Notes on Detecting the Effects of Non Tariff Measures

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NOTES ON DETECTING THE EFFECTS OF NON TARIFF MEASURES

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Abstract

Alternative approaches to estimating the effects of non-tariff measures (NTMs) on trade flows are discussed and evaluated critically. Recent econometric studies point to three results: (i) NTM restrictiveness measures based on an aggregate of 'core' NTMs are more restrictive than existing tariffs and, because of export composition towards agricultural products, in the aggregate, these 'core' NTMs limit market-access most for low-income countries; (ii) Proxies for individual NTMs, have a negative effect on the volume of bilateral trade for the detailed product under scrutiny; (iii) harmonization of standards is trade enhancing. Case studies confirm several of these patterns, and also that perceived severity of NTMs varies across products and across destinations for a given product. Across broadly-defined imports at the section level, NTMs are more restrictive than the corresponding tariffs with two-thirds of the AVE estimates in the 25%-50% range. Technical regulations and non-automatic licensing are the most used single-NTM measures and the restrictiveness of technical regulations increases with income per capita.

1. Introduction

In the field of growth, the lack of robustness of cross-section studies is now well-documented. This lack of robustness has contributed to the newer diagnostic-oriented approach to policy reform which is suspicious of 'best-practices' where expectations are based on the traditional presumptive approach to reforms ('we know how markets work and here is the list of reforms to be carried out').[1] This diagnosis in the field of the determinants of growth carries over to international trade policy and to the effects of Non-tariff Measures (NTMs[2]) on international trade. Whereas, until recently, NTMs were mostly dominated by QRs or VERs both of which were almost always welfare-reducing and hence 'actionable', with the proliferation of NTMs, this clear-cut diagnosis no longer holds. As a result, it is recognized that detecting the effects of NTMs in view of taking policy measures to eliminate those that are purely protectionist (in the sense of welfare-reducing) is difficult. The diagnosis is complicated by the fact that the effect of NTMs on the volume of trade (and on welfare) is also likely to depend on other behind-the-border (BTB) barriers to trade, themselves difficult to measure and to discern from NTMs (an NTM measure can be amplified if it is on a product also facing a significant BTB measure).

This note reviews the methodologies used to detect the effects of NTMs on imports and offers (partial) new evidence, concentrating on measuring tariff equivalent effects which serve as a (partial) basis for any subsequent welfare analysis. Issues related to the welfare effects and to policy implications are taken up in our companion note. Section 2 reviews critically the different modeling approaches to measuring the effects of NTMs. Section 3 reports the results from the growing number of studies relying on the models reviewed in section 2. These studies draw on the global UNCTAD NTM data base of 2002-04, but also on the rapidly growing data bases on various trade facilitation measures used to measure the importance of BTB. Section 4 completes the paper with additional exploratory tabulations across products and across NTMs. Section 5 concludes.

[1] The huge success of this agnostic approach is exemplified in the recent outburst of randomized control trials for the evaluation of projects and of aid programs. Unfortunately randomized control trials cannot be applied to evaluate the impact of trade policy reforms for lack of natural control groups.

[2] Some make a distinction between an NTM and NTB reserving the use of NTBs as a measure of protection. Previously most NTMs were QRs which explains why the word NTB was often used to encompass all non-tariff measures. It may therefore be preferable to use NTM instead of NTB to underline that the measure may not be necessarily welfare-reducing, but we follow tradition and will, at times use NTB.

2. Model-based Approaches to Detecting the Effects of NTMs

The systematic analysis of the effects of NTMS has focused on evaluating their ad-valorem equivalents (i.e. on tariffs that would reduce imports by the same amount as the NTM in question) and on their effects on the volume of trade. Two modeling approaches have been used in the literature. One draws estimates using the gravity model of trade, often focusing on the effects of NTBs on the volume of aggregate bilateral trade. The other, draws on the factor-endowment-based theories of trade focusing on the volume of trade at the product level where import volumes are correlated with factor endowments, country characteristics, tariffs and various proxies of NTBs. We review briefly each approach.

2.1 The Gravity Approach to NTM measurement

We start with the ubiquitous gravity model, most often used to examine the effects of NTBs. While many applications stick to the gravity equation for the volume of aggregate trade, the interest here is on a comparison of NTM measures at the product level so we formulate directly the disaggregated version (see e.g. Anderson and Van Wincoop, 2004 or Feenstra, 2004). Then, the volume of bilateral trade for good k between i and j is given by:

$$\ln X_{ij}^{k} = a_i + b_j - (1-\sigma)\ln t_{ij}^{k} + \varepsilon_{ij} \qquad (1)$$

where X^k_{ij} represents the export flows of good k from country i to importer j (valued at cif prices), t^k_{ij} represents all (gross) bilateral "trade costs", σ the elasticity of substitution for good-class k, a_i and b_j are country (exporter and importer) fixed effects that capture all characteristics that are specific to each pair (GDPs, population, etc...) and ε_{ij} is a normally distributed error term. The associated trade costs function for good k between i and j, t_{ij}, is expressed as:

$$\ln t_{ij}^{k} = \ln\left(1+T_{ij}^{k}\right) + \gamma \ln NTM_{ij}^{k} + \delta \ln D_{ij} + \sum \theta_n DUM_{ij}^{n} + \nu_{ij} \qquad (2)$$

i.e. trade costs are stipulated to be a function of the tariff rate on product k imported by country j from i, T^k_{ij}, and of an average NTM index of importer j against exporter i, NTM^k_{ij}, the bilateral distance between the economic center of countries i and j, D_{ij}, and a set of control variables (usually dummy variables having the value of 1 if countries i and j share a common land border, an economic integration agreement, are on the same continent, or share the same primary language).

Substituting (2) into (1) yields the model used to predict the effects of NTMs on the volume of bilateral trade. The problems start here. First, the gravity model works better for aggregate trade than for trade at the product-line level. This is important since we are mostly interested in the relative importance of various NTMs by sector of activity or, even better, at the product-level. Such estimates then need to be carried out at the product level where NTMs they differ across categories of products. For example, a technical regulation will imposed on chemical products but not on textiles. This is why the model must be specified at the disaggregated product level.

Second, for a given indicator, NTM^k_{ij}, there is little variation in the data across suppliers to country j for a given product since when an importer specifies an NTM on a product, it is usually the same for all exporters. Thus there is (even) less bilateral variation in NTMs than in tariffs and this makes identification of the effects of NTMs much more difficult. With very little variation in bilateral tariffs, and even less in the indicator of bilateral barriers, estimates will be instable, suffering from multicollinearity.

Thus, with NTMs mostly defined multilaterally (the same barrier is applied by country j on its imports whomever the exporter i) and given the limited data available on NTMs, one can only estimate an NTM restrictiveness by importing country, not bilaterally, especially when using the NTMs tabulated from the WITS data base.[3] Going a step further, since the initial NTM variable is importer-specific, this dramatically complicates the interpretation of the estimated coefficient for the "bilateral" NTM variable. To take an example, drawn from Anderson et al. (2008) who use this framework, they state that "the coefficient for *bilateral* NTB variables can be interpreted as -for some given of NTBs multilaterally – the effect on a particular pairing of countries of being a member of some group *m*".[4] Moreover, there are further econometric problems in the data as missing values may not reflect the absence of an NTM on that particular tariff line.

In sum, even though it has been often used (see the review of the literature below), the gravity equation is not very informative if one is interested to compare the effects of different types of NTMs on a large panel of countries at a disaggregated product level.

2.2 The Factor-endowment-based Approach to NTM measurement

Since one is interested in the effects of NTMs at the product level, is it natural to use as a benchmark a model that isolates the determinants of the aggregate (rather than bilateral) volume of product trade and then to add on the effects of tariffs and NTMs. This approach initiated by Leamer (1990) has been extended recently by Kee et al. (2009) to the estimation of NTMs. Drawing on an earlier study (Kee et al., 2009) in which they estimate the elasticity of demand for imports at the HS-6 product line level), they estimate the quantity-impact of NTBs for good k as:

$$\left[\ln m_{k,i} - \varepsilon_{k,i}\ln\left(1+t_{k,i}\right)\right] = \alpha_k + \sum_r \alpha_k^r C_i^r + \beta_k NTB_{k,i} + \sum_r \beta_k^r C_i^r NTB_{k,i} + \kappa_{k,i} \qquad (3)$$

where
$m_{k,i}$ is the import value of good *k* in country *i*;

[3] Even with a large survey (over 10,000 respondents) such as the one designed by ECORYS in their study of EU/US NTBs, Anderson et al. (2008) explain that due to a small response numbers in each bilateral response cell, a "higher quality measure of the degree of the perceived NTBs faced by an exporter in any representative country i for export to country j was obtained by averaging importer j responses across all exporters".

[4] Anderson et al. (2008) are interested in the effects of NTBs in a two-region world (NAFTA and European Economic area). They conclude that their estimated coefficient on the NTB dummy delivers the "surcharge faced by EU exporters to NAFTA *relative to a baseline NTB that implicitly affects all exporters to j alike"* which is not very useful for our purpose.

