INTERNATIONAL AGRICULTURAL TRADE RESEARCH CONSORTIUM

Working Paper

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

John Christopher Beghin
Anne-Celia Disdier
Stéphan Marette

November 2012
IATRC
Working Paper #12-02

International Agricultural
Trade Research Consortium

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

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

Working Paper #12-02

*Contact author: Beghin, 383 Heady Hall, Economics, Iowa State University. Ames, IA 50011-1070. Phone 515 292 9141, email: <beghin@iastate.edu>

November 2012
ISSN 1098-9210
IATRC
Working Paper #12-02

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)*

This draft: October 19, 2012

Abstract:
We extend the trade restrictiveness indices (TRIs) approach to the case of market failures and domestic regulations addressing them, in presence of arbitrary tariffs and other domestic price policy distortions. We focus on standard-like non-tariff measures (NTMs) affecting cost of production and potentially enhancing domestic demand by increasing product quality or reducing negative externalities. The impact of NTMs on trade is ambiguous depending on the relative strength of the supply cost and demand enhancing effects. We apply the framework to the NTM database of Kee, Nicita, and Olarreaga (2009) and derive ad valorem equivalents for NTMs and other policy distortions. These equivalents are then used to compute TRIs. 10% of the NTM ad valorem equivalents at the 6-digit level of the Harmonized System are negative indicating a net trade-enhancing effect of these NTMs in those sectors. Consequently, TRIs computed without a protectionist presumption are smaller than their constrained counterparts not allowing for trade enhancements effects of NTMs. Accounting for externalities and anti-protective effects significantly reduces the measure of trade policy restrictiveness for most countries.

Keywords: Non-tariff measures, externalities, ad valorem equivalents, trade restrictiveness indices

JEL code: F13

*Contact author: Beghin, 383 Heady Hall, Economics, Iowa State University. Ames, IA 50011-1070. Phone 515 292 9141, email: beghin@iastate.edu. We thank Alessandro Nicita for providing the dataset of Kee, Nicita and Olarreaga (2009) and for discussions, along with Jean-Christophe Bureau, Frank van Tongeren, and participants at the ETSG 2012 Leuven 14th Annual Conference 13-15 September 2012, KU Leuven.

1. Introduction

Standard-like non-tariff measures (NTMs) are playing an increasing role in international trade. Some of them have protectionist purposes, especially in a context of decreasing tariff barriers. However, some others are adopted by policymakers to address market imperfections (externalities, information asymmetries). In such cases, NTMs may be trade and welfare enhancing. The literature measuring the restrictiveness of the trade policy, through the computation of various indices, has failed to consider these effects. This paper aims to fill this gap.

We consider a small open economy distorted, first by arbitrary tariffs and other domestic price policy distortions, and second by market imperfections and existing NTMs allegedly addressing them. The latter may or may not be optimally set or may be motivated by protectionist motives. We then apply and extend the trade restrictiveness index (TRI) approach of Anderson and Neary (2005) to this more general and realistic case encompassing market failures and the existing domestic regulations addressing them.

With potential market imperfections, the impact of NTMs on import demand is in most cases ambiguous depending on the relative strength of the supply cost and demand enhancing effects. The net effect is an empirical question. We apply the proposed framework to the NTM global database of Kee et al. (2009) and derive ad valorem equivalents (AVEs) for NTMs and other policy distortions (tariffs and domestic production subsidies). These AVEs are then used to evaluate the restrictiveness of the trade policy defined by countries. 10% of the NTM AVEs at the 6-digit level of the Harmonized System (HS) are negative, suggesting a net trade-enhancing effect of these NTMs in those sectors through demand increasing effects. These enhancing effects cast doubt on the predominant presumption that NTMs are exclusively protectionist and cannot possibly boost trade, let alone welfare. This presumption underlies much of the economic literature addressing NTMs. We call it the protectionist prior on NTMs. Our analysis shows that more agnostic priors should prevail when analyzing NTMs.

With global sourcing, it is challenging to guarantee products' safety and quality and to mitigate negative externalities. Standards and regulations affecting quality help overcome asymmetric information issues. Occasional recalls by toy and food companies illustrate the importance of various safety concerns, such as led paints in children toys (Lipton and Barboza, 2007). Consumers may also care about global commons and avoid purchasing products obtained using unsustainable environmental practices. To preserve their reputation, large firms (e.g. Home Depot, IKEA, etc.) have shown strong support for forest certification (McDermott and Cashore, 2009). Similarly, consumer welfare is improved by quality requirements limiting residues of dangerous pesticides and antibiotics in food products (Disdier and Marette, 2010).

Inspections at the border and domestic markets help enforcing these quality standards and raise the cost of both domestic and foreign producers entering the market where the quality standards are in place. To illustrate, between October 2006 and 2007, the U.S. Consumer Product Safety Commission (CPSC) announced 473 products recalls of which 389 cases involved imported products (CPSC, 2008). Meeting the NTMs is costly for both domestic and foreign suppliers and more so for the latter.

In this context, regulatory interventions have strong economic and political support, despite risks of inefficiency and distortions. In an open-economy context, regulation stops dangerous goods at the border. Such regulation encompasses the same domestic standards, and additional instruments like border inspections and labeling requirements. The effects of these regulatory instruments are complex not only because instruments are imperfect but also because they impact costs of heterogeneous producers. While a regulation may thwart a market failure and enhance trade between countries, it may also reduce market access for foreign producers who cannot easily comply with this regulation. This last effect may outweigh the “legitimate action” to mitigate a market failure. Indeed, both trade and welfare impacts of regulation are ambiguous and in general hard to evaluate. A rigorous empirical measure of these trade and welfare impacts requires a consistent framework, a task our paper tackles.

The TRI approach of Anderson and Neary (1992, 1994, 1996, 2003, and 2005) provides a welfare-based consistent aggregation of various trade distortions into a scalar uniform surtax factor, equivalent to these distortions in terms of their welfare effects. The TRI approach is a concept applying to a whole economy because it relies on the balance of trade approach. Nevertheless, it has been applied successfully to partial equilibrium and multi-market situations. Feenstra (1995) has proposed some simplifying assumptions greatly fostering the applicability of the approach by reducing the number of price responses to estimate or calibrate in the implementation. The TRI and its extensions such as the Mercantilist TRI – MTRI – (Anderson and Neary, 2003) have been used to derive the tariff equivalent of arbitrary tariff structures (Anderson and Neary, 1994), tariffs and quotas (Anderson and Neary, 1992 and 2005), tariffs and domestic production subsidies (Anderson et al., 1995; Anderson and Neary, 2005; Beghin et al., 2003), and tariffs and AVEs of other NTMs (Hoekman and Nicita, 2011; Kee et al., 2009; Lloyd and MacLaren, 2008), among others. As shown in these applications, the TRI approach provides a consistent aggregation of distortionary effects of various policy instruments into a single “total” AVE within a given sector. The latter property explains the recent success and popularity of the approach in empirical investigations of NTMs in presence of tariffs and other price policies at the sector level.

The novelty of the present paper is to allow for market imperfections; we derive the TRI in this expanded context, and apply the extended framework to an empirical analysis of NTMs and global trade without imposing the protectionist prior.

Despite its inherent ability to capture second-best situations, the determination of the TRI under market failure has been completely overlooked in the trade literature. The only related effort in this direction is from Chau et al. (2007) who conceptually develop a quantity-based distance function, a trade restrictiveness quantity index, in presence of environmental externalities but abstracting from existing policy interventions.

We fill this gap in the TRI-related trade literature: we consider the TRI of arbitrary tariffs, domestic production subsidies, and NTMs in presence of external effects. This undertaking is a substantive step forward for two reasons. First, trade policy reforms often occur in the context of market imperfections such as asymmetric information or negative externalities imposed on some agents. Accounting for these imperfections is relevant and it has been the central pillar of the trade and environment literature using the dual approach to trade (Copeland, 1994; and Beghin et al., 1997). Surprisingly, this case has eluded the TRI literature. Second, numerous NTMs have been emerging in the last 15 years for several reasons, including potential protectionism, but also to address consumer and retailer concerns for health and the environment and associated external effects. A priori, excluding potential market imperfections when analyzing NTM policy reforms biases results and could lead to erroneous policy recommendations. Not surprisingly, sectoral AVEs and TRI estimates are likely to exhibit upward bias when they are econometrically constrained to be trade-impeding (the protectionist prior). We depart from this restrictive premise and start from an agnostic prior on the impact of NTM policies on trade and welfare. We allow for possible external effects.[1]

We first develop a parsimonious framework to account for external effects and corrective policies addressing these effects, in the context of a TRI. We pay particular attention to NTMs

[1] Several investigations using the standard gravity equation approach find some trade enhancing effects of NTMs but without a rationalization based on some market imperfection presumably mitigated by the NTMs being analyzed (see Li and Beghin, 2012).

and their protective effects against import competing products, as well as their potential demand enhancing effects when NTMs reduce information asymmetries. The framework is then used in an empirical investigation using the NTM global database of Kee et al. (2009). The data consist of a large cross section of products (HS6) and importing countries.

