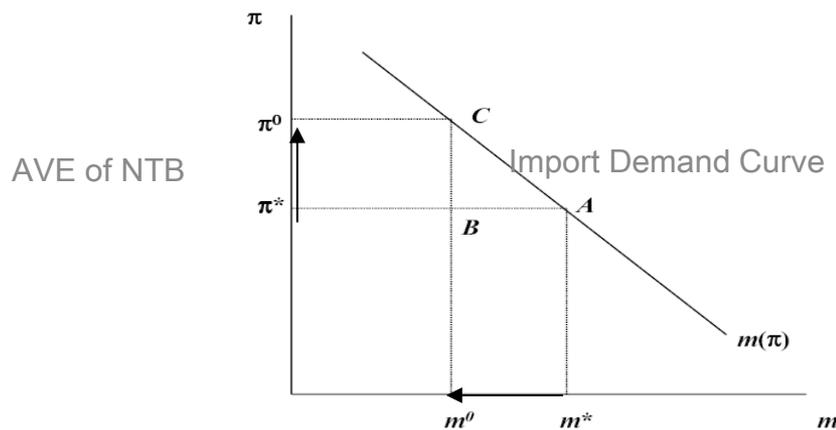
c. MA-OTRI

- The MA-OTRI is a weighted average of the applied levels of protection faced in the rest of the world (across tariff lines and trading partners)
- The weights are an increasing function of the exporter's export shares and importers' import demand elasticities

Trade policy stance: Trade Restrictiveness Indexes (ct'd)

Estimation of AVE of NTBs

1. Estimate the quantity impact of NTBs on imports (Leamer, 1990, Harrigan, 1993 and Trefler, 1993)
 - Predict imports with and without NTBs using factor endowments as control variables
 - The estimated impact of NTBs on imports varies by country and product
2. Convert the import-quantity impact into AVEs
 - Moving along (country and good specific) import demand curves using estimates of import demand elasticities



Estimated quantity impact on imports

Application: Trade Restrictiveness Indexes

- In this application we look at OTRI and MA-ORTI for 2008
- Data and variables description are available [here](#)

- 2 types of OTRI
 1. OTRI: tariffs + AVEs of NTMs
 2. TTRI: tariffs only
- Calculated for both MFN and Applied tariff (we always use the ones calculated from Applied tariff)
- Based on imports

- 2 types of MA-OTRI
 1. MA-OTRI: tariffs + AVEs of NTMs
 2. MA-TTRI: tariffs only
- Tariff Preferences are taken into account

OTRI and TTRI by region, 2009

	All Trade	Agriculture	Manufacture
East Asia and Pacific	8.54	29.13	6.71
	<i>2.65</i>	<i>7.01</i>	<i>2.09</i>
Europe and Central Asia	6.13	37.99	2.02
	<i>3.45</i>	<i>24.61</i>	<i>0.68</i>
Latin America and the Caribbean	11.89	22.21	10.50
	<i>7.26</i>	<i>7.99</i>	<i>7.06</i>
Middle East and North Africa	5.02	8.67	4.68
	<i>3.68</i>	<i>4.27</i>	<i>3.65</i>
North America	5.30	17.71	3.97
	<i>1.43</i>	<i>4.47</i>	<i>1.09</i>
South Asia	15.78	19.71	15.90
	<i>15.16</i>	<i>16.97</i>	<i>15.34</i>
Sub-Saharan Africa	10.69	15.77	9.48
	<i>6.43</i>	<i>7.46</i>	<i>6.24</i>
Total	0.06	0.33	0.03
	<i>0.02</i>	<i>0.07</i>	<i>0.01</i>
<i>OTRI in bold and TTRI in italic</i>			
<i>Weighted average, w= gdp per capita</i>			