α_k are tariff line dummies that capture any good-specific effect;

$t_{k,i}$ is the *ad-valorem* tariff on good k in country i;

$\varepsilon_{k,i}$ is the import demand elasticity (obtained extraneously);

C_i^r are *r* country-specific variables (agricultural land on GDP, capital on GDP and labor on GDP for relative factor endowments and GDP for economic size, a dummy for island and the average distance to world markets for geography);

$NTB_{k,i}$ is a dummy variables indicating the presence of a NTB for line k imported by i;

$\beta_{k,i}$ the parameter that capture the impact that the NTB imposed on good k in country i has on the corresponding imports.

Equation (3) is estimated at the HS-6 tariff line level. To make NTBs comparable between them and comparable with ad-valorem tariffs, Kee et al. transform the quantity impact into an ad-valorem price-equivalent (AVE) defined as $AVE = \partial \ln p^d / \partial NTB$, where p^d is the domestic price. They show that the ad-valorem equivalent (AVE) of the NTB imposed on good k by country i is given by:

$$AVE_{k,i} = \frac{e^{\hat{\beta}_{k,i}} - 1}{\varepsilon_{k,i}} \tag{4}$$

with $\hat{\beta}_{k,i}$ obtained from the estimation of (3). AVEs are then computed for each country at the HS-6 level and aggregated up to an aggregate measure.

This method has several advantages over the gravity approach. First, it delivers directly the sought-after tariff-equivalent of NTBs (see (4)). Second, suppose that one adds indices of trade facilitation as in e.g. Shepherd and Wilson (2008) to the NTB indices. Then one can compare directly the relative effects on imports of removing, tariffs, versus removing NTBs, and one can also compare the effects of removing the aggregate of NTBs and tariffs versus removing BTB measures. Third, insofar as the elasticity of imports is taken extraneously to the estimation, the endogeneity of imports is, at least, partly resolved.

Once one goes beyond the traditional approach relying on coverage and frequency indices, this approach is likely to be more informative than the gravity-based approach which has dominated the evaluation of the effects of NTBs (see table 1 below).

The approach, however, also has several shortcomings. First, idiosyncratic measurement errors, likely to cancel out at the aggregate level, will be magnified in at the HS-6 product-line level. Second, it is difficult to introduce relevant control variables (beyond dummy variables) at the disaggregated level. Indeed, at the HS-6 level, there is nothing else than tariffs and trade volumes. Third, the estimate of the price elasticity of demand for imports, which is essential for computing the AVE, will likely change in magnitude with the sample period.[5]

[5] For example, textiles and clothing, subject to a large number of NTMs in the 6200 (quotas) and 8100 (technical regulations) categories of NTBs, has witnessed a significant change since 2002-04 when the NTM data were last collected and the price elasticity of demand for imports estimated in Kee et al. (forthcoming).

3. Econometric Estimates of the Effects of NTMs

The extensive use of gravity equation in the assessment of specific NTMs is due to its simplicity. Since the sign of the variables that capture the effect of the NTM in the regression is not constrained, it is possible to also capture the trade-enhancing effect of regulations when they act as standards that facilitate trade. In certain cases one can also measure import elasticities with respect to variations in the restrictiveness of the standards themselves when there is some variability across countries or over time (e.g., the level of chemical residues, of aflatoxins, etc.).

Table 1 summarizes the results from some of the studies on NTMs and BTBs (when these are included in an appraisal of NTMs). As indicated by the asterisks, the overwhelming majority of studies are based on the gravity model. The table distinguishes between studies that aim at capturing the effects of NTMS on all trade flows from those that relate to specific sectors (agriculture, electronics, etc…). Three relatively robust conclusions emerge.

1. NTMs are more restrictive than tariffs and low income countries face more restrictive market access conditions. Kee et al.(2009) and Hoekman and Nicita (2008) find that NTMs generally restrict trade more than tariffs (i.e. the estimated AVEs are higher than the observed tariffs at the product line level).[6] Because of the composition of trade towards agricultural products (where the aggregate of trade restrictions are estimated to be the highest), low-income countries face more restrictive market access conditions than other countries. Note however (see discussion in section 2 above) that the NTB restrictiveness index is an aggregate of the 5 'core' NTMs (Technical regulations, Quantity restrictions, Monopolistic measure, Prices control measures and agricultural domestic support), so that it is not possible to know which of these NTMs is the most restrictive.

2. Subject to the included controls, NTMs restrict bilateral trade volumes. The bulk of the studies in table 1 concern product-specific trade flows. All the studies find that the particular NTM/NTB proxy used has a negative impact on the volume of bilateral trade in the product under scrutiny. While in each case, this correlation may be capturing the effects of omitted variables correlated with the NTM, because all the studies (including several that have not been published) find systematically that NTMs reduce the volume of trade. For example, the studies show that the SPS and TBT measures in agriculture have a significantly negative impact on the EU imports of agricultural products.

[6] This pattern would not be robust if the NTB dummy were systematically correlated positively with an omitted variable in which case the estimated AVE would be upward-biased.

Table 1. Model-based estimates of NTBs

Authors (year)	NTB/NTM studied	NTB/NTM proxy introduced in the gravity equation	NTB/NTM database	Products trade flows	Sample	Main Results
ALLTRADE FLOWS						
Hoekman and Nicita (2008) **	Non-Tariff Barriers	1 variable: NTB restrictiveness index (OTRI-TTRI) ***a/***	Kee, Nicita and Olarreaga (2009) ***b/***	Total trade flows (aggregated)	104 importers and 115 exporters for the year 2006	AVEs of NTBs are larger than corresponding tariffs at the HS-6 level. Other things equal, a 10% reduction in NTB restrictiveness increases import volume by 1.8%.
Moenius (2004)*	International and Country-specific standards	3 Count variables: the number of shared standards in year t, industry k between countries I and j, the number of country-specific standards in the importing (exporting) countries.	*PERINORM* database = German Deutsches Intitut fur Normung + Agence Francaise de Normalisation + Bristish Standards Intitution	Trade in 471 industries	12 (OECD) countries over 1980-1995	Bilaterally shared standards are favorable to bilateral trade volumes. Country-specific standards of the importer reduce imports for agricultural products while they increase trade for manufacturing products (interpretation: standards offer valuable information increasing demand).
PRODUCT-SPECIFIC TRADE FLOWS						
Disdier and Fontagné (2008)*	EU authorization regime for biotech products (GMOs)	2 dummies: one equals to 1 for products exported by j on with the EU imposes in t a moratorium and/or a product-specific measures; one equals to 1 if country i adopts in t a national safeguard measures on products exported by j.	*Agbios* database completed with scrutinity of legislation.	Trade flows of Maize, cotton and oilseed rape trade flows (HS6, 7 tariff lines)	19 main exporters towards 39 main importers over 1994-2005	EU GMO measures reduce exports of Argentina, Canada, US and Brazil for the affected products, with effects varying across products and complainants. Importers other than the EU (New Zealand, Switzerland and Norway) have also implemented measures on OGMs that negatively affect their imports.
Disdier, Fontagné, and Mimouni (2008)*	Sanitary and Phyto-Sanitary (SPS) measures and Technical Barriers to trade (TBT) on	3 variables: a dummy equals to 1 if the importing country notifies at least one barrier; a frequency ratio; an *ad-valorem* equivalent of SPS and TBT.	*UNCTAD* for the 2 first variables and Kee, Nicita and Olarreaga (2009) for the third ***c/***	Trade flows of agricultural and food industry products (HS4, 690 tariff lines)	183 exporters and 154 importers, for 2004	SPS measures and TBTs implemented by OECD countries significantly reduce their imports of agricultural products from developing countries but do not affect trade between OECD members. European imports are more negatively influenced by SPS and TBTs than imports of other OECD countries.