We find a significant fraction of sectors exhibiting a net trade expanding effect of NTMs, suggesting that some NTMs are likely to enhance domestic demand rather than being welfare and trade reducing. As the net effect (demand shift net of the import cost increases) is a lower bound on the corrective role of NTMs on demand. It is likely that the demand shift alone is actually larger than the trade effect. Evidently, we also find a large number of sectors for which trade is impeded by NTMs. When all AVEs are combined into TRIs we find that the TRIs constraining NTMs to be trade impeding are systematically larger than those obtained without that constraint.

Our paper proceeds as follows. We present the framework in Section 2. We then describe the data and detail the econometric approach in Section 3. Section 4 presents the estimation results of AVEs and TRIs. We conclude in Section 5.

2. A Simple framework

We follow the standard TRI approach with the balance of trade function derived from the dual approach to trade for a small open distorted economy. We build on the usual framework with a negative externality affecting the representative consumer as in Copeland (1994). The externality is assumed exogenous to the consumer but influenced by the policymaker via some NTM regulations such as standard-like regulations. These regulations may not be set optimally and may be set at a protectionist level as in Fisher and Serra (2000).

The utility of the representative consumer is $u(x,H)$ with non negative market goods x and negative externality H influenced by a vector of NTM policies, *NTM*, and with the usual definitions and properties:

$$u_x = \partial u / \partial x > 0 \text{ and } u_H = \partial u / \partial H < 0;$$
$$H = H(NTM) \text{ with } \partial H / \partial NTM < 0.$$

All domestic consumer prices p are inclusive of the exogenous world price wp, a tariff τ, and the unit cost equivalent of the domestic NTM on foreign suppliers to sell in the domestic market, or $p = wp + \tau + t(NTM)$.[2]

Given domestic prices p, the associated expenditure function is:

$$e(p, \overline{u}, \overline{H}) = \underset{x}{Min}(p' x \mid u \geq \overline{u}; H \leq \overline{H}),$$

with the usual derivative properties:

$$e_p = \delta e / \delta p = x(p, u, H(NTM)) \geq 0, \text{ and } e_H = \delta e / \delta H \geq 0.$$

Expenditure function e exhibits all the usual homogeneity and curvature properties in prices, implying $p' e_p = 0$, $e_H = p' e_{pH}$, $e_u = p' e_{pu}$; $e_{pNTM} = e_{pH} H_{NTM}$, and $f' e_{pp} f \leq 0$ for any arbitrary vector f of similar dimension as p. The marginal damage e_H of the negative externality is positive for any given utility level. To keep utility constant, expenditure has to increase when the negative externality increases. The positive inverse of the marginal utility of income is e_u. We eventually assume simplified preferences to follow Feenstra (1995) and Kee et al. (2009) in the empirical section based on partial equilibrium.

The impact of the NTM policy encompasses several cases. Protectionism of the NTM is implied by $H_{NTM} = 0$ because the policy does not address an externality or is not based on science. Another special case could be that the NTM policy affects H but that $H(NTM)$ does not affect a particular demand (particular good n) directly or $e_{p_n H} = 0$. In this case the policy is not protectionist per se but addressing the market imperfection has no bearing on that particular

[2] Domestic and foreign firms have heterogeneous cost of meeting the NTM standard as explained later in the production component of the model and we assume that domestic firms are more efficient at meeting the NTM.

demand for good *n*. These last two remarks show the difficulty to gauge revealed protectionism.[3] For integrability of the Hicksian demands into the expenditure function, at least one of the demands represented by *x* has to be influenced by the external effect *H*. To illustrate, *H* could be the negative health effect of consuming products that are hazardous if minimum quality standards are not imposed on their production. The standard reduces the occurrence of sickness which may affect the demand for these products, and possibly other demands via better health (reduced medical expenditure, more active leisure activities) or not at all (all demands independent of health status). Similar examples can be constructed with environmental external effects such as global commons or consumer retail packaging waste.

On the production side, domestic supply decisions in competitive industries are derived from the *gdp* function:

$$gdp(p^p, \bar{z}) = \max_y (p^{p}{}' y \,|\, g(y, \bar{z}) \leq 0),$$

with *y* denoting the net output vector, *z* the vector of fixed national endowments, and p^p the vector of producer prices. Producer prices include production subsidies, *s*, such as farm subsidies, not seen by consumers, $p^p = wp + \tau + t(NTM) + s$. World prices can be normalized to 1 so the price distortions *s*, *t*, and τ are viewed indifferently as either ad valorem or specific policy distortions. For simplicity we assume that domestic firms already meet the standards implied by *NTM* but that foreign firms may not. A more complicate framework affecting both domestic and foreign firms could be included but the essence here is that *t(NTM)* captures the asymmetric protective effect of *NTM* at the border on foreign industries.[4] The *gdp* function has the usual

[3] Demand not being enhanced by the NTM policy is not sufficient although suspicion of protectionism may arise.

[4] *NTM* would then enter the GDP function and the derivative $gdp_{pNTM} = y_{NTM}$ would represent the leftward shift of domestic supplies caused by the NTM policies. The unit cost equivalent of y_{NTM} would be assumed to be smaller than *t(NTM)* to indicate a net protective effect of *NTM* on domestic suppliers as in Fisher and Serra (2000).

envelope and homogeneity properties:

$$gdp_p = \partial gdp / \partial p^p = y;\ p^p{}' gdp_p = gdp;\ p^p{}' \partial y / \partial p^p = p^p{}' gdp_{pp} = 0;\ \text{and}\ f' gdp_{pp} f \geq 0\ \text{for any}\ f.$$

For convenience we also define compensated excess demand functions *m*, with $m(p, p^p, H(NTM), u, \bar{z}) = x(p, u, H(NTM) - y(p^p, \bar{z})$, with partial derivatives indicated by the appropriate subscript as for *e* and *gdp*.

Now we have all the elements to develop the balance of trade function *B*:

$$B(p, p^p, wp, NTM, , \bar{z}, H, u) \ = \ e(p, u, H(NTM)) - gdp(p^p, \bar{z}) - \tau'(x(p, u, H) - y(p,\ \bar{z})) + s'y(p,\ \bar{z}) \quad (1)$$

Variable *B* indicates the amount of foreign exchange necessary to sustain utility *u* given *NTM*, *wp*, *z*, *s*, and *τ*. Homogeneity in prices and envelope properties of *e* and *gdp* lead to a simpler formulation of (1) seemingly omitting tariff revenues and production subsidy costs.

$$B(p, p^p, wp, \bar{z}, H(NTM), u) = (1 + t(NTM))'(x(p, u, H(NTM)) - y(p^p, \bar{z}). \quad (1')$$

2.1. Trade restrictiveness indices with externality

The TRI problem in our case is to find a scalar *T* equivalent to standard-like policies, tariffs, and production subsidies to apply as a tariff surcharge on world prices such that:

$$\begin{aligned} &B(wp(1+T), wp(1+T), wp, \bar{z}, H(0), u_0) = \\ &B(wp + \tau_0 + t(NTM_0), wp + \tau_0 + t(NTM_0) + s_0, wp, \bar{z}, H(NTM_0), u_0) = B_0 \end{aligned} \quad (2)$$

The tariff surcharge accounts for several components: tariffs *τ*, domestic production subsidies *s*, the demand shift via *H*(*NTM*), and the protective effect from raising foreign cost to satisfy *NTM*, that is, *t*(*NTM*).

Next, while holding *u* constant, we differentiate equation (2) with respect to *T*, *τ*, *s*, and *NTM* to derive the relative change in *T* rather that *T* as it is customarily done in TRI literature. This step yields:

$$(B_p^{'} wp + B_{p^p}^{'} wp)dT = (B_p^{'} + B_{p^p}^{'})(d\tau + \partial t / \partial NTM \ dNTM) + B_{p^p}^{'} ds + B_H H_{NTM} dNTM, \quad (3)$$

with subscripts denoting the variable involved in the partial derivative of *B*. Solving for *dT* yields:

$$dT = (1/(B_p^{'} wp + B_{p^p}^{'} wp))[(B_p^{'} + B_{p^p}^{'})d\tau + B_{p^p}^{'} ds + ((B_p^{'} + B_{p^p}^{'})\partial t / \partial NTM + B_H H_{NTM})dNTM], \quad (4)$$

with partial derivatives B_i:

$$B_p^{'} = -\tau^{'} e_{pp};$$
$$B_{p^p}^{'} = (\tau + s)^{'} gdp_{pp};$$
$$B_H = (wp + t(NTM))^{'} e_{pH} > 0.$$

Equation (4) shows that the TRI has three policy components corresponding to the tariff, subsidy, and NTM policies. The *NTM* component is the sum of a demand effect via reduced externality *H*, and a NTM protectionist effect relative to foreign goods (through a tariff equivalent *t* increasing in *NTM*). While the sign of this protectionist effect on imports is clear, the combined effect of *NTM* on *m* via the externality *H* and the protectionist effect *t(NTM)* is ambiguous as their relative magnitude is unknown analytically. For example, a pure protectionist NTM policy imposing useless labeling requirements would raise *t(NTM)* and have no effect on consumers' perception and would lead to a welfare loss and trade contraction. Conversely, standards requiring safe goods including imported ones are likely to lead to a net demand-enhancing effect lowering transaction costs for consumers. The latter NTM policy would be trade and welfare enhancing. The econometric investigation will sort the NTM regimes into trade impeding and trade enhancing since we do not impose the protectionist NTM prior.

