Trade Restrictiveness Indices in Presence of Externalities: An Application to Non-Tariff Measures

John Christopher Beghin (Iowa State University)
Anne-Celia Disdier (Paris School of Economics-INRA)
Stéphan Marette (INRA)

IATRC Session 6
December 10, 2012

Motivations

- Trade context: lower tariffs, emergence, if not explosion, of non-tariff measures (SPS and TBT measures) acting as standards
- In this NTM context, markets are imperfect through asymmetric information and external effects affecting the environment, health, sustainability, etc…
- Standards can help mitigating these imperfections but can be protectionist (“too high”, or not justified at all)
- Most of the trade literature treats (explicitly or implicitly) these NTMs as protectionist, reducing trade (& welfare)
- We depart from this “protectionist” premise and allow for market imperfections and apply this context to the TRI

What is the TRI?

- TRI: a welfare index of distortions. It aggregate distortions using welfare weights and expresses all these as a tariff (surcharge) equivalent (holding utility constant)
- A theoretically consistent approach to aggregate distortions as opposed to trade weights (marginal vs. average weights)
- Many applications (tariff, domestic subsidies, quotas, and recently NTMs) as noted next
- Extensions to consistent aggregation for mercantilism (holding trade constant and utility endogenous)
- Partial-equilibrium applications reduce the TRI to own-price effects and a sum of tariffs weighted by DWL triangles

The trade literature on NTMs

- NTMs are protectionist by assumption (trade costs), yet trade-enhancing effects are often found empirically in investigations. Hard to rationalize negative trade costs…
- Mercantilist literature (more trade implies more welfare). The link between trade and welfare is tenuous (Krishna, others)
- A few partial equilibrium applications of the TRI for NTMs but forcing them to be trade impeding (constrained in the econometrics)
- Paper by Kee et al. applies TRI to NTMs and derives ad valorem equivalents to tariffs NTMs, and domestic subsidies and various TRIs but rules out trade enhancing effects

What we do

- Use and extend the TRI of Anderson and Neary in the context of a generic external effect (a public bad affects consumers) mitigated by a standard. The standard affects the unit cost of imports
- Derive the TRI in the presence of external effect and the AVE of the standard and the implied specification for imports
- Allows for ambiguous sign of the NTM AVEs and changes in TRIs
- Use cross-section dataset (sectors x country) of Kee et al. to estimate AVEs of NTMs, and associated TRIs corresponding to the structure of tariffs, NTMs, and subsidies
- 10% of sectors (HS-6) exhibit a trade-enhancing impact of NTMs; TRIs are lower than those without the externality, several countries exhibit negative changes in TRI

The dual approach to trade

- Competitive benchmark (n markets with CRS industries). Modeled as a single firm with multiple outputs under some input/endowment constraints
- Some external cost (from imports) maps into a public bad
- A representative consumer maximizes utility under a national income constraint and consumes n goods domestically produced or imported, and is affected by the public bad
- All/some markets are open and distorted at the border by tariffs and NTMs and domestically by subsidies to producers (e.g., CAP). Could add more…

External effect

- An externality affects consumers; the NTM standard increases the cost of imports and reduces the externality. This assumes that domestic producers already satisfy the standard. Could relax this easily (standard costly for both producers)
- Examples: sustainability standard and global common of virgin forest; health incidence of pesticide residues and MRL regulation; biodiversity loss and exotic pest linked to imports regulated by border inspections or ballast cleaning regulation
- For simplicity the bad is expressed directly as a function of the standard. Could be bad=f(imports=g(standards))