	agriculture					

Table 1. (continued) Model-based estimates of NTBs

Authors (year)	NTB/NTM studied	NTB/NTM proxy introduced in the gravity equation	NTB/NTM database	Products trade flows	Sample	Main Results
Otsuki, Wilson and Sewadeh (2001a)*	Sanitary and Phyto-Sanitary (SPS) measure on food: Aflatoxin EU standards	1 variable: the maximum aflatoxin level imposed on food products import by EU members on countries i in 1995.	*FAO survey* of mycotoxin standards on food and feed stuffs (1995)	Trade flows of "cereals" and "fruits, nuts and vegetables" (SITC)	EU-15 imports from 9 SSA countries over 1989-1998	A 10 % reduction of maximum allowable level of aflatoxin in European countries reduces SSA exports of cereals by 11%, and by 4.3 % for fruits, nuts and vegetables. (Groundnuts are found to be highly sensitive to aflatoxin standards (a 13% reduction)).
Otsuki, Wilson and Sewadeh (2001b)*	Sanitary and Phyto-Sanitary (SPS) on food: Aflatoxin EU standards	1 variable: the maximum aflatoxin level imposed on groundnut products import by EU members on countries i in 1995.	*FAO survey* of mycotoxin standards on food and feed stuffs (1995)	Trade flows of "groundnut oil" and "groundnuts for oilseeds" (SITC)	EU-15 imports from 9 SSA countries over 1989-1998	A 10 % reduction of maximum allowable level of aflatoxin in European countries will lead to an 11% reduction of Sub-Saharan African exports of edible groundnuts, whereas the aflatoxin regulation appears not to affect trade in groundnuts for oilseed. The negative impact of standards increased for edible groundnuts and oilseeds overtime, reflecting more stringent requirements for inspection imposed in Europe.
Czubala, Sheperd, and Wilson (2009)*	EU products standards on textile and clothing	2 Count variables: the number of EU standards internationally harmonized with the ISO standards and the number that are not	World Bank EUSDB ***d/***	Trade flows of clothing, fabrics and fibres (HS2, 14 tariff lines)	EU-15 imports from 47 SSA countries over 1995-2003	Non-harmonized standards reduce Sub-Saharan African exports of textile and clothing. EU standards that are internationally-harmonized to ISO standards are less trade restricting.
Portugal-Perez, Reyes and Wilson (2009)*	EU product standards in electronics	2 Count variables: the number of EU standards internationally harmonized with the IEC standards and the number that are not	World Bank EU Electro-technical Standards Database (*EUESDB*)	Trade in 3 categories of electronic and related products	EU Imports from 131 countries over 1990-2006	Internationally-harmonized European standards expand EU imports of electronic products while European standards not aligned with international norms have a lower effect on EU imports, in some cases a negative effect (depending on the electronic product considered).

Table 1. (end) Model-based estimates of NTBs

Authors (year)	NTB/NTM studied	NTB/NTM proxy introduced in the gravity equation	NTB/NTM database	Products trade flows	Sample	Main Results
Moenius (2006)*	Product standards in electrical goods	4 variables: a dummy equals to 1 if countries i and j have exactly the same voltage + the same 3 count variables than in Moenius (2004).	Kropla (2006) for electricity specification and *PERINORM* for standards	Trade in 471 industries sorted into electricity dependent products or not.	12 (OECD) countries over 1980-1995	Voltage harmonization is positively associated with the volume of trade in the selected industries. Both national and international standardization promotes trade flows in electricity-dependent products and, on average, electricity-dependent products generally benefit more from standardization than other manufactured products.
Mantovani and Vancauteren (2003)*	EU environmental regulations	1 variable: indicator of the industry k -expenditure on environmental protection of the exporting country i	*EUROSTAT* compiled with information of the CEC (1998)	Trade flows of 18 sectors (NACE - 3d)	EU-15 and 6 CEEC over 1995-1998	A significant negative impact on trade of compliance costs associated with EU environmental standards.

Notes:
* Estimates based on a gravity-model.
** Estimates bease on an endowment theory of trade.
a/ difference between the tariff trade restrictiveness index (TTRI), capturing only tariffs, and the overall trade restrictiveness index (OTRI) including the effect of both tariff and NTMs (see Kee, Nicita and Olarreaga, 2009).
b/available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:21085342~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html
c/available at http://team.univ-paris1.fr/teamperso/fontagne/data.htm
d/available at http://go.worldbank.org/6OEYNCYSD0 and http://www.wto.org/english/tratop_e/tbt_e/tbt_e.htm

Source: Authors' compilation from different studies (see references)

3. Harmonization of standards increase bilateral trade flows. Bilaterally shared standards and harmonized standards, significantly increase trade or, at least are less trade-restricting than non-harmonized standards. This intuitively plausible result is drawn from a relatively small (but growing) number of studies and needs further verification to acquire robustness.

This said, as pointed out earlier, a major problem for virtually all the product-specific gravity studies is that the NTM variables are always importer-specific. This means that country-specific effects necessary to capture time-invariant omitted factors that influence the volume of bilateral trade cannot be included in the estimation, thereby aggravating omitted-variable bias (see discussion in section 2.2). [7]

4. The Distribution of NTMs and of their Ad-valorem equivalents

We conclude this note by examining patterns of NTMs and their average tariff equivalents. We draw on the estimates of Kee et al. (2009) who report the aggregate ad-valorem equivalent of NTMs to see if any patterns emerge when the NTM equivalents are extended to individual NTMs. We also inspect the patterns of AVEs and tariffs across NTMs.

4.1 The Distribution of NTMs

We start with a description of the raw data and the distribution of NTMs at the tariff-line level. According to the TRAINS classification, the NTM dummy used by Kee at al. (2009) includes then 4 types of NTMs at the 1-digit level (3000: Price control measures), 10 types at the 2-digit level (3100: Administrative pricing) and 153 types at the 4-digit, most disaggregated, level (3110: Minimum import prices. (Table A1.1 in annex 1 gives an exhaustive list detailing the NTMs according to these codes).[8] Kee et al. sample covers NTM's AVE estimates for 91 countries (including 21 HI-OECD countries) and 4,961 HS-6 product categories (see Kee et al.'s table 3 for the list of countries and their corresponding average AVE of core NTB, pages 188-189).

Following the TRAINS-WITS classification of NTMs, we start with a description of the distribution of these NTMs across HS-6 tariff lines over the sample of 93 countries used by Kee et al. (2009). This distribution of NTMs is given in table 2. Column1 give the frequency distribution when NTBs are defined at the 1-digit NTM code level which corresponds to the 'core' definition of the NTB variable used by Kee et al. when they estimate equation(3).

[7] See a also in Carrère and De Melo (2009) a detailed summary of case study ' results which are informative and useful, partly because they confirm some of the patterns emerging from the larger earlier data set where it is apparent that technical regulations represent the most frequent form of NTMs (see section 4).

[8] For comparison purposes, the new database under construction in the joint ITC-UNCTAD project should give measures for 240 NTMs for 50 countries (of which 20 would be high-income OECD countries) by 2011. See details in Carrère and De Melo (2009).

At the 1-digit NTM classification level, the NTM dummy variable recorded at the HS-6 tariff line level then takes the value 1 when a given country imposes on good k at least one of the four following NTMs:

- Prices control measures (TRAINS code 3100, 3200 and 3300);
- Quantity restrictions (TRAINS code 6100, 6200 and 6300);
- Monopolistic measures (TRAINS code 7100, 7200 and 7900);
- Technical regulations (TRAINS code 8100)

Table 2 shows that 74% of the HS-6 tariff lines only have one 'core' NTM and 25% of the lines have two NTMs. Moving to a more disaggregated level, the percentage of tariff lines with only one NTM falls, but not by much and at the most disaggregated level of NTM definition, 39% of the tariff lines only have one NTM.

Table 2. Frequency Distribution of the number NTBs per HS-6 product categories (HS-6 products for 93 countries, over 2002-04)

1-digits	Freq.	Percent	Cum.	2-digits	Freq.	Percent	Cum.	4-digits	Freq.	Percent	Cum.
1	91,995	73.76	73.76	1	84,116	67.44	67.44	1	49,176	39.43	39.43
2	31,151	24.98	98.74	2	32,140	25.77	93.21	2	33,418	26.79	66.22
3	1,562	1.25	99.99	3	7,909	6.34	99.55	3	20,801	16.68	82.9
4	15	0.01	100	4	538	0.43	99.98	4	7,331	5.88	88.78
				5	20	0.02	100	5	4,152	3.33	92.11
								6	4,845	3.88	95.99
								7	2,190	1.76	97.75
								8	1,288	1.03	98.78
								9	810	0.65	99.43
								10	291	0.23	99.66
								11	41	0.03	99.7
								12	196	0.16	99.85
								13	146	0.12	99.97
								14	35	0.03	100
								15	3	0	100
Total	124,723	100			124,723	100			124,723	100	

Each row gives the number of lines with NTBs at the defined level (for example at the2-digit level, 6.34% percent of HS-6 tariff lines have 3 NTBs).
Notes: NTB Digits classification corresponds to the use of digits in the NTB data classification. See table A1.1 for definition of 2-digit codes and figure 2 for definition of 4-digit NTB codes. Following is an example of the level of detail at 1, 2 and 4 digit level for the category Price and control measures:
1-digit: 3000 Price control measures
2-digit: 3100 Administrative pricing
4-digit 3110 Minimum import prices
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data

This general lack of multiple NTMs at a disaggregated level justifies extending the global measure of Kee et al. to compute the AVE for each core NTB. Because for 74% of the AVE estimates (at the country/HS6 product level), there is only one underlying NTB at the 1-digit level (and then, for 26%, the AVE estimates includes the combined impact of at least 2 NTBs)[9], then by merging the initial NTBs file from TRAINS-WITS (containing information on the different types of NTBs as described in table A1.1) with Kee et al.'s AVE

[9] We thank the authors for giving us access to their database.

database[10], we can isolate AVEs for each type of NTMs, for at least 74% of cases.[11]

This said, to come up with a "classification" of the AVEs of different types of NTMs one would need to have simultaneously different types of NTMs for a given product line for the same importing country. This is not possible now, but might be possible with the new data base under construction. Then one could rerun the estimation of Kee et al. (2009) using dummies for each NTM and then one could compare the resulting estimated AVEs for a given country/product. With the data currently available, this can only be done for 26% of the data where more than one NTM is included.