OTRI and TTRI by income group, 2008

	All Trade	Agriculture	Manufacture
High Income	5.76	25.08	3.64
	<i>2.79</i>	<i>11.30</i>	<i>1.72</i>
Low Income	12.64	16.68	11.83
	<i>9.08</i>	<i>11.23</i>	<i>8.68</i>
Lower Middle	11.90	20.28	10.69
	<i>6.25</i>	<i>8.82</i>	<i>5.85</i>
Upper Middle	11.74	21.86	10.33
	<i>6.60</i>	<i>9.32</i>	<i>6.18</i>
Total	5.60	33.45	3.43
	<i>1.55</i>	<i>6.72</i>	<i>1.14</i>
<i>OTRI in bold and TTRI in italic</i>			
<i>Weighted average, w= gdp per capita</i>			

MA-OTRI and MA-TTRI by region, 2008

	All Trade	Agriculture	Manufacture
East Asia and Pacific	10.62	29.69	7.25
	<i>3.86</i>	<i>10.20</i>	<i>2.94</i>
Europe and Central Asia	7.41	21.67	3.85
	<i>1.89</i>	<i>6.19</i>	<i>1.17</i>
Latin America and the Caribbean	12.88	30.09	9.24
	<i>3.37</i>	<i>6.73</i>	<i>2.60</i>
Middle East and North Africa	5.19	11.90	4.89
	<i>2.31</i>	<i>4.21</i>	<i>2.30</i>
North America	9.19	25.52	6.01
	<i>2.51</i>	<i>8.93</i>	<i>1.44</i>
South Asia	21.94	31.16	7.72
	<i>2.70</i>	<i>4.79</i>	<i>2.44</i>
Sub-Saharan Africa	9.50	34.06	6.75
	<i>2.28</i>	<i>5.95</i>	<i>1.45</i>
Total	9.27	27.73	7.92
	<i>4.55</i>	<i>14.06</i>	<i>3.87</i>
MA OTRI in bold and MA TTRI in italic			
<i>Weighted average, w= gdp per capita</i>			

MA-OTRI and MA-TTRI by income group, 2008

	All Trade	Agriculture	Manufacture
High Income	10.15	21.48	8.40
	<i>2.70</i>	<i>6.50</i>	<i>2.17</i>
Low Income	14.71	22.88	9.89
	<i>4.16</i>	<i>5.31</i>	<i>2.37</i>
Lower Middle	16.01	28.35	10.83
	<i>3.08</i>	<i>6.64</i>	<i>1.96</i>
Upper Middle	10.11	26.92	6.76
	<i>2.54</i>	<i>7.35</i>	<i>1.92</i>
Total	9.27	27.73	7.92
	<i>4.55</i>	<i>14.06</i>	<i>3.87</i>
MA OTRI in bold and MA TTRI in italic			
<i>Weighted average, w= gdp per capita</i>			

c. Databases

- Data for trade policy analysis

Data for trade policy analysis

a. Tariff data

- WTO integrated database (IDB) and Consolidated Tariff Schedules database (CTS): MFN applied tariffs and imports of WTO Members at the tariff-line level which often means 8 digits, sometimes even 10 digits, starting in 1996
 - WTO Tariff Analysis Online ([TAO](#))
- WITS provides access to five trade and tariffs databases:
 - The WTO's IDB and CTS databases
 - UN Comtrade
 - UNCTAD's TRAINS database
 - CEPII and IFPRI's [MAcMap](#) database (see [Boüet et al., 2005](#))
 - [AMAD](#) (Agricultural Market Access Database)

Data for trade policy analysis

b. NTM data

- WITS (21 countries, 19 developing + EU and Japan)
- World Bank Temporary Trade Barriers [Database](#)
- AMAD (also data on tariff-quotas)
- TPP database
- World Bank TBT [database](#)
- [Data](#) on ad-valorem equivalents of NTMs from [Kee et al. \(2009\)](#)
- WTO databases
 - [SPS](#)
 - [TBT](#) (and also this [database](#) on Specific Trade Concerns)
 - [Subsidies](#)