Partial equilibrium illustration

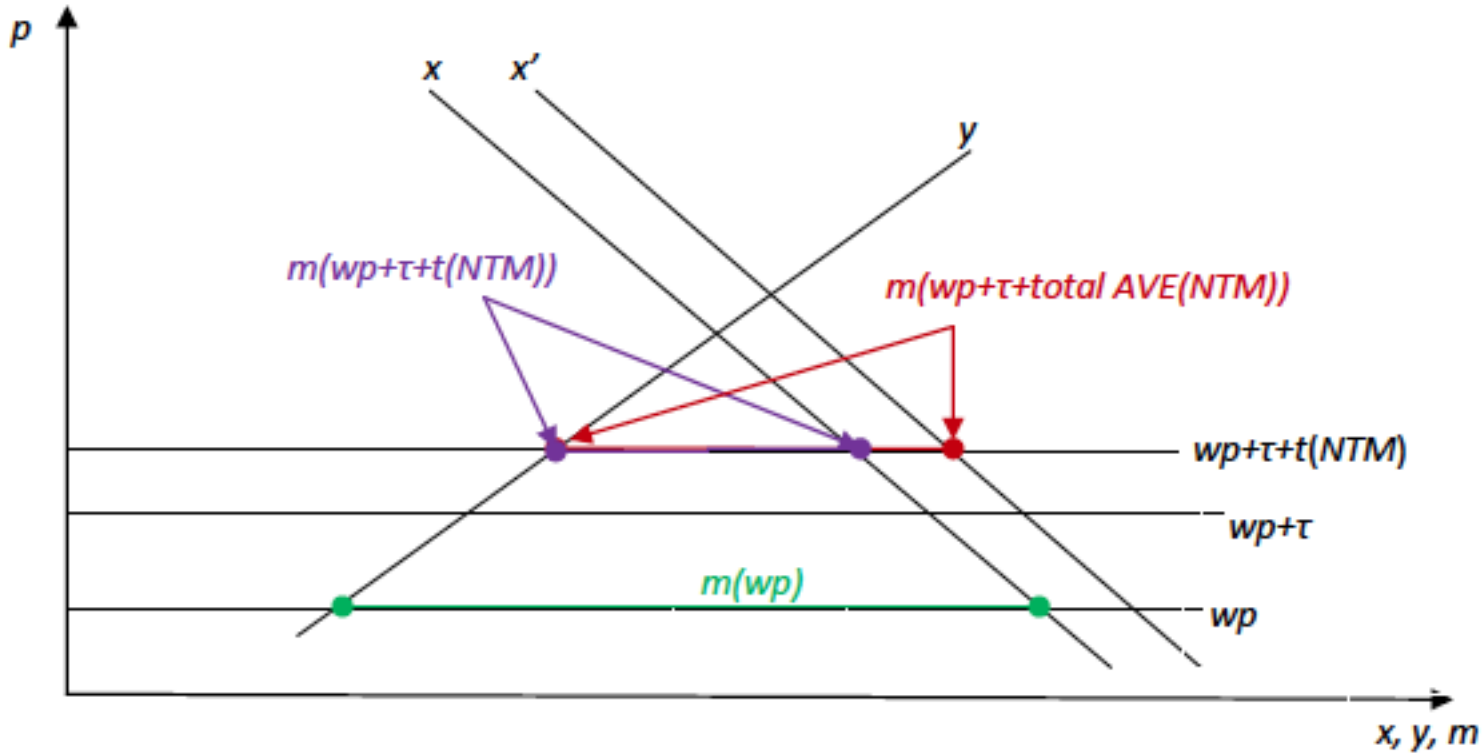

Figure 1. The impact of NTMs on demand, supply and imports

Dataset

- UNCTAD-COMTRADE database of Kee et al. (2009)
- Imports: COMTRADE. Average HS6, average flows 2001-2003
- Imports demand elasticities: Kee et al. (2008)
- Tariffs: UNCTAD & WTO
- NTMs: UNCTAD-TRAINS WTO Notifications. Dummy (= 1 if the importing country imposes at least one NTM on a given HS6 product)+ 2 updates but unclear on the exact cutoff date
- NTMs cover technical regulations, price controls, quantity restrictions, and monopolistic measures
- Production subsidies: agricultural domestic support (WTO, continuous measure). 1995-1998 WTO notifications

Dataset (cont.)

- Countries' characteristics: Economic size (GDP) & relative factor endowments (agricultural land over GDP, capital over GDP, and labor over GDP) (WDI)
- Controls for islands (dummy) & remoteness (average distance to world markets, i.e. import-weighted distance to each trading partner)
- Sample has 93 importing countries, 4941 HS6 products, but only a cross section of NTMs
- Production subsidies for about 160 lines out of 4941 lines