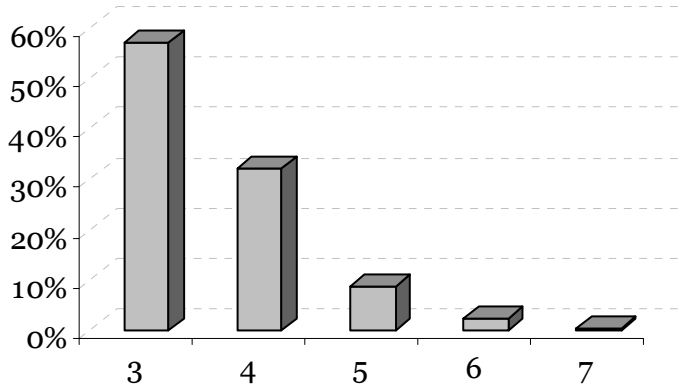
Pending new data, one can exploit the cross-country dimension of the sub-sample of the 70% of observations where the estimated AVE can be linked to the corresponding NTB. Actually, as reported in figure 1, for a given product (defined at the HS6 level), all countries do not impose the same 2-digit NTB. Indeed, over the 4,961 HS-6 product lines, 60% face 3 different 2-digit NTMs across the panel and 32% 4 NTMs. Hence, there is some heterogeneity across countries at the HS-6 level which allows us to look for different patterns of restrictiveness across NTMs at the product level. [12]

[10] Available at http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:21085342~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

[11] For instance, in Kee et al.'s (2009) sample, estimates for the Brazil evidence an NTBs's AVE of 1.08 for the HS6 products "320810" and of 1.02 for the product "821192". The TRAINS-WITS database indicates the presence of a NTB of type 6300 (Prohibitions) imposes by the Brazil on product "320810", of type 8100 (Technical regulations) on product "821192". We therefore attribute the Kee at al.'s AVE estimates to the corresponding NTB. However, in the case for instance of product "291249", 3 NTBs are imposed by the Brazil (6100, 6300 and 8100). Then, the corresponding AVE of 1.74 can not be decomposed in this case into each components of the "core" NTB dummy.

[12] This search should be prefaced by two caveats. First, the NTMs include two data bases, TRAIN-WITS and the EU standard Database which does not report information on the underlying "core" NTMs. Hence we cannot decompose the AVE according to the classification reported in table A1.1. While this represents only 0.06% of the AVE estimates reported in the Kee et al.'s database for non-EU countries but, since 90% of the information from that data base concerns NTMs imposed by the EU, we can only are enable to analyze the underlying NTBs of the 38% of the AVE computed for the EU. Hence, interpretation concerning EU's NTB is limited. Second, estimates are for the years 2002-2004 with data on "core" NTBs for 1999-2001 depending on the country (see their table 1 page 184-185 for the year per country in the database).

Figure 1. Distribution over the 93 countries of the number of different 2-digit NTB on a HS6 product lines



Note: computation on the 84,116 observations having only one type of NTB 2-digits per lines, see table A1.1.
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

4.2. AVE patterns for single-NTM products

We stick with the 2-digit NTM classification level and restrict the sample to HS-6 products with a single NTM (this includes 84,116 observations, see table 3) so that we can interpret the corresponding AVE without ambiguity. The results are shown in table 3 for the 8 NTMs applied in our sample.

Table 3. Frequency Distribution of single-NTM AVEs (HS-6 products, 93 countries, for 2002-04)

2-digits	Freq.	Percent	Unweighted average		Import-weighted average	
			AVE	Tariff	AVE	Tariff
3100	50	0.06%	36.7%	16.9%	19.3%	14.4%
3200	0	-	-	-	-	-
3300	9	0.01%	40.6%	76.7%	15.8%	153.5%
6100	21,255	25.27%	38.1%	10.5%	33.9%	7.7%
6200	5,972	7.10%	42.6%	4.1%	32.2%	3.1%
6300	2,320	2.76%	46.4%	8.7%	20.8%	11.8%
7100	251	0.30%	39.8%	24.6%	39.9%	15.1%
7200	0	-	-	-	-	-
7900	0	-	-	-	-	-
8100	54,259	64.50%	43.3%	15.9%	25.6%	7.2%
Total	84,116	100%				

Note:

- Computation on the 84,116 observations having only one type of NTB 2-digits per lines, see table A1.1. Definition of NTB codes at the 2-digit level:

3100 *Administrative pricing* — *6200* *Quotas*
3200 *Voluntary export price restraint* — *6300* *Prohibitions*
3300 *Variable charges* — *7100* *Single channel for imports*
6100 *Non-automatic licensing* — *8100* *Technical regulations*

Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

The most frequently used NTM is "Technical regulation" (8100) followed by "Non-automatic licensing" (6100). Countries do not use "voluntary export price restraints" (3200) and use very exceptionally "variable charges" (3300) and "other price control measures".[13] A more detailed description is provided in figure 2 which shows that loss of information by aggregation is confined to "non-automatic licensing" (6100) and "technical regulations" (8100).

Three conclusions emerge from inspecting these AVEs at the NTM level.

1. The distribution of AVEs is narrow with most NTM having an AVE around 40%. This range of estimates at the product-line is narrow and probably underestimates the true variance in estimates. This could be due to our using all estimates including those that are not statistically significant. It would be useful to compare ranges when more stringent criteria are imposed on the estimates. Also, next to prohibitions, the highest AVE estimate is for 8100.[14] Interestingly, this ranking corresponds to the subjective answers obtained from the interviews summarized in section 4.

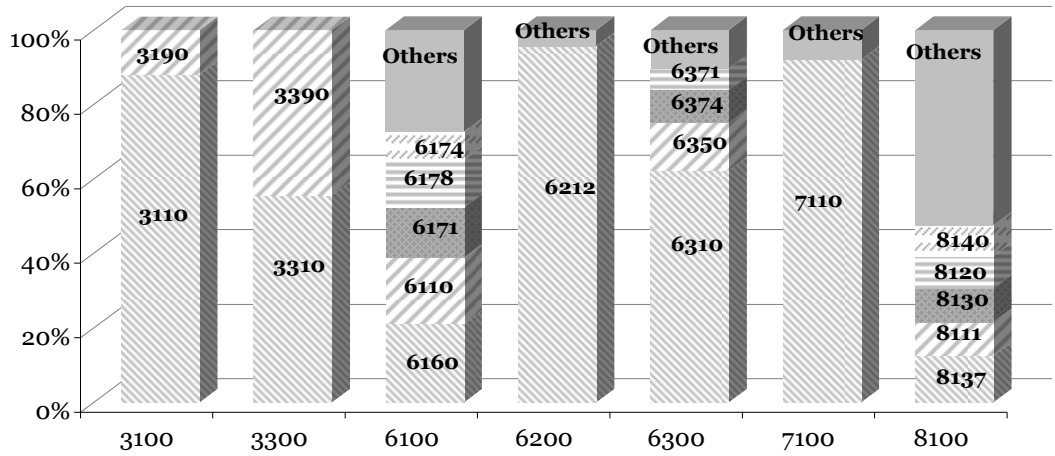
2. Across all NTMs, the restrictiveness of the measure on import volumes is greater than the corresponding tariff on that product line. Except for variables charges (3300), this holds regardless of the choice of weighing scheme.

3. NTMs are associated with smaller import volumes. This is evident from a comparison of unweighted and import-weighted AVEs. This confirms that imports are endogenous to NTMs and tariffs.

4. The cumulative distribution of AVE estimates (see figure 3) suggests that two thirds of the AVE estimates at the product line level are in the 25%-50% range.

[13] This is not surprising since the Uruguay Round agreements generally eliminated all VERs (and the MFA-related quotas in 2005).
[14] Note that, as explained by Kee et al. (2009), because of the methodology used to adapt to the zero-one nature of each NTM, the AVE should be interpreted as the marginal contribution of the corresponding NTM after controlling for the tariff level.