Next, to further elucidate these effects and undertake our empirical investigation, we assume a simplified structure for the Hessian matrix of cross-price responses (e_{pp} - gdp_{pp}) as in Feenstra (1995), Hoekman and Nicita (2011), Kee et al. (2009), and Lloyd and MacLaren (2008).

The Hessians e_{pp} and gdp_{pp} are each assumed to be diagonal and constant which leads to $B^{'}_{p} > 0$ and $B^{'}_{p^p} > 0$ if τ and s are non negative. From these conditions we derive an implementable framework to approximate the sector total AVE corresponding to all policy types τ, s and NTM as well as the implied TRI and the MTRI. In general, if the Hessian matrices of price responses of imports (or demand and supply responses) are not constrained to be diagonal, off-diagonal elements can be positive or negative and it is impossible to *a priori* sign elements of $B_p{'}$ and $B_{p^p}{'}$ and therefore the change in the TRI, dT. The computation of T is obviously cumbersome in the presence of off-diagonal cross-price effects and non-constant slopes.

We recover TRI T from dT as in Feenstra (1995) and Kee et al. (2009) equivalent to the initial tariffs, subsidies, and NTMs relative to a world with all policies set to 0 by integrating both sides of (4) with respect to T going from zero to T and policies going from (0,0,0) to (τ, s, NTM). The latter approach works only if dT is non-negative. This step yields:

$$T = \sqrt{(1/wp'(gdp_{pp} - e_{pp})wp}\sqrt{(B'_p + B'_{p^p})\tau + B'_{p^p}s + B'_{NTM}NTM)}, \qquad (5)$$

with $B_{NTM} = (B^{'}_{p} + B^{'}_{p^p})\partial t / \partial NTM + B_H H_{NTM}$ whose sign is undetermined. The original formula in Feenstra (1995) contains the first positive element from tariffs abstracting from s and NTM. Here, two additional components originate from production subsidies (positive contribution to the TRI), as long as subsidies are positive, and from NTM policies (ambiguous sign). To further compare, Kee et al. (2009) have the protectionist effects of tariffs and subsidies and a protectionist effect of NTMs (see their equation (16)). No externality or demand enhancement appears in their equation. This additional effect included in our equation (5) can potentially enhance trade and complicates the simple narrative of obstructive NTM policies and their tax equivalent. Equation (5) is in essence the square root of a weighted sum of dead weight losses from tariff, production subsidies, and the welfare effects of NTMs. If the latter is a pure protectionist policy, then $B_H H_{NTM}$ is zero (no demand shift) and the dead weight loss from the tariff equivalent *t(NTM)* is added to the sum. If the NTM policy enhances trade, then the latter maps into a welfare gain. Removing the NTM decreases the TRI as welfare falls with its removal. If the latter effect dominates the distortionary effect of tariffs and subsidies, then *dT* is negative and *T* cannot be recovered using (5). Instead, *dT* is the form of choice as in the early TRI investigations (e.g., Anderson et al., 1995).

These effects are illustrated in partial equilibrium in figure 1. Figure 1 shows the two effects of the NTM policies, that is, the demand enhancement shift (from *x* to *x*' with greater utility achieved with reduced health hazard), and increase in border price ($wp+t(NTM)+\tau$) reflecting the international cost of meeting the country's standard and the tariff, and their total effects on imports *m*. In previous investigations only the border price effect of *NTM*, *t(NTM)*, was considered and the trade (and welfare) impact of *NTM* on imports was always negative.

Insert Figure 1 here

We also consider the MTRI, which holds aggregate imports ($wp'm$) constant. The MTRI yields the tariff equivalent to all distortions holding aggregate trade unchanged but allowing for welfare variation. The MTRI is derived in Anderson and Neary (2003) and Kee et al. (2009) who call it the overall TRI (OTRI). The derivation of the MTRI follows the spirit of the derivation of the TRI and we only present its final formula in equation (12). We refer readers to Anderson and Neary (2003) and Kee et al. (2009) for details.

An important consequence from the potential presence of trade-enhancement effects and negative AVEs from NTMs is that our TRI and MTRI estimates will be equal or smaller than the TRI and MTRI à la Kee et al. (2009) where all policies are constrained to be trade impeding. We discuss this important point in the empirical section.

2.2. The import equation to estimate

Next, we derive the import equation to estimate and the AVEs of all policy instruments. Totally differentiation of *m* (holding *u* constant) for changes in exogenous variables leads to a change in imports of good *n* in any country equal to:

$$\begin{aligned} dm^n &= (\partial m^n / dp^n) d\tau^n - (\partial y^n / \partial p^n) ds^n + [(\partial m^n / dp^n)(\partial t^n / \partial NTM^n) \\ &+ (\partial x^n / \partial H)(\partial H / \partial NTM^n)] dNTM^n - (\partial y^n / \partial z^n) dz^n . \end{aligned} \quad (6)$$

Equation (6) and *m* provide a way to estimate the response of imports to tariffs, subsidies, and NTM policies, and other variables as in Feenstra (1995). We then derive the estimate of the AVE to the net effect of NTM policies on good *n*. Unfortunately we cannot separately identify the individual effects of *NTM* on *m* in (6), but we can estimate their net effect. We also exploit some structure to put a lower bound on this net effect as explained below. Following Kee et al. (2009) we move the tariff effect on the left hand side of (6) and the general specification for the import demand of good *n* in country *c* (as indicated by superscript *n*,*c*) is:

$$\ln m^{n,c} - \varepsilon_{n,c} \ln(1 + \tau^{n,c}) = \beta_n + \sum_k \beta_k^z z_k^{\,n,c} + \beta_{n,c}^S s^{n,c} + \beta_{n,c}^{NTM} NTM^{n,c} . \quad (7)$$

Elasticity $\varepsilon_{n,c}$ is the own-price response of import of good *n* in country *c*. $\beta_{n,c}^{NTM}$ is the sum of two AVE components (the tariff equivalent of *NTM* on world prices, and the ambiguous import subsidy/tax effect of *NTM* via decreased externality). Note that the latter AVE component is bound to the left to -100% as prices are non-negative. This non-negative constraint provides a lower bound of -100% on $\beta_{n,c}^{NTM}$ if we further assume that there is no trade impediment effect of the NTM policy (*t(NTM)=0*) at the border. This is a limit case to establish the lowest non-negative prices faced by agents in the economy.

Our equation (7) is equivalent to equation (8) in Kee et al. (2009), but in our more general context of trade in presence of external effects.[5] The total AVE of NTM policies on good n, AVE_{total}^{NTM}, is:

$$AVE_{total}^{NTM} = \beta_{n,c}^{NTM} / \varepsilon_{n,c}, \text{with } -1 \leq AVE_{total}^{NTM}. \quad (8)$$

An AVE is developed similarly for production subsidies, based on the fact that $(1-\gamma)AVE_{n,c}^{S} = \beta_{n,c}^{S} / \varepsilon_{n,c}$, with ($\gamma = {}^{\partial x/\partial p}\!/\!_{\partial m/\partial p}$). Unfortunately, parameter γ is not readily known as we only have estimates of import demand price elasticities and not the underlying output and demand price responses. Hence, we estimate a lower bound to the production subsidy AVE by abstracting from fraction (1-γ). Alternatively, the production subsidy AVE estimate could be seen as a market price support subsidy, affecting both consumer and producer prices. This assumption is maintained in Kee et al. (2009) for example. Farm policies however, more often affect farm production incentives rather than market prices.