Estimation strategy

- Estimation: tariff line by tariff line (HS6-digit)
- Potential endogenous NTMs & production subsidies. Instruments follow Kee et al., 2009: exports, past import changes, GDP-weighted average of NTMs and P subsidies at the HS6 digit of the 5 closest geographic neighbors ("qui se ressemble s'assemble…")
- Two-stage estimation: Probit (presence/absence of a NTM & instruments as explanatory variables). Inverse Mills ratio included in the 2nd stage (trade flows)+ prediction of Production subsidies
- Quantity impact of NTMs & P subsidies is then transformed into AVEs using import demand elasticities also in the dataset
- AVEs for each importing country & HS6 line
- Last, AVEs aggregated at the country level (NTMs with tariffs and production subsidies) to get TRIs or changes in TRI if negative AVEs

HS Chapter codes	HS Chapter names	Simple frequency ratio of NTMs	AVE of NTMs all HS6 lines (mean)		AVE of NTMs if NTM=1 (mean)	
			with externality	w/o externality	with externality	w/o externality
I	Animals	0.460	0.270	0.453	0.586	0.986
II	Vegetables	0.420	0.120	0.291	0.286	0.693
III	Fats and oils	0.370	0.293	0.427	0.791	1.153
IV	Beverages, tobacco	0.423	0.179	0.344	0.424	0.814
V	Minerals	0.097	0.087	0.132	0.902	1.366
VI	Chemicals	0.196	-0.003	0.118	-0.013	0.600
VII	Plastics	0.160	0.072	0.136	0.450	0.853
VIII	Leather	0.123	0.026	0.079	0.208	0.641
IX	Wood	0.160	0.033	0.089	0.204	0.552
X	Paper	0.131	0.013	0.068	0.101	0.519
XI	Textiles	0.277	0.114	0.231	0.414	0.833
XII	Footwear	0.239	0.102	0.176	0.426	0.737
XIII	Stone glass	0.109	0.031	0.074	0.287	0.679
XIV	Pearls	0.015	-0.005	0.004	-0.364	0.273
XV	Metals	0.121	0.039	0.091	0.322	0.750
XVI	Machinery	0.174	0.098	0.168	0.565	0.963
XVII	Vehicles	0.198	0.020	0.120	0.102	0.604
XVIII	Optical, medical instr.	0.132	0.016	0.077	0.123	0.582
XIX	Arms	0.306	-0.191	0.057	-0.625	0.186
XX	Miscellaneous	0.144	0.072	0.125	0.498	0.869

Table 2. AVEs of binding and non-binding NTMs, by HS chapter

		Binding NTMs (AVE>0)				Non-binding NTMs (AVE≤0)		
HS Chapter codes	HS Chapter names	Share of binding NTMs	AVE of NTMs if NTM=1 (mean)	Share of significant AVE (5%)	AVE if NTM=1 & AVE significant (5%) (mean)	AVE of NTMs if NTM=1 (mean)	Share of significant AVE (5%)	AVE if NTM=1 & AVE significant (5%) (mean)
I	Animals	0.603	1.523	0.747	1.806	-0.833	0.056	-0.933
II	Vegetables	0.579	1.129	0.741	1.234	-0.873	0.042	-0.961
III	Fats and oils	0.654	1.646	0.654	1.795	-0.823	0.028	-0.914
IV	Beverages, tobacco	0.579	1.316	0.632	1.585	-0.803	0.029	-0.943
V	Minerals	0.525	2.483	0.682	3.346	-0.846	0.045	-0.909
VI	Chemicals	0.352	1.567	0.482	2.074	-0.871	0.018	-0.961
VII	Plastics	0.552	1.480	0.521	1.470	-0.817	0.000	-
VIII	Leather	0.530	1.190	0.738	1.393	-0.899	0.035	-1.000
IX	Wood	0.597	0.900	0.660	1.061	-0.828	0.059	-0.958
X	Paper	0.503	1.016	0.466	1.530	-0.823	0.012	-0.937
XI	Textiles	0.490	1.714	0.638	1.741	-0.834	0.027	-0.934
XII	Footwear	0.597	1.260	0.506	1.594	-0.807	0.016	-0.840
XIII	Stone glass	0.565	1.145	0.493	1.671	-0.830	0.035	-0.970
XIV	Pearls	0.364	0.703	0.900	0.736	-0.974	0.057	-1.000
XV	Metals	0.533	1.334	0.515	1.997	-0.830	0.017	-0.954
XVI	Machinery	0.605	1.462	0.496	1.503	-0.811	0.017	-0.954
XVII	Vehicles	0.432	1.310	0.529	1.519	-0.815	0.032	-0.930
XVIII	Optic, medic instr.	0.503	1.092	0.460	1.494	-0.859	0.007	-0.930
XIX	Arms	0.186	0.739	0.581	0.971	-0.936	0.051	-0.973
XX	Miscellaneous	0.592	1.449	0.644	1.797	-0.881	0.001	-1.000