Figure 2. Decomposition 2-digit NTMs into corresponding 4-digit NTM components (HS6 products, 93 countries, for 2002-04)



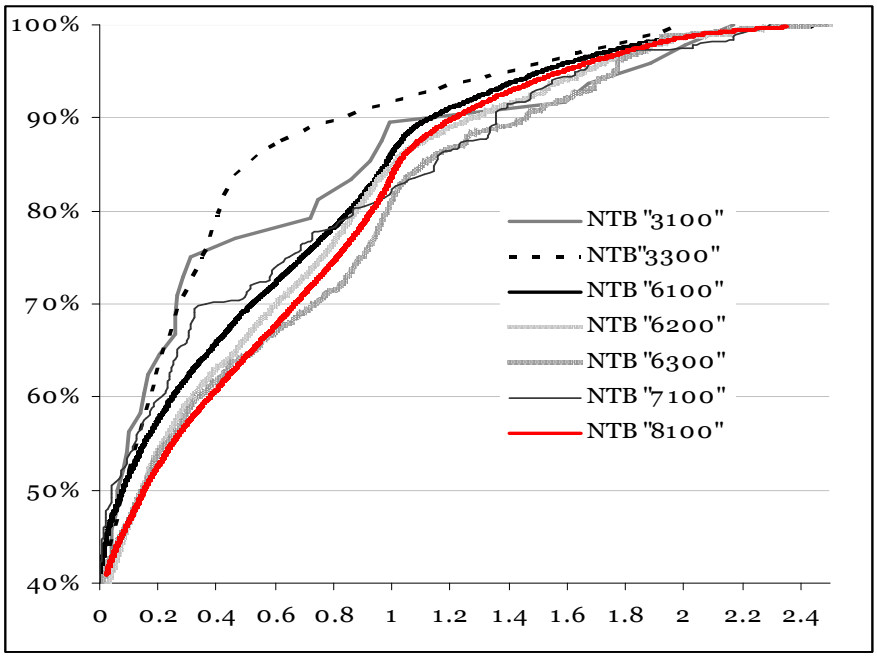
Note:

- Computation on the 84,116 observations having only one type of NTB 2-digits per lines, see table A1.1.
- Definition of corresponding codes:

3110	Minimum import prices	6310	Total prohibition
3190	Administrative pricing n.e.s.	6350	Import diversification
3310	Variable levies	6371	Prohibition to protect human health
3390	Variable charges n.e.s.	6374	Prohibition to protect environment
6110	Licence with no specific ex-ante criteria	7110	States trading administration
6160	Licence combined with or replaced by special import authorization	8111	Product characteristics req. to protect human health
6171	Prior authorization to protect human health	8120	Marking requirements
6174	Prior authorization to protect environment	8130	Labelling requirements
6178	Prior authorization to ensure national security	8137	Labelling requirements to ensure human safety
6212	Allocated to exporting countries	8140	Packaging requirements

Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

Figure 3. Cumulative Distribution of each NTB 2-digits' AVE
(HS6 products, 93 countries, for 2002-04)



Note: Computation on the 84,116 observations having only one type of NTB 2-digits per lines, see table A1.1.
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

Table 4 disaggregates the distribution of NTBs and corresponding AVEs at the product section level (HS1). Several patterns appear. First, textiles (section 11), a sector that is highly protected world-wide, simultaneously includes the highest number of the 3 types of NTBs: Technical regulation (8100), Quotas (6300) and Prohibitions (6300) with high corresponding AVEs (ranging from 35% to 48%).[15]

Second, the highest count for "Non-automatic licensing measures" (6100) applies for products of the chemicals or allied industries (section 6). This section is the only one including the 7 types of NTBs on its HS-6 lines.

Third, machinery and mechanical appliances (section 16) face simultaneously some of the highest AVE about (49%) estimates for "technical regulations" (8100), but also of other NTMs (i.e. for 64% for prohibitions (6300), and 46% for non-automatic-licensing (6100).[16]

[15] The data are for 2002-2004 so they still include quotas measures on textile that have now been abolished.
[16] Since the NTMs are not codified continuously and since the same import elasticity applies to all NTMS, the variations in estimates, which are small, only capture composition effects, i.e. different patterns of NTMs across country-product pairs.

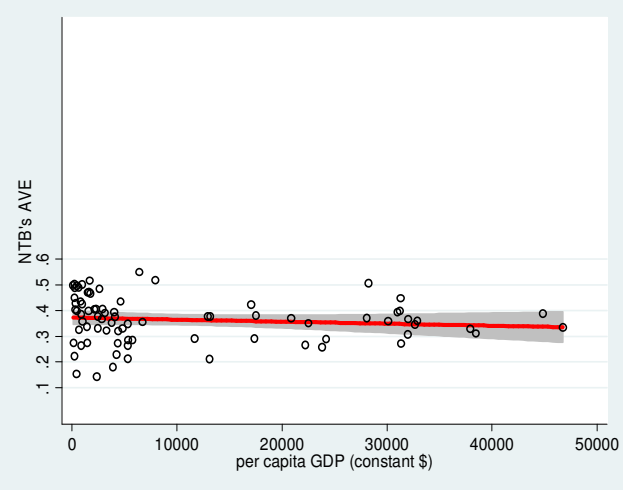
Table 4. Frequency and unweighted AVE by 2-digit NTB type by product Section

	3100		3300		6100		6200		6300		7100		8100	
(Chapter 1 - 5) - Section I-Live Animals; Animal Products	-	-	*4*	20%	*2099*	43%	*19*	54%	*89*	38%	-	-	*4085*	51%
(Chapter 6-14) - Section II-Vegetable Products	*6*	54%	-	-	*1581*	39%	*29*	55%	*43*	55%	*24*	31%	*5374*	44%
(Chapter 15) - Section III-Animal or Vegetable Fats and Oils	-	-	*3*	104%	*223*	42%	-	-	*16*	55%	*2*	11%	*736*	57%
(Chapter 16 -24) - Section IV-Prepared Foodstuffs; Beverages, Tobacco	*1*	99%	*1*	35%	*652*	37%	-	-	*45*	22%	*78*	36%	*4011*	51%
(Chapter 25 -27) - Section V-Mineral Products	-	-	-	-	*663*	45%	*10*	22%	*56*	35%	*56*	76%	*1004*	44%
(Chapter 28 -38) - Section VI-Products of the Chemicals or Allied Industries	*1*	14%	*1*	0%	*4117*	34%	*79*	15%	*108*	38%	*71*	23%	*5773*	37%
(Chapter 39 - 40) - Section VII-Plastics and Rubber and Articles Thereof	*3*	3%	-	-	*506*	42%	*8*	43%	*38*	64%	-	-	*1619*	46%
(Chapter 41 - 43) - Section VIII-Raw Hides and Skins, Leather, Articles of animal gut	-	-	-	-	*381*	39%	-	-	*7*	84%	-	-	*756*	42%
(Chapter 44 -46) - Section IX-Wood and Articles of Wood	-	-	-	-	*418*	37%	*2*	56%	*7*	20%	-	-	*761*	44%
(Chapter 47 -49) - Section X-Pulp of wood or of other Fibrous Cellulosic Material; Paper	*2*	10%	-	-	*338*	33%	-	-	*24*	45%	*1*	32%	*1271*	36%
(Chapter 50 -63) - Section XI-Textile and Textile Articles	*1*	46%	-	-	*2512*	35%	*5671*	43%	*1509*	48%	-	-	*9829*	35%
(Chapter 64 -67) - Section XII-Footwear, Headgear, Umbrellas, etc.	*10*	44%	-	-	*285*	47%	*65*	25%	*24*	49%	-	-	*607*	41%
(Chapter 68 -70) - Section XIII-Articles of Stone, Plaster, Cement, Asbestos, etc.	*1*	0%	-	-	*265*	37%	*14*	37%	*16*	44%	-	-	*1046*	46%
(Chapter 71) - Section XIV-Natural or Cultured Pearls, Precious Stones, etc.	-	-	-	-	*396*	22%	*4*	na	*19*	na	-	-	*330*	11%
(Chapter 72 -83) - Section XV-Base Metals and Articles of Base Metal	*18*	35%	-	-	*1537*	34%	*4*	38%	*60*	39%	*1*	65%	*4295*	43%
(Chapter 84 - 85) - Section XVI-Machinery and Mechanical Appliances; Electrical Eq.	-	-	-	-	*2641*	46%	*18*	50%	*56*	64%	-	-	*8044*	49%
(Chapter 86 - 89) - Section XVII-Vehicles, Aircraft, Vessels, Transport Equipment	*6*	41%	-	-	*1056*	36%	*33*	27%	*96*	39%	*3*	74%	*1025*	38%
(Chapter 90 - 92) - Section XVIII-Optical, Photographic, medical Instruments	-	-	-	-	*717*	35%	*2*	59%	*38*	42%	*1*	0%	*2376*	42%
(Chapter 93) - Section XIX-Arms and Ammunition; Parts and Accessories thereof	-	-	-	-	*528*	25%	*13*	19%	*47*	21%	*14*	20%	*24*	18%
(Chapter 94 - 96) - Section XX-Miscellaneous Manufactured Articles	-	-	-	-	-	-	-	-	-	-	-	-	-	-
(Chapter 97 - 98) - Section XXI-Works of art, Collectors' Pieces and Antiques	*1*	0%	-	-	*340*	49%	*1*	0%	*22*	80%	-	-	*1293*	53%