Next, we specify $\beta_{n,c}^{NTM}$ as a transformation of an exponential such that it satisfies a lower bound on the total AVE of the *NTM* effects as before and in addition allowing for fixed effects per commodity and interaction terms with country-specific exogenous shifters (endowments) z. For a continuous *NTM* variable, this leads to $\beta_{n,c}^{NTM} = a - \exp(\beta_{n}^{NTM} + \sum_{k} \beta_{nk}^{NTM} z_{k}^{n,c})$, with parameter a constrained such that the AVE of *NTM* is lower bounded at -1 or -100%. The corresponding value is $a=\varepsilon_{n,c}$. If *NTM* is approximated by a dichotomous variable, then the various partial derivatives of m, and t with respect to *NTM* do not exist and are replaced by the first difference of m for *NTM* equal to one and zero. This leads to an alternative formula of the total *NTM* AVE ($AVE_{total}^{NTM_{dum}}$) following Halvorsen and Palmquist (1980):

$$AVE_{total}^{NTM_{dum}} = [\exp(\beta_{n,c}^{NTM}) - 1] / \varepsilon_{n,c}, \text{ with } -1 \leq AVE_{total}^{NTM_{dum}}. \quad (9)$$

[5] Bratt (2012) extends Kee et al. (2009)'s approach and computes the bilateral effects of NTMs of exporting countries and then translates them into AVEs.

The lower bound condition in (9) is slightly more cumbersome with a dichotomous *NTM*. The intuition is that $\exp(\beta_{n,c}^{NTM})-1$ cannot be too large of a positive number to keep producer and consumer prices non-negative (or that $\exp(\beta_{n,c}^{NTM}) \leq 1+\|\varepsilon_{n,c}\|$ or $\beta_{n,c}^{NTM} \leq \ln(1+\|\varepsilon_{n,c}\|)$). Using the same specification as for the continuous variable case of $\beta_{n,c}^{NTM}$, we specify the lower bound constraint for the dichotomous case using parameter *a* in $\beta_{n,c}^{NTM} = a - \exp(\beta_{n}^{NTM} + \sum_{k} \beta_{nk}^{NTM} z_{k}^{n,c})$ with $a = \ln(1+\|\varepsilon_{n,c}\|)$. For small values of $\|\varepsilon_{n,c}\|$, the dichotomous and continuous values of *a* are approximately equal.

A parallel formulation is used for $\beta_{n,c}^{S} = -\exp(\beta_{n}^{S} + \sum_{k} \beta_{nk}^{S} z_{k}^{n,c})$. As production subsidy *s* is positive, presumably its AVE would not lead to negative producer price issues.

The total AVE of all distortions, that is, tariffs, NTMs, and subsidies for good *n* in country *c* is then (assuming the normalization *wp*=1):

$$TOT_{n,c} = \tau_{n,c} + AVE_{n,c}^{NTM} + AVE_{n,c}^{s}. \qquad (10)$$

The TRI in equation (5) translates into:

$$T_c = \left(\frac{\sum_{n} (\partial m_{nc} / \partial p_{nc}) TOT_{n,c}^{2}}{\sum_{n} (\partial m_{nc} / \partial p_{nc})} \right)^{1/2}. \qquad (11)$$

Again, if (4) gives a negative *dT*, then (11) cannot be used and the change in TRI *dT* is kept to express the change in the index equivalent to the welfare impact of the policy interventions. Recall that *dT* is expressed as a sum of consumer welfare changes, and that *T* is the square root of a positive sum of deadweight losses.

As noted above, we use similar information to estimate the MTRI:

$$MTRI_c = \left(\frac{\sum_n (\partial m_{nc} / \partial p_{nc}) TOT_{n,c}}{\sum_n (\partial m_{nc} / \partial p_{nc})} \right). \quad (12)$$

3. Data and econometric specification

We use the UNCTAD[6]-Comtrade database of Kee et al. (2009) as well as their import demand estimates (Kee et al., 2008) to estimate the import demand equation (7), recover AVEs (equations (9) and (10)) at the 6-digit level of the Harmonized System (HS), and compute the MTRI and TRI equivalents to the three types of distortions (tariffs, NTMs and subsidies) as in equations (11) and (12) for each country.

3.1. Data

Trade data come from the Comtrade database. Kee et al. (2009) use the average of imports at the HS6-digit tariff line by importing country between 2001 and 2003. Imports demand elasticities are extracted from Kee et al. (2008). Tariff data are taken out from the UNCTAD and the World Trade Organization (WTO). Tariffs are for the most recent year for which data are available between 2000 and 2004. For specific tariffs, ad valorem equivalents are used. Data on NTMs are from the UNCTAD TRAINS (Trade Analysis and Information System) database and the following NTMs are selected: price control measures, quantity restrictions, monopolistic measures, and technical regulations. A dummy is set to one if the importing country imposes at least one NTM on a given HS6 product. Regarding production subsidies, Kee et al. (2009) focus on agricultural domestic support. The source is the WTO. This continuous variable is in dollars and its log form is used in the estimations.

Countries' characteristics are measured by the economic size (gross domestic product –

[6] United Nations Conference for Trade and Development.

GDP), and relative factor endowments (agricultural land over GDP, capital over GDP, and labor over GDP). Data are extracted from the World Development Indicators of the World Bank. Two geographical variables are also introduced: a dummy for islands and a measure of remoteness (average distance to world markets defined as the import-weighted distance to each trading partner). Our sample includes 93 importing countries and 4,941 HS6 products.

3.2. Econometric specification

As in Kee et al. (2009), we run estimations tariff line by tariff line (HS6-digit). To control for the potential endogeneity of NTMs and production subsidies, we instrument them using exports, GDP-weighted average of the NTM dummy variable at the HS6 digit of the 5 closest neighbors (in terms of geographic distance) and the GDP-weighted average of the agricultural domestic support at the HS6 digit of the 5 closest neighboring economies (Kee et al., 2009). The instrumented estimation is performed in two stages. We first estimate a probit where the dependant variable is the presence or the absence of a NTM and the explanatory variables are the instruments. The mills ratio derived from this first stage is then included in the second stage equation. If one (or more) country provides production subsidies, instruments for this variable (exports, GDP-weighted average of the agricultural domestic support of the 5 closest neighbors) are also included in the second stage equation.

The quantity impact of NTMs and production subsidies is then transformed into price-equivalents (AVEs) using the import demand elasticities from Kee et al. (2008). AVEs are calculated for each importing country and HS6 line. To ease result interpretation, we compute the mean over all importing countries at the HS6 and HS2 levels. Following our estimation, 10% of AVEs for NTMs at the HS6-digit level are negative, i.e., highlighting trade-enhancing NTMs. In contrast to Kee et al. (2009) our procedure allows us to keep these negative values in our sample. AVEs of NTMs, tariffs and production subsidies are then aggregated at the country level to derive the trade restrictiveness indices corresponding to all three types of policy interventions.

4. Results

We first present the results on AVEs of NTMs in the presence of externalities. We also provide comparisons with the AVEs obtained when externalities are not accounted for (as in Kee et al., 2009). These AVEs are then added to the tariffs and AVEs of production subsidies to compute the TRI and MTRI at the country level.

4.1. AVEs of NTMs

Table 1 first reports the simple frequency ratio of NTMs for each HS chapter, i.e., the share of HS6 tariff lines for which at least one importing country of our sample imposes at least one NTM. More disaggregated results (at the HS 2-digit level) are available in the Appendix (Table A.1). We focus the discussion on the results obtained for the 20 HS chapters. However, conclusions are, of course, unchanged if the analysis is performed at the HS2 level (96 sectors). The frequency ratio of NTMs presented in Table 1 should be interpreted as follows: for chapter I "Animals", the value 0.46 means that 46% of HS6 tariff lines included in the HS Chapter "Animals" are affected by at least one NTM in at least one importing country.

Results suggest that agricultural products (Chapter 01-04) are more affected by NTMs than manufactured products. The frequency ratio is indeed larger for these products. This is line with the high number of countries' notifications of sanitary and phytosanitary measures to the WTO. According to the results presented in the Appendix (Table A.1), for some HS 2-digit sectors, such as live animals, meat, dairy products, edible fruit and nuts, more than half of the tariff lines are subject to at least one NTM in one importing country. By contrast, for many manufactured products, the share of HS6 tariff lines impacted by a NTM is much lower. A strong exception is 'pharmaceutical products' (frequency ratio of 52.7%). Interestingly, textiles (chapter

XI) and footwear (chapter XII) – and to a lesser extend vehicles (chapter XVII) –, for which the competition between Northern and Southern countries is exacerbated, are subject to many NTMs suggesting that some of them may be protectionist measures.