Table 3. Trade restrictiveness indices, by country

ISO	Country	MTRI Tariffs	MTRI Overall protection w/o. externality	MTRI Overall protection w. externality[1]	TRI Tariffs	TRI Overall protection w/o. externality	TRI Overall protection w. externality[1]	dTRI Tariffs	dTRI Overall protection w/o. externality	dTRI Overall protection w. externality
POL	Poland	0.103	0.144	0.031	0.150	0.270	-	0.022	0.073	-0.001
PRT	Portugal	0.036	0.134	0.045	0.175	0.478	0.441	0.031	0.229	0.195
PRY	Paraguay	0.107	0.200	0.015	0.123	0.386	0.054	0.015	0.149	0.003
ROM	Romania	0.120	0.178	0.116	0.157	0.305	0.216	0.025	0.093	0.047
RUS	Russia	0.102	0.294	0.058	0.125	0.490	0.263	0.016	0.240	0.069
RWA	Rwanda	0.088	0.130	0.124	0.113	0.237	0.219	0.013	0.056	0.048
SAU	Saudi Arabia	0.142	0.158	0.062	0.348	0.368	0.248	0.121	0.135	0.062
SDN	Sudan	0.174	0.467	-0.074	0.214	0.679	0.231	0.046	0.461	0.053
SEN	Senegal	0.086	0.374	-0.183	0.108	0.559	-	0.012	0.312	-0.107
SGP	Singapore	0.000	0.309	-0.297	0.000	0.528	-	0.000	0.279	-0.290
SLV	El Salvador	0.064	0.135	0.027	0.096	0.278	-	0.009	0.078	-0.017
SVN	Slovenia	0.102	0.198	-0.048	0.120	0.348	-	0.015	0.121	-0.049
SWE	Sweden	0.014	0.061	-0.015	0.052	0.276	0.175	0.003	0.076	0.031
THA	Thailand	0.109	0.132	0.083	0.168	0.248	0.144	0.028	0.061	0.021
TTO	Trinidad & T.	0.072	0.082	0.068	0.296	0.315	0.300	0.088	0.099	0.090
TUN	Tunisia	0.228	0.365	0.100	0.300	0.528	0.358	0.090	0.278	0.128
TUR	Turkey	0.043	0.105	-0.001	0.095	0.259	0.938	0.009	0.067	0.879
TZA	Tanzania	0.137	0.519	0.084	0.160	0.810	0.574	0.026	0.656	0.329
UGA	Uganda	0.067	0.067	0.065	0.084	0.085	0.079	0.007	0.007	0.006
UKR	Ukraine	0.064	0.285	0.195	0.159	0.519	0.437	0.025	0.270	0.191
URY	Uruguay	0.097	0.211	0.028	0.117	0.412	0.204	0.014	0.169	0.042
USA	United States	0.024	0.083	-0.137	0.049	0.256	-	0.002	0.065	-0.123
VEN	Venezuela	0.135	0.231	0.016	0.158	0.383	0.022	0.025	0.147	0.000
ZAF	South Africa	0.069	0.077	0.050	0.131	0.157	0.044	0.017	0.025	0.002
ZMB	Zambia	0.086	0.116	0.116	0.113	0.205	0.208	0.013	0.042	0.043

Conclusions

- What we did: Derived TRI with external effects and estimated AVEs of NTMs. Computed total AVEs (tariffs, subsidies, NTMs) and TRIs
- 10% of AVEs are negative at HS6. dTRI negative for several countries, typically with low tariff structure and sizable trade. Evidence of anti-protectionist/trade enhancing effects…
- Policy recommendations based on “regular” AVEs and TRI will be biased upward on the welfare cost and trade impeding effects of NTM policies
- Could be replicated with more refined data (our proxy for standards is rough). We plan to disaggregate the technical measures from the aggregate NTM regime
- Protectionism of NTMs beyond the obvious is empirically elusive