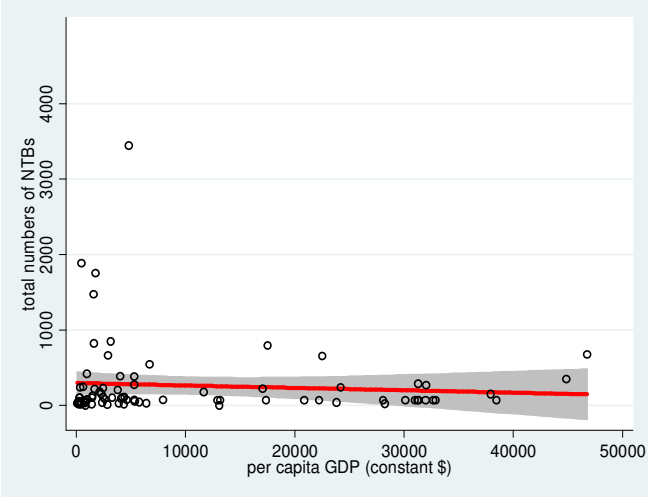
Note: Each cell includes the number of NTBs followed by the corresponding AVE. For example, textiles have 9829 NTBs of type 81 (technical regulation) with an average tariff equivalent (AVE) of 35%.
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

Figures 4. Ad-valorem equivalent of NTMs and per capita income (4a) and NTM count per country (4b)
(Simple average over HS-6 products per country, for 2002-2004)

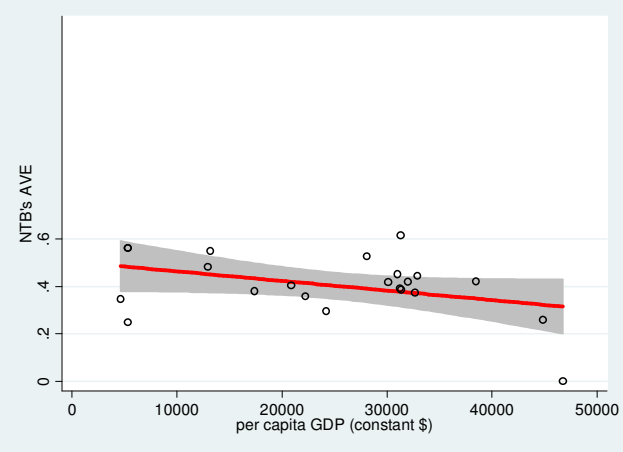
4a. Non-automatic Licensing (6100)- AVE



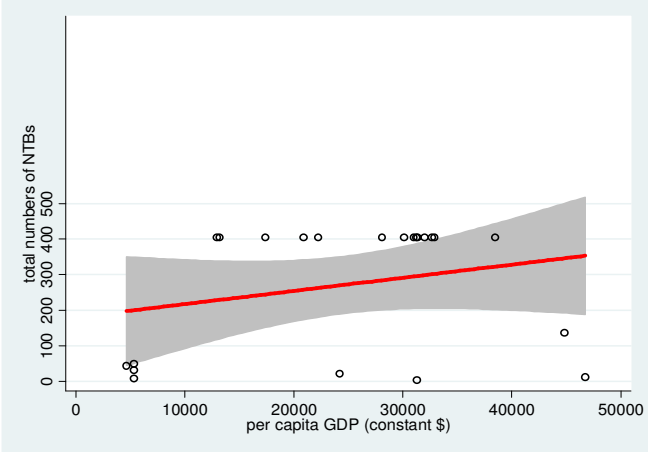
4b.Non-automatic Licensing(6100) - Numbers



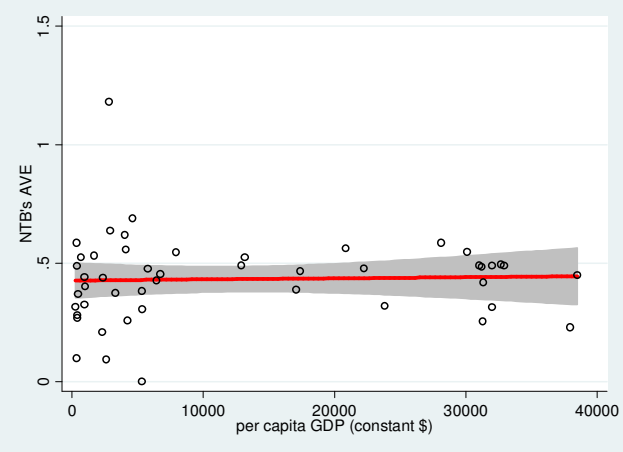
4c. Quotas (6200) - AVE



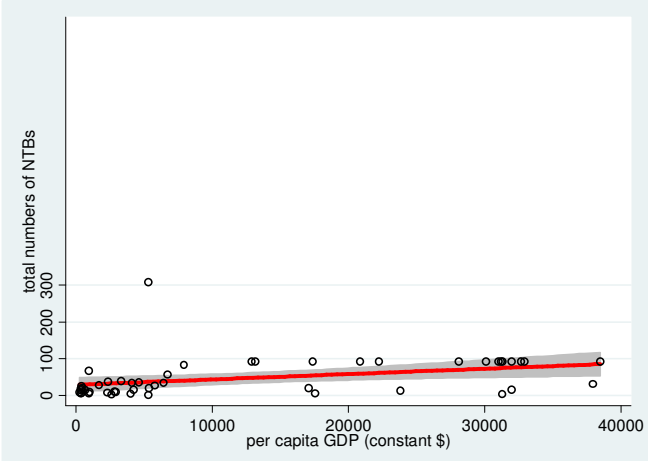
4d. Quotas (6200) - Numbers



4e. Prohibitions (6300) - AVE



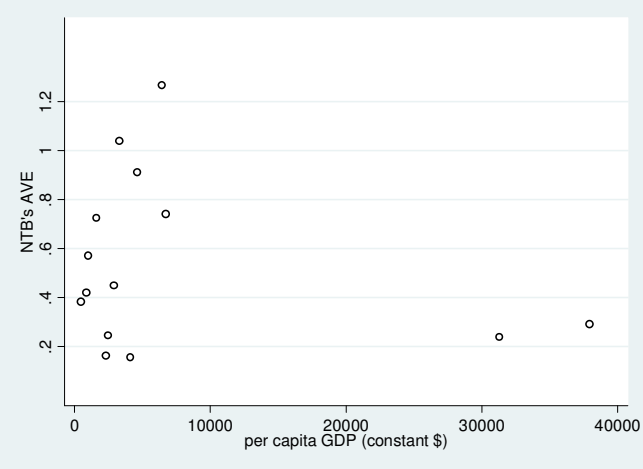
4f. Prohibitions (6300) - Numbers



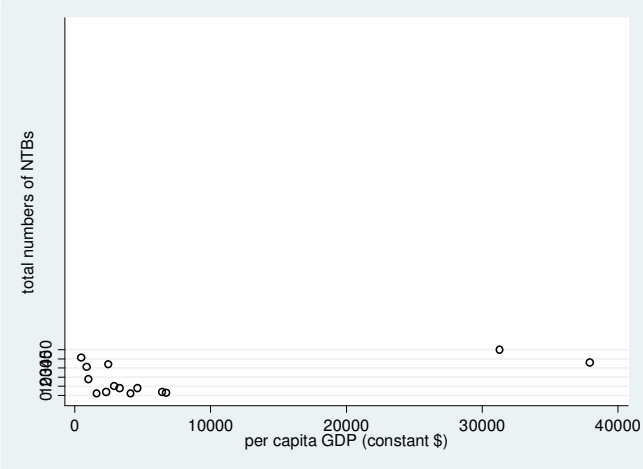
Note: Computation based on 2-digit NTM classification level
lines: fitted values with the corresponding 95% Confidence Interval (gray area).
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

Figures 4 (continued). Ad-valorem equivalent of NTMs and per capita income
(Simple average over HS-6 products per country, for 2002-2004)

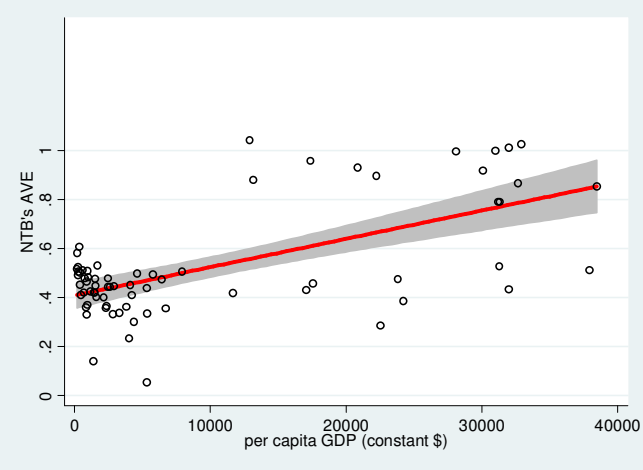
4g. Single Channel for imports (7100) - AVE



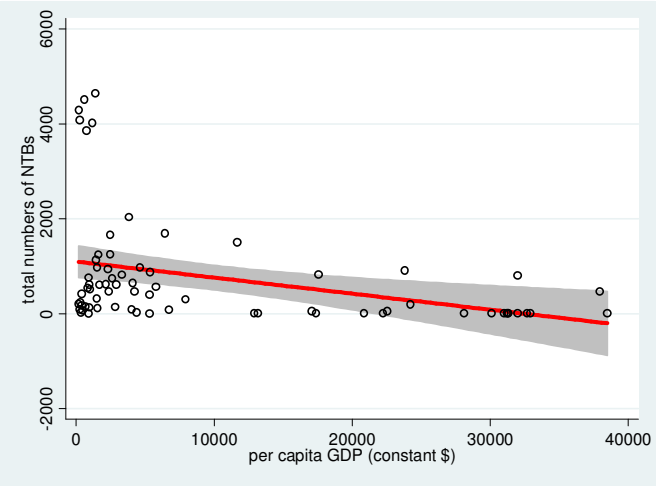
4h. Single Channel for imports (7100) - Numbers



4i. Technical Regulations (8100) - AVE



4j. Technical regulations (8100) - Numbers



Note: Computation based on 2-digit NTM classification level
lines: fitted values with the corresponding 95% Confidence Interval (gray area).
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

Finally, figure 4 checks for systematic patterns in the estimates of AVEs for each one of the NTMs according to per capita income level (NTM categories 3100 and 3300 are not displayed because of few measures). The figures on the left-hand side (4a) plot the distribution of average AVEs per country (simple average over all HS-6 lines where that measure is applied) and the figures on the right-hand side (4b) plot the count of NTM measures per country. Where it is statistically significant, we report two fitted lines for both measures as a function of per capita GDP.