The next column of Table 1 reports the average AVE of NTMs for each HS chapter allowing for the presence of externalities. The mean is computed over all importing countries and HS6 lines within each chapter. Strong differences can be observed across chapters. First, the magnitude of the mean AVE varies significantly across sectors and is much higher for agricultural products, textiles and footwear than for other products. Second, almost all chapters exhibit a positive average AVE, indicating that NTMs have, on average, a net negative impact on trade flows. However, for three chapters (chemicals, pearls and precious metals, and arms), the average AVE is negative, suggesting that NTMs are trade-enhancing either by improving quality or by being anti-protectionist. Not controlling for these positive trade effects may therefore bias the computation of AVEs, TRIs, and MTRIs. A closer look at our results suggests that 10% of AVEs of NTMs computed at the HS 6-digit level are negative. These negative AVEs are spread over all HS chapters. Column 3 of Table 1 underlines the upward bias affecting the computation of AVEs when externalities are not accounted for: as expected, the average AVE for each HS chapter is always higher than the average AVE obtained in column 2.

As highlighted with the frequency ratio, the share of HS6 tariff lines subject to at least one NTM greatly differs across chapters and could therefore bias the average AVE calculated using all HS6 lines. To control for this bias, columns 4 and 5 of Table 1 report the average AVE computed only on HS6 tariff lines on which at least one NTM is applied. Column 4 allows for the presence of externalities, while column 5 does not. As expected, the average AVE computed only on HS6 lines subject to a NTM is always higher in absolute value than the one based on all HS6 lines (with or without a NTM). However, the ranking of chapters is now slightly different. AVEs of NTMs are still high for several agricultural products (especially for fats & oils and animals). However, the magnitude of the mean AVE is also notable for some manufactured products (e.g. machinery). Furthermore, the difference between the AVEs computed using all HS6 lines and using only lines with a NTM cannot only be explained by the frequency of NTMs. For example, the frequency ratio of NTMs is relatively similar for mineral (chapter V, ratio: 9.7%) and stone glass (chapter XIII, ratio: 10.9%). However, the difference between the average AVE based on HS6 lines subject to a NTM and the one based on all HS6 lines is much higher for minerals than for stone (0.814 vs. 0.256 in the presence of externalities; 1.234 vs. 0.605 in the absence of externalities). This result is also observed at a more disaggregated level (see Table A.1 in the appendix). This divergence of AVEs can be rationalized by the difference in the shares of binding and non-binding NTMs across chapters as well as in the magnitudes of the AVEs of binding and non binding NTMs. These facts are investigated in Table 2.

Insert Table 1 here

Table 2 distinguishes between binding NTMs, i.e., those impeding trade flows, and non-binding NTMs. For simplicity, this table considers only AVEs of NTMs in the presence of externalities. The AVEs of binding NTMs are strictly positive, while the ones of non-binding NTMs are just non positive. The first four columns of Table 2 deal with binding NTMs and the last three with non-binding NTMs. The share of binding NTMs varies across chapters, from 18.6% (arms) to 65.4% (fats and oils). For 15 out of 20 chapters however, the majority of NTMs are binding (with a share in column 1 of Table 2 above 50%). We then successively report the average AVE, the share of significant AVEs (at the five percent significance level) and the average AVE computed using only significant observations. Several interesting facts emerge.

We previously noticed that NTMs were more numerous on agricultural products. According to the second column of Table 2, the AVEs of binding NTMs on agricultural products are however not necessarily higher than the ones obtained on manufactured products. For example, the average AVE for Minerals (2.483) is much higher than the one observed for agricultural products. The next column indicates that the share of significant AVEs for binding NTMs is rather high (between 46% for Optical and medical instruments and 90% for Pearls and precious metals). For 15 out of 20 aggregate sectors, this share is equal or higher to 50%. Lastly, we notice that in all but one cases (plastics), the average AVE based on significant binding NTMs is higher than the one computed using all (significant and non-significant) binding NTMs. These results are also observed at the HS 2-digit level (see Table A.2).

We now focus on non-binding NTMs (last three columns of Table 2). AVEs of non-binding NTMs are equal to zero or negative, and because of the non-negative prices' constraint, they are included in the interval [-1;0]. Recall that these negative AVEs have been ignored in the existing literature. For example, Kee et al. (2009) constrain their estimation in order to get null or positive AVEs only (Kee et al., 2009, p.177). Interestingly we can observe that the magnitude of these AVEs is high in absolute value. The minimum is equal to -0.803 (Beverages and tobacco), and the maximum (-0.974) is reached for Pearls and precious metals. The mean over all chapters is -0.841, with a standard deviation of 0.026. For all chapters, the numbers are even higher if we consider only significant observations. However, as highlighted in Table 2, very few non-binding NTMs have a statistically significant trade impact (below 6% for each chapter). This share of significant observations is much lower than the one previously observed for binding NTMs.

To sum up, our results suggest the presence of both binding and non-binding NTMs, with statistically significant trade effects. A much smaller share of significant AVEs is observed for non-binding NTMs than for binding NTMs. However, the magnitude of AVEs for non-binding NTMs is not negligible and often close to -1. Next, these AVEs of NTMs are further used to calculate the TRI and MTRI.

Insert Table 2 here

4.2. Trade restrictiveness indices

Table 3 presents the results for the MTRIs and TRIs at the country level. Table 4 provides some summary statistics for both indexes. Three calculations are performed based on (i) tariffs only, (ii) overall protection without allowing for externalities (as in Kee et al., 2009) and (iii) overall protection allowing for the presence of externalities. We first focus on the MTRIs and then investigate the results for the TRIs.

The MTRI represents the uniform tariff that would provide the same level of imports (as the one obtained with the existing structure of protection. Main results are as follows: First, if we look at the mercantilist indices computed using only tariffs (1st column of Table 3), we can observe that developed countries (where, on average, tariffs have been significantly reduced over the last decades) exhibit smaller MTRIs than developing and emerging countries. Interestingly, emerging countries have quite high MTRIs, sometimes higher than the ones observed for developing countries: for example, the MTRIs based on tariffs equal 0.105 for Brazil, 0.135 for China, and 0.257 for India which is the highest value observed in our sample including 93 countries. Second, the inclusion in the computation of production subsidies and NTMs but without allowing for the presence of externalities increases the values of the MTRIs (2nd column of Tables 3). If we look at summary statistics (2nd column of Table 4), the median and mean values are respectively 0.136 and 0.171; they were respectively equal to 0.081 and 0.072 when only tariffs were considered. The dispersion in the distribution is also higher, with a standard deviation of 0.116 (instead of 0.056). Third, allowing for the presence of externalities related to NTMs reduces the value of the MTRIs (column 3 of Tables 3 and 4). In other words, for all countries included in our sample, the MTRIs based on overall protection (tariffs, production subsidies and NTMs) and allowing for externalities are equal or smaller than the MTRIs based on overall protection but excluding externalities. This last result suggests that some NTMs have a trade enhancing effect for almost all countries. Lastly, Table 3 shows that for only 14 over 93 countries the values in column 3 (including overall protection and externalities) are higher than the values in column 1 (based only on tariffs). However, overall protection also includes domestic production subsidies. If we exclude these subsidies from the computation, the share is even smaller (only 9 countries over 93). This result suggests that considering NTMs as being always protectionist biases the evaluation of the restrictiveness of the trade policy.

The analysis of the TRIs offers similar conclusions. Recall that the TRI is the uniform tariff that would provide the same level of domestic welfare (as the one obtained with the existing structure of protection). When only tariffs are included in the calculation, we observe as previously higher values for developing and emerging countries than for developed ones (column 4 of Table 3). When the calculation includes production subsidies and NTMs (in addition to tariffs) with a protectionist prior on NTMs, then the TRI values are higher (column 5 of Tables 3 and 4). Last, when the TRI is computed using tariffs, NTMs and production subsidies but with an agnostic prior on the impact of NTMs (column 6 of Tables 3 and 4), the magnitude of the index is smaller for all countries (except for 3 of them[7]).

As previously mentioned, if equation (4) provides a negative dT (cf. supra), then the TRI level cannot be computed using (5). For these reasons, the last three columns of Tables 3 and 4 report the change in TRI, dT, i.e., the change in the index equivalent to the welfare impact of the policy interventions. The main previous conclusions remain unchanged. If we focus on the last column of Table 3 which is the most important one for our purpose, we observe that for 27 over 93 countries, the change in TRI is negative. Furthermore, for 45 over 93 countries, these values

[7] For these three countries, the result comes in fact from the AVEs of production subsidies and not for the AVEs of NTMs.

are smaller than the ones obtained when tariffs only are included in the computation (column 7 of Table 3). These two last results highlight that some NTMs can have positive welfare effects.