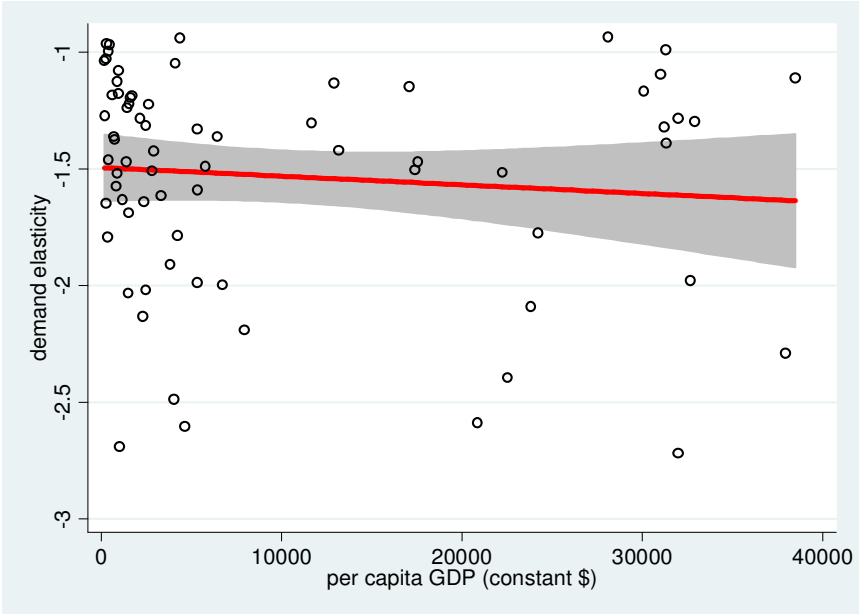
The following patterns emerge:

1. With the exception of technical regulations (8100), AVE estimates do not show much variation across NTMs. This reflects the combination of the zero-one measurement of NTMs and the common scaling by the import price elasticity at the product line. More precise data on NTMs would introduce greater dispersion in the patterns of AVEs. On the other hand, there is great variation in the number of NTMs per country across NTM classification.

2 Single-channel for imports (7100) is an LDC NTM (with no statistical trend);

3. The pattern for technical regulations (8100) indicates that the restrictiveness of these regulations increases with income per capita. As details in Kee et al. (2009, see equation (12) page 12), the AVE is computed from the estimated impact of the NTB on trade divided by the corresponding estimated demand elasticity. Hence, the pattern revealed in figure 4i can be reflect both systematic changes in elasticity estimates across income groups (for example a high import demand elasticity estimate for low-income countries and a lower – in absolute value - import demand elasticity estimate for high-income countries) and/or, for a given demand elasticity, more restrictive technical regulations (with a stronger negative impact on trade) in high-income countries. In figure 5 we report the evolution of the import demand elasticity with per capita GDP on the sub-sample of imports facing technical regulation (exactly same sub-sample than figures 4i and 4j). *It seems then that the pattern revealed in figure 4i actually reflects more trade restrictive technical regulations in high income countries rather than difference in import demand elasticities.*

Figure 5. Estimated demand elasticity for imports facing technical regulations (8100)
(Simple average over HS-6 products per country, for 2002-2004)



Note: Computation based on the same sub-sample than figures 4i and 4j.
lines: fitted values with the corresponding 95% Confidence Interval (gray area).
Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.

5. Conclusions

The combination of case studies with econometric estimates provides a better understanding of the complexity and variety of NTMs and of their effects restrictiveness on trade. This paper has surveyed the state of understanding prior to the launch of major joint effort by UNCTAD and ITC to extend systematically the collection of official data along the lines in TRAINS-WITS combined with extensive interviews of exporting companies.

Perceptions gathered through interviews suggest that for developing countries *certification requirements* are important regardless of destination while c*ustoms formalities* are perceived as a more important barrier to trade in Africa than in other regions. For exports destined to high-income countries, *testing requirements* represent an important obstacle for exporters. Not surprisingly, NTMS are also perceived to be particularly costly for agricultural products because of the variety of SPS standards across countries and of high costs of compliance costs related to certification. For many low-income countries, barriers to trade are also high at home, notably with respect to certification as the necessary infrastructure to carry out certification is often lacking. Interviews also suggest that arbitrariness and non-transparency plague exporters to developing countries' destination, be it with respect to customs procedures or product standards. Rules of Origin are often perceived as a significant barrier when exports are towards the EU, US or Japan.

The growing number of econometric studies appears to be leading to several stylized patterns. The paper suggests three. First, NTMs are more restrictive than tariffs and low income countries face more restrictive market access conditions. Second, subject to the included controls, NTMs restrict bilateral trade volumes. Third, harmonization of standards increase bilateral trade flows.

Across broadly-defined imports at the section level, NTMs are more restrictive than the corresponding tariffs with two-thirds of the AVE estimates in the 25%-50% range. Technical regulations and non-automatic licensing are the most used single-NTM measures and the restrictiveness of technical regulations increases with income per capita.

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ANNEXES TO

NOTES ON DETECTING THE EFFECTS OF NON TARIFF MEASURES

By

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and
Jaime de Melo

Annex 1.
UNCTAD trains Coding System of NTMs included in the Kee et al.(2009)'s sample
Annex 2.
Distribution of NTMs over products/sector

Annex 1.

Table A1.1. TRAINS Classification for NTBs included in the Kee et al.(2009)'s sample

1-digit	2-digits	4-digits	NTM description
3000			**Price control measures**
	3100		*Administrative pricing*
		3110	Minimum import prices
		3190	Administrative pricing n.e.s.
	3200		*Voluntary export price restraint*
	3300		*Variable charges*
		3310	Variable levies
		3320	Variable components
		3330	Compensatory elements
		3340	Flexible import fees
		3390	Variable charges n.e.s.
6000			**Quantity control measures**
	6100		*Non-automatic licensing*
		6110	Licence with no specific ex-ante criteria
		6120	Licence for selected purchasers
		6130	License for specified use
		6131	Linked with export trade
		6132	For purposes other than exports
		6140	Licence linked with local production
		6141	Purchase of local goods
		6142	Local content requirement
		6143	Barter or counter trade
		6150	Licence linked with non-official foreign exchange
		6151	External foreign exchange
		6152	Importers' own foreign exchange
		6160	Licence combined with or replaced by special import authorization
		6170	Prior authorization for sensitive product categories
		6171	Prior authorization to protect human health
		6172	Prior authorization to protect animal health and life
		6173	Prior authorization to protect plant health
		6174	Prior authorization to protect environment
		6175	Prior authorization to protect wildlife
		6176	Prior authorization to control drug abuse
		6177	Prior authorization to ensure human safety
		6178	Prior authorization to ensure national security
		6179	Prior authorization for purposes n.e.s.
		6180	License or political reasons
		6190	Non-automatic licensing n.e.s.
	6200		*Quotas*
		6210	Global quotas
		6211	Unallocated
		6212	Allocated to exporting countries
		6220	Bilateral quotas
		6230	Seasonal quotas
		6240	Quotas linked with export performance
		6250	Quotas linked with purchase of local goods
		6270	Quotas for sensitive product categories
		6271	Quotas to protect human health
		6272	Quotas to protect animal health and life
		6273	Quotas to protect plant health
		6274	Quotas to protect environment
		6275	Quotas to protect wildlife
		6276	Quotas to control drug abuse
		6277	Quotas to ensure human safety
		6278	Quotas to ensure national security
		6279	Quotas for purposes n.e.s.
		6280	Quotas for political reasons
		6290	Quotas n.e.s.