Insert Tables 3 and 4 here

5. Conclusion

We extend the TRI approach to a small distorted open economy to account for market imperfections (externalities, asymmetric information) and NTM domestic regulations addressing them. Up to date, the presence of externalities and potential anti-protectionist effects of NTMs has been ignored. Allowing for such occurrence, we derive the AVEs of NTMs, as well as the TRIs and MTRIs equivalent to all policy interventions (tariffs, NTMs and production subsidies). We show that in general the impact of NTMs on import demand is ambiguous depending on the relative strength of the import-enhancing effects of NTMs via a shift in domestic demand, and the protective effect of the same NTMs at the border. We then apply the approach to the UNCTAD-Comtrade database built by Kee et al. (2009). 10% of NTM AVEs computed at the HS 6-digit level are negative indicating a net trade-enhancing effect of these NTMs in those sectors. The MTRI and TRI results show that some NTMs have a trade enhancing effect for almost all countries. Policy recommendations on the trade and welfare impacts (MTRI and TRI) of NTMs will be biased by overstating their trade impeding and welfare decreasing effects.

Although we show it is possible to rationalize and econometrically identify trade-enhancing effects of NTMs mitigating external effects and other market imperfections or having anti-protectionist effects on domestic suppliers, we do so using UNCTAD NTM data and relatively simple NTM proxies. It would be interesting to refine these results and use more disaggregated data (e.g., Perinorm data) and focus on a subset of sectors for which we identify negative NTM AVEs. Nevertheless our results corroborate the trade-enhancing effects found in the literature for some products (e.g. Disdier et al., 2008; Moenius, 2004). The value added of our analysis is to formalize the possibility of anti-protectionist effects or external effects and their mitigation through regulations affecting quality of products and identify their effects on trade restrictiveness. Our analysis also extends the applicability of the TRI framework to more realistic market conditions and lets the data reveal unconstrained patterns.

References

Anderson, J.E., G.J. Bannister, and P. Neary (1995). "Domestic Distortions and International Trade," *International Economic Review* 36(1): 139-157.

Anderson, J. and P. Neary (1992). "Trade reforms with quotas, partial rent retention and tariffs," *Econometrica* 60(1): 57-76.

Anderson, J. and P. Neary (1994). "Measuring the restrictiveness of trade policy," *World Bank Economic Review* 8(2): 151-169.

Anderson, J. and P. Neary (1996). "A new approach to evaluating trade policy," *Review of Economic Studies* 63(1): 107-125.

Anderson, J. and P. Neary (2003). "The mercantilist index of trade policy," *International Economic Review* 44(2): 627-649.

Anderson, J. and P. Neary (2005). *Measuring the Restrictiveness of Trade Policy*, Boston: MIT Press.

Beghin, J.C., J.C. Bureau, and S.J. Park (2003). "Food Security and Agricultural Protection in South Korea," *American Journal of Agricultural Economics* 85(3): 618-632.

Beghin, J.C., D. Roland-Holst, and D. van der Mensbrugghe (1997). "Trade and Environment Linkages. Piecemeal Reform and Optimal Intervention," *Canadian Journal of Economics* 30(2): 442-455.

Bratt, M. (2012). "Estimating the Bilateral Impact of NTMs," Manuscript, University of Geneva.

Chau, N.H., R. Färe, and S. Grosskopf (2007). "Trade Restrictiveness and Pollution," WP 2007-15, Department of Applied Economics and Management, Cornell University, Ithaca, New York.

Copeland, B.R. (1994). "International Trade and the Environment: Policy Reform in a Polluted Small Open Economy," *Journal of Environmental Economics and Management* 26(1): 44-65.

CPSC, U.S. Consumer Product Safety Commission (2008). "Import Safety Strategy," Manuscript, Washington D.C.

Disdier, A.-C., Fontagné, L. and Mimouni, M. (2008), "The Impact of Regulations on Agricultural Trade: Evidence from the SPS and TBT Agreements", *American Journal of Agricultural Economics* 90(2): 336-350.

Disdier, A-C. and S. Marette (2010). "The Combination of Gravity and Welfare Approaches for Evaluating Non-Tariff Measures," *American Journal of Agricultural Economics* 92(3): 713-726.

Feenstra, R.C. (1995). "Estimating the effects of trade policy," in G. Grossman and K. Rogoff (eds.), *Handbook of International Economics*, vol. 3, Elsevier, Amsterdam.

Fisher, R. and P. Serra (2000). "Standards and protection," *Journal of International Economics* 52(2): 377-400.

Halvorsen, R. and R. Palmquist (1980). "The Interpretation of Dummy Variables in Semilogarithmic Equations," *American Economic Review* 70(3): 474-475.

Hoekman, B. and A. Nicita (2011). "Trade Policy, Trade Costs, and Developing Country Trade," *World Development* 39(12): 2069-2079.

Kee, H.L., A. Nicita, and M. Olarreaga (2008). "Import Demand Elasticities and Trade Distortions," *Review of Economics and Statistics* 90(4): 666-682.

Kee, H.L., A. Nicita, and M. Olarreaga (2009). "Estimating Trade Restrictiveness Indices," *The Economic Journal* 119: 172-199.

Li, Y. and J.C. Beghin (2012). "A Meta-Analysis of Estimates of the Impact of Technical Barriers to Trade," *Journal of Policy Modeling* 34(3): 497-511.

Lipton, E. and D. Barboza (2007). "As More Toys Are Recalled, Trail Ends in China," *The New York Times*, Web Edition, June 20th.

Lloyd, P. and D. MacLaren (2008). "An Estimated Trade Restrictiveness Index of the Level of Protection in Australian Manufacturing," *Australian Economic Review* 41(3): 250-259.

McDermott, C. and B. Cashore (2009). "Forestry Driver, Mapping Project - Global and US Trade Report," Yale University, School of Forestry & Environmental Studies, GISF Research Report 012.

Moenius, J. (2004), "Information versus Product Adaptation: The Role of Standards in Trade", Northwestern University, Kellogg School of Management, International Business and Markets Research Center Working Paper.

Table 1: Frequency ratios and AVEs of NTMs, by HS chapter

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

Note: This table considers only AVEs of NTMs in the presence of externalities.

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
ALB	Albania	0.117	0.123	0.110	0.134	0.150	0.109	0.018	0.022	0.012
ARG	Argentina	0.129	0.178	0.081	0.141	0.341	0.223	0.020	0.116	0.050
AUS	Australia	0.057	0.126	-0.078	0.095	0.266	-	0.009	0.071	-0.089
AUT	Austria	0.016	0.076	0.018	0.053	0.406	0.369	0.003	0.165	0.136
BEL	Belgium	0.021	0.100	0.022	0.067	0.452	0.418	0.005	0.204	0.175
BFA	Burkina Faso	0.106	0.152	0.092	0.122	0.258	0.156	0.015	0.066	0.024
BGD	Bangladesh	0.178	0.247	0.108	0.225	0.389	0.259	0.051	0.151	0.067
BLR	Belarus	0.085	0.168	0.075	0.106	0.315	0.181	0.011	0.099	0.033
BOL	Bolivia	0.080	0.144	0.065	0.086	0.268	0.106	0.007	0.072	0.011
BRA	Brazil	0.105	0.247	0.080	0.128	0.416	0.217	0.016	0.173	0.047
BRN	Brunei	0.141	0.205	0.155	0.572	0.846	0.581	0.327	0.716	0.338
CAN	Canada	0.028	0.057	-0.058	0.076	0.174	-	0.006	0.030	-0.064
CHE	Switzerland	0.039	0.068	-0.071	0.192	0.273	-	0.037	0.075	-0.055
CHL	Chile	0.069	0.107	0.012	0.069	0.196	-	0.005	0.038	-0.035
CHN	China	0.135	0.205	0.013	0.203	0.366	-	0.041	0.134	-0.007
CIV	Ivory Coast	0.094	0.318	-0.338	0.118	0.524	-	0.014	0.275	-0.254
CMR	Cameroon	0.140	0.165	0.137	0.160	0.226	0.186	0.026	0.051	0.034
COL	Colombia	0.112	0.240	-0.008	0.131	0.446	0.083	0.017	0.199	0.007
CRI	Costa Rica	0.040	0.042	0.010	0.072	0.096	-	0.005	0.009	-0.019
CZE	Czech Rep.	0.041	0.048	0.002	0.063	0.094	-	0.004	0.009	-0.023
DEU	Germany	0.014	0.070	0.000	0.049	0.379	0.334	0.002	0.144	0.111
DNK	Denmark	0.017	0.114	-0.046	0.047	0.547	0.434	0.002	0.299	0.188
DZA	Algeria	0.129	0.383	-0.093	0.159	0.578	-	0.025	0.334	-0.025
EGY	Egypt	0.128	0.421	-0.119	0.197	0.690	0.267	0.039	0.477	0.071
ESP	Spain	0.015	0.081	-0.014	0.055	0.513	0.461	0.003	0.263	0.212
EST	Estonia	0.009	0.023	0.003	0.050	0.127	-	0.002	0.016	-0.001
ETH	Ethiopia	0.136	0.148	0.075	0.182	0.217	-	0.033	0.047	-0.003
FIN	Finland	0.011	0.046	0.005	0.042	0.301	0.341	0.002	0.090	0.117
FRA	France	0.013	0.078	0.000	0.044	0.361	0.289	0.002	0.130	0.083
GAB	Gabon	0.153	0.153	0.123	0.175	0.176	0.074	0.031	0.031	0.005
GBR	Great Britain	0.019	0.083	-0.003	0.090	0.393	0.315	0.008	0.154	0.099
GHA	Ghana	0.144	0.185	0.124	0.245	0.356	0.250	0.060	0.126	0.063
GRC	Greece	0.012	0.066	0.029	0.049	0.554	0.541	0.002	0.307	0.293
GTM	Guatemala	0.068	0.172	-0.034	0.096	0.361	-	0.009	0.130	-0.034
HKG	Hong Kong	0.000	0.014	-0.042	0.000	0.109	-	0.000	0.012	-0.038
HND	Honduras	0.067	0.083	0.075	0.092	0.152	0.138	0.008	0.023	0.019
HUN	Hungary	0.061	0.113	0.036	0.087	0.249	0.083	0.008	0.062	0.007
IDN	Indonesia	0.046	0.082	0.050	0.085	0.355	0.153	0.007	0.126	0.023
IND	India	0.257	0.317	0.172	0.297	0.668	0.601	0.088	0.446	0.361
IRL	Ireland	0.008	0.040	0.014	0.042	0.240	0.208	0.002	0.058	0.043
ISL	Iceland	0.029	0.061	0.012	0.122	0.231	0.094	0.015	0.053	0.009
ITA	Italy	0.017	0.088	0.011	0.072	0.441	0.376	0.005	0.195	0.142
JOR	Jordan	0.120	0.262	-0.033	0.163	0.422	-	0.027	0.178	-0.046
JPN	Japan	0.078	0.299	0.161	0.323	0.589	0.472	0.105	0.347	0.223
KAZ	Kazakhstan	0.043	0.149	0.016	0.073	0.350	0.058	0.005	0.123	0.003