Table A1.1 *(c'd)*. TRAINS Classification for NTBs included in the Kee et al.(2009)'s sample

1-digit	2-digits	4-digits	NTM description
	6300		*Prohibitions*
		6310	Total prohibition
		6320	Suspension of issuance of licences
		6330	Seasonal prohibition
		6340	Temporary prohibition
		6350	Import diversification
		6370	Prohibition for sensitive product categories
		6371	Prohibition to protect human health
		6372	Prohibition to protect animal health and life
		6373	Prohibition to protect plant health
		6374	Prohibition to protect environment
		6375	Prohibition to protect wildlife
		6376	Prohibition to control drug abuse
		6377	Prohibition to ensure human safety
		6378	Prohibition to ensure national security
		6379	Prohibition for purposes n.e.s.
		6380	Prohibition for political reasons (embargo)
		6390	Prohibitions n.e.s.
7000			**Monopolistic measures**
	7100		*Single channel for imports*
		7110	States trading administration
		7120	Sole importing agency
		7170	Single channel for imports for sensitive product categories
		7171	Single channel for imports to protect human health
		7172	Single channel for imports to protect animal health and life
		7173	Single channel for imports to protect plant health
		7174	Single channel for imports to protect environment
		7175	Single channel for imports to protect wildlife
		7176	Single channel for imports to control drug abuse
		7177	Single channel for imports to ensure human safety
		7178	Single channel for imports to ensure national security
		7179	Single channel for imports for purposes n.e.s.
	7200		*Compulsory national services*
		7210	Compulsory national insurance
		7220	Compulsory national transport
	7900		*Monopolistic measures n.e.s.*
8000			**Technical measures**
	8100		*Technical regulations*
		8110	Product characteristics requirements
		8111	Product characteristics req. to protect human health
		8112	Product characteristics req. to protect animal health and life
		8113	Product characteristics req. to protect plant health
		8114	Product characteristics req. to protect environment
		8115	Product characteristics req. to protect wildlife
		8116	Product characteristics req. to control drug abuse
		8117	Product characteristics req. to ensure safety
		8118	Product characteristics req. to ensure national security
		8119	Product characteristics req. for purposes n.e.s.
		8120	Marking requirements
		8121	Marking requirements to protect human health
		8122	Marking requirements to protect animal health and life
		8123	Marking requirements to protect plant health
		8124	Marking requirements to protect environment

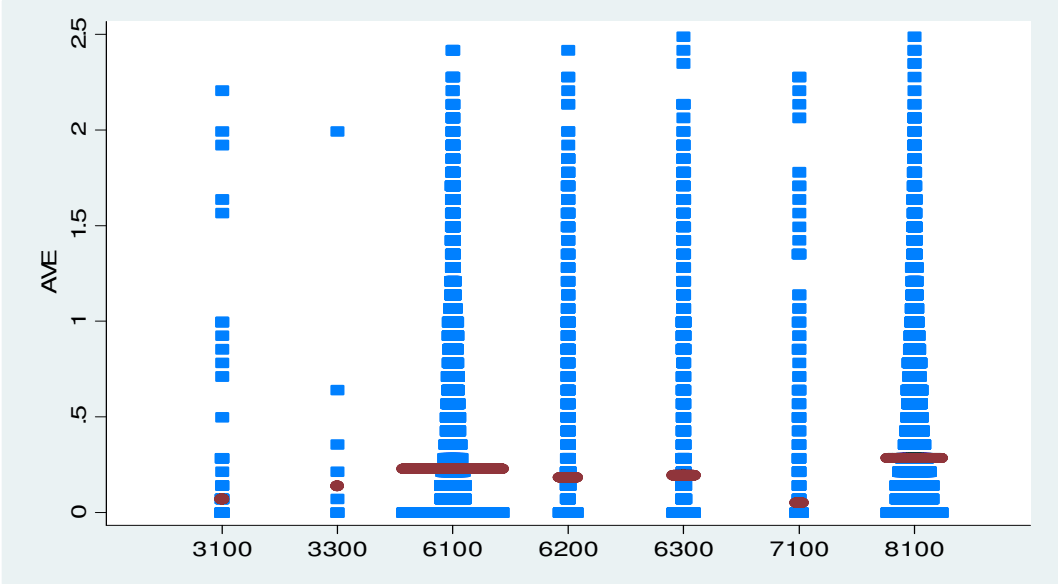
Table A1.1*(c'd)*. TRAINS Classification for NTBs included in the Kee et al.(2009)'s sample

1-digit	2-digits	4-digits	NTM description
		8125	Marking requirements to protect wildlife
		8126	Marking requirements to control drug abuse
		8127	Marking requirements to ensure human safety
		8128	Marking requirements to ensure national security
		8129	Marking requirements for purposes n.e.s.
		8130	Labelling requirements
		8131	Labelling requirements to protect human health
		8132	Labelling requirements to protect animal health and life
		8133	Labelling requirements to protect plant health
		8134	Labelling requirements to protect environment
		8135	Labelling requirements to protect wildlife
		8136	Labelling requirements to control dug abuse
		8137	Labelling requirements to ensure human safety
		8138	Labelling requirements to ensure national security
		8139	Labelling requirements for purposes n.e.s.
		8140	Packaging requirements
		8141	Packaging requirements to protect
		8142	Packaging requirements to protect
		8143	Packaging requirements to protect
		8144	Packaging requirements to protect
		8145	Packaging requirements to protect
		8146	Packaging requirements to protect
		8147	Packaging requirements to protect
		8148	Packaging requirements to protect
		8149	Packaging requirements to protect
		8150	Testing, inspection and quarantine requirements
		8151	Testing, inspection etc. req. to protect human health
		8152	Testing, inspection etc. req. to protect animal health and life
		8153	Testing, inspection etc. req. to protect plant health
		8154	Testing, inspection etc. req. to protect environment
		8155	Testing, inspection etc. req. to protect wildlife
		8156	Testing, inspection etc. req. to control drug abuse
		8157	Testing, inspection etc. req. to ensure human safety
		8158	Testing, inspection etc. req. to ensure national security
		8159	Testing, inspection etc. req. for purposes n.e.s.
		8160	Information requirements
		8161	Information requirements to protect human health
		8162	Information requirements to protect animal health and life
		8163	Information requirements to protect plant health
		8164	Information requirements to protect environment
		8165	Information requirements to protect wildlife
		8166	Information requirements to control drug abuse
		8167	Information requirements ensure human safety
		8168	Information requirements to ensure national security
		8169	Information requirements for purposes n.e.s.
		8170	Requirement relative to transit
		8180	Requirement to pass through specified customs
		8190	Technical regulations n.e.s.
		8191	Technical regulations nes. to protect human health
		8192	Technical regulations nes. to protect animal health and life
		8193	Technical regulations nes. to protect plant health
		8194	Technical regulations nes. to protect environment
		8195	Technical regulations nes. to protect wildlife
		8196	Technical regulations nes. to control drug abuse
		8197	Technical regulations nes. to ensure human safety
		8198	Technical regulations nes. to ensure national security
		8199	Technical regulations nes. for purposes n.e.s.

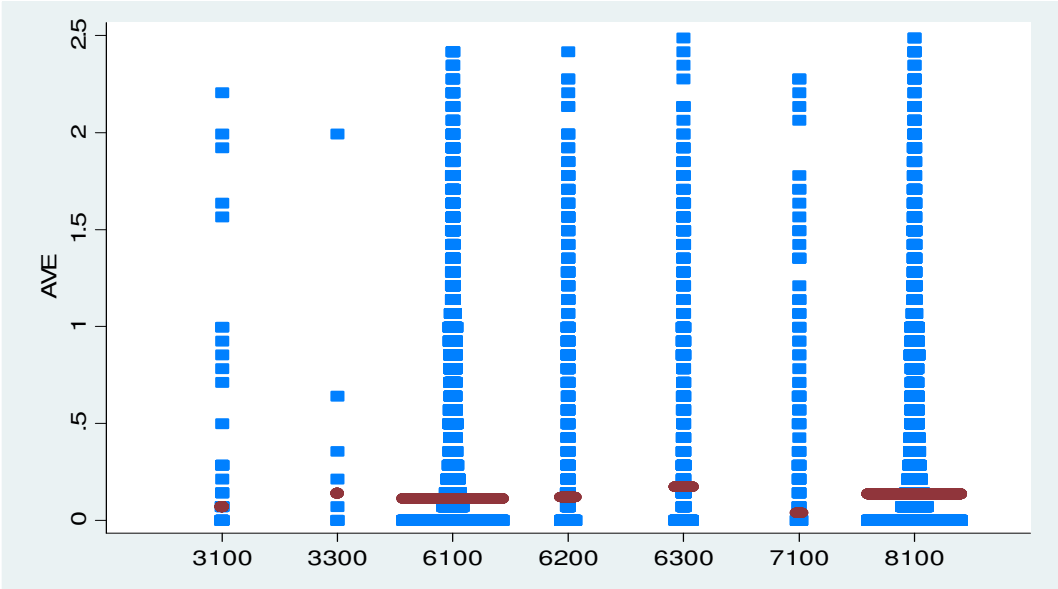
Annex 2

Figure A2.1. Distribution of each NTB 2-digits' AVE over the HS6 products (unweighted and weighted average on the 93 countries, for 2002-04)

UnWeighted



Import-Weigthed



Note: Median AVE in red.

Source: authors' computations based on Kee et al. (2009) and TRAINS-WITS data.