KEN	Kenya	0.119	0.127	0.110	0.184	0.206	0.178	0.034	0.043	0.032
KOR	South Korea	0.107	0.108	0.107	0.505	0.510	0.510	0.255	0.260	0.261
LBN	Lebanon	0.057	0.196	0.043	0.098	0.387	0.178	0.010	0.150	0.032
LKA	Sri Lanka	0.074	0.075	0.065	0.138	0.139	0.100	0.019	0.019	0.010
LTU	Lithuania	0.021	0.056	-0.053	0.064	0.189	-	0.004	0.036	-0.060
LVA	Latvia	0.028	0.136	0.006	0.073	0.339	0.087	0.005	0.115	0.008
MAR	Morocco	0.228	0.472	-0.109	0.275	0.728	0.339	0.076	0.530	0.115
MDA	Moldova	0.047	0.072	0.041	0.202	0.239	0.182	0.041	0.057	0.033
MDG	Madagascar	0.030	0.042	0.023	0.049	0.107	-	0.002	0.011	-0.005
MEX	Mexico	0.151	0.303	0.025	0.211	0.490	0.235	0.045	0.240	0.055
MLI	Mali	0.097	0.129	0.077	0.112	0.183	0.074	0.012	0.034	0.005
MUS	Mauritius	0.122	0.207	0.105	0.233	0.386	0.254	0.054	0.149	0.064
MWI	Malawi	0.098	0.150	0.113	0.130	0.244	0.166	0.017	0.060	0.028
MYS	Malaysia	0.053	0.446	-0.093	0.246	0.693	-	0.061	0.480	-0.011
NGA	Nigeria	0.221	0.418	-0.180	0.309	0.620	-	0.096	0.384	-0.026
NIC	Nicaragua	0.049	0.134	-0.028	0.080	0.296	-	0.006	0.088	-0.035
NLD	Netherlands	0.014	0.084	0.012	0.059	0.491	0.441	0.003	0.241	0.194
NOR	Norway	0.045	0.078	0.020	0.255	0.333	0.247	0.065	0.111	0.061
NZL	New Zealand	0.027	0.142	-0.148	0.044	0.401	-	0.002	0.161	-0.087
OMN	Oman	0.117	0.176	0.116	0.257	0.375	0.279	0.066	0.140	0.078
PER	Peru	0.126	0.224	0.073	0.129	0.390	0.218	0.017	0.152	0.047
PHL	Philippines	0.029	0.435	-0.055	0.059	0.640	-	0.004	0.410	-0.023
PNG	Pap. N. Guinea	0.029	0.094	0.009	0.152	0.293	0.082	0.023	0.086	0.007
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

[1] With an externality and some negative AVEs, the MTRI can be smaller or larger than the TRI and the two indices may not have similar signs.

Table 4. Trade restrictiveness indices, summary statistics

	MTRI Tariffs	MTRI Overall protection w/o. externality	MTRI Overall protection w. externality	TRI Tariffs	TRI Overall protection w/o. externality	TRI Overall protection w. externality	dTRI Tariffs	dTRI Overall protection w/o. externality	dTRI Overall protection w. externality
Minimum	0.000	0.014	-0.338	0.000	0.085	0.022	0.000	0.007	-0.290
Maximum	0.257	0.519	0.195	0.572	0.846	0.938	0.327	0.716	0.879
Mean	0.081	0.171	0.019	0.141	0.365	0.259	0.029	0.161	0.051
Median	0.072	0.136	0.022	0.122	0.355	0.221	0.015	0.126	0.028
Std deviation	0.056	0.116	0.091	0.097	0.169	0.168	0.047	0.145	0.136

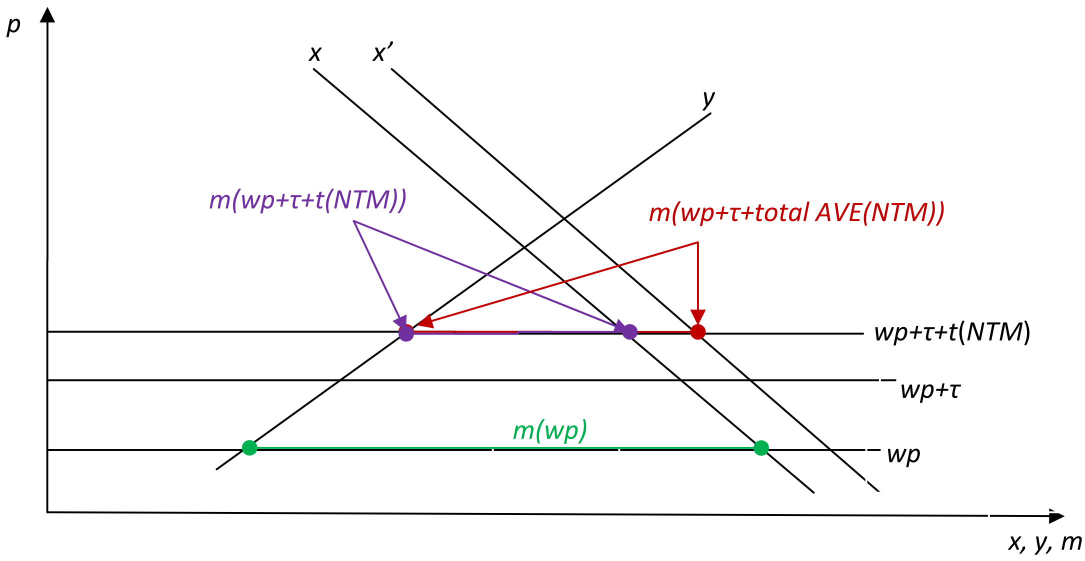

Figure 1. The impact of NTMs on demand, supply and imports

Appendix

Table A.1. Frequency ratios and AVEs of NTMs, by HS 2-digit sector

HS Chapters	HS2 Codes	HS2 Names	Simple frequency ratio of NTMs	AVE of NTMs all HS6 lines (mean) with externality	AVE of NTMs all HS6 lines (mean) w/o. externality	AVE of NTMs if NTM=1 (mean) with externality	AVE of NTMs if NTM=1 (mean) w/o. externality
Animals	01	Live animals	0.507	0.157	0.349	0.311	0.688
	02	Meat & edible meat offal	0.504	0.508	0.688	1.008	1.365
	03	Fish and crustaceans	0.453	0.053	0.306	0.117	0.675
	04	Dairy products, eggs	0.528	0.675	0.738	1.278	1.397
	05	Products of animal origin	0.245	-0.003	0.115	-0.014	0.469
Vegetables	06	Live trees & other plans, bulbs, roots	0.489	-0.082	0.125	-0.167	0.255
	07	Edible vegetables	0.490	0.117	0.320	0.240	0.654
	08	Edible fruit and nuts	0.507	0.180	0.356	0.355	0.703
	09	Coffee, tea, maté	0.430	0.092	0.294	0.213	0.684
	10	Cereals	0.421	0.057	0.308	0.137	0.731
	11	Products of the milling industry	0.373	0.310	0.363	0.831	0.974
	12	Oil seeds & oleaginous fruits	0.342	0.107	0.280	0.312	0.817
	13	Lac, gums & resins	0.309	-0.164	0.053	-0.530	0.173
	14	Vegetable plaiting materials	0.160	0.127	0.148	0.794	0.927
Fats and oils	15	Animal or vegetable fats and oils	0.370	0.293	0.427	0.791	1.153
Beverages	16	Preparations of meat, of fish	0.525	0.106	0.302	0.202	0.576
	17	Sugars	0.463	0.288	0.404	0.622	0.873
	18	Cocoa	0.414	0.084	0.268	0.204	0.647
	19	Preparations of cereals, flour, starch or milk	0.452	0.405	0.557	0.898	1.234
	20	Preparations of vegetables, fruit, nuts	0.453	0.247	0.398	0.545	0.877
	21	Miscellaneous edible preparations	0.500	0.293	0.432	0.586	0.864
	22	Beverages, spirits and vinegar	0.361	0.023	0.270	0.063	0.746
	23	Residues and waste from the food industries	0.201	0.089	0.197	0.441	0.980
	24	Tobacco	0.466	-0.001	0.228	-0.002	0.491
Minerals	25	Salt	0.085	0.025	0.067	0.295	0.797
	26	Ores, slag and ash	0.048	0.014	0.028	0.304	0.594
	27	Mineral fuels, mineral oils	0.164	0.276	0.352	1.684	2.153
Chemicals	28	Inorganic chemicals	0.149	0.011	0.099	0.073	0.664
	29	Organic chemicals	0.196	-0.001	0.125	-0.003	0.637
	30	Pharmaceutical products	0.527	0.125	0.421	0.237	0.799
	31	Fertilizers	0.283	-0.039	0.134	-0.138	0.474
	32	Tanning or dyeing extracts	0.167	0.039	0.114	0.231	0.684
	33	Essential oils and resinoids	0.287	-0.118	0.085	-0.409	0.296
	34	Soaps	0.232	-0.071	0.080	-0.305	0.347
	35	Albuminoidal substances	0.203	-0.119	0.038	-0.586	0.188
	36	Explosives	0.201	0.023	0.134	0.112	0.667
	37	Photographic or cinematographic goods	0.107	0.017	0.069	0.155	0.640
	38	Miscellaneous chemical products	0.162	-0.027	0.075	-0.169	0.461
Plastics	39	Plastics	0.162	0.057	0.119	0.349	0.737
	40	Rubber	0.155	0.101	0.168	0.650	1.083
Leather	41	Raw hides and skins	0.117	0.045	0.100	0.387	0.855
	42	Leather	0.147	0.018	0.081	0.122	0.553
	43	Fur skins and artificial fur	0.102	-0.003	0.033	-0.033	0.319
Wood	44	Wood	0.171	0.022	0.087	0.130	0.508
	45	Cork	0.107	0.152	0.156	1.422	1.454

	46	Straw	0.113	0.006	0.029	0.050	0.257
Paper	47	Pulp of wood	0.090	0.032	0.063	0.352	0.698
	48	Paper	0.137	0.003	0.069	0.023	0.503
	49	Printed books, newspapers	0.134	0.054	0.067	0.405	0.501
Textiles	50	Silk	0.176	0.329	0.398	1.872	2.263
	51	Wool	0.248	0.301	0.390	1.214	1.576
	52	Cotton	0.259	0.025	0.150	0.096	0.581
	53	Other vegetable textile fibres	0.220	0.128	0.194	0.581	0.880
	54	Man-made filaments	0.303	0.007	0.157	0.022	0.517
	55	Man-made staple fibres	0.279	0.096	0.200	0.346	0.717
	56	Wadding	0.289	0.246	0.384	0.850	1.330
	57	Carpets	0.260	0.174	0.297	0.668	1.143
	58	Special woven fabrics	0.242	0.229	0.367	0.947	1.516
	59	Impregnated, coated, covered or laminated textile fabrics	0.259	0.091	0.196	0.353	0.757
	60	Knitted or crocheted fabrics	0.256	0.089	0.192	0.348	0.750
	61	Articles of apparel & clothing accessories, knitted/ crocheted	0.287	0.274	0.325	0.954	1.131
	62	Art. of apparel & clothing accessories, not knitted/ crocheted	0.321	0.026	0.176	0.082	0.547
	63	Other made-up textile articles	0.273	0.052	0.217	0.190	0.793
Footwear	64	Footwear	0.362	0.068	0.188	0.187	0.518
	65	Headgear	0.130	0.207	0.230	1.586	1.764
	66	Umbrellas	0.097	-0.007	0.032	-0.077	0.332
	67	Feathers	0.088	0.176	0.193	1.994	2.190
Stone glass	68	Stone	0.087	0.018	0.059	0.202	0.673
	69	Ceramic products	0.128	0.032	0.073	0.250	0.568
	70	Glass	0.119	0.043	0.088	0.362	0.742
Pearls	71	Pearls	0.015	-0.005	0.004	-0.364	0.273
Metals	72	Iron & steel	0.124	0.071	0.135	0.573	1.090
	73	Articles of iron or steel	0.148	0.030	0.086	0.206	0.581
	74	Copper	0.092	-0.008	0.045	-0.090	0.490
	75	Nickel	0.047	0.025	0.042	0.533	0.893
	76	Aluminum	0.128	-0.004	0.048	-0.031	0.376
	78	Lead	0.052	0.007	0.035	0.131	0.670
	79	Zinc	0.086	0.018	0.060	0.210	0.699
	80	Tin	0.064	-0.005	0.024	-0.081	0.368
	81	Other base metals	0.060	0.092	0.108	1.546	1.801
	82	Tools	0.150	0.043	0.090	0.286	0.598
	83	Miscellaneous articles of base metal	0.132	0.023	0.078	0.172	0.590
Machinery	84	Nuclear reactors	0.168	0.113	0.182	0.671	1.084
	85	Electrical machinery & equipment	0.186	0.071	0.140	0.381	0.755
Vehicles	86	Railway	0.078	0.087	0.098	1.108	1.256
	87	Vehicles	0.277	0.003	0.153	0.012	0.551
	88	Aircraft	0.122	0.008	0.071	0.064	0.583
	89	Ships, boats	0.080	0.011	0.044	0.138	0.547
Optical, medic.	90	Optical, photographic, measuring, precision, medical instr.	0.184	0.021	0.107	0.112	0.579
instruments	91	Clocks and watches	0.000	-	-	-	-
	92	Musical instruments	0.068	0.022	0.043	0.317	0.639
Arms	93	Arms	0.306	-0.191	0.057	-0.625	0.186
Miscellaneous	94	Furniture	0.149	0.177	0.225	1.191	1.509
	95	Toys	0.162	0.042	0.106	0.262	0.656
	96	Miscellaneous manufactured articles	0.126	0.019	0.068	0.150	0.542

Table A.2. AVEs of binding and non-binding NTMs, by HS 2-digit sector

HS2 Sectors	Share of binding NTMs	Binding NTMs (AVE>0)			Non-binding NTMs (AVE≤0)		
		AVE of NTMs if NTM=1 (mean)	Share of signif. AVE (5%)	AVE if NTM=1 & AVE signif. (5%) (mean)	AVE of NTMs if NTM=1 (mean)	Share of signif. AVE (5%)	AVE if NTM=1 & AVE signif. (5%) (mean)
Live animals	0.628	1.026	0.796	1.136	-0.898	0.030	-0.896
Meat & edible meat offal	0.693	1.802	0.700	2.305	-0.783	0.019	-0.835
Fish and crustaceans	0.436	1.386	0.722	1.655	-0.863	0.073	-0.938
Dairy products, eggs	0.859	1.607	0.819	1.769	-0.730	0.063	-1.000
Products of animal origin	0.436	0.963	0.662	1.194	-0.770	0.048	-0.919
Live trees & other plans, bulbs, roots	0.512	0.442	0.558	0.531	-0.807	0.041	-0.969
Edible vegetables	0.638	0.864	0.815	0.903	-0.858	0.039	-0.985
Edible fruit and nuts	0.559	1.326	0.697	1.494	-0.876	0.012	-0.975
Coffee, tea, maté	0.543	1.113	0.584	1.350	-0.858	0.061	-0.991
Cereals	0.548	0.928	0.801	1.055	-0.821	0.070	-0.878
Products of the milling industry	0.850	1.132	0.893	1.218	-0.865	0.140	-0.967
Oil seeds & oleaginous fruits	0.439	1.879	0.674	2.012	-0.912	0.053	-0.941
Lac, gums & resins	0.258	0.636	0.455	0.855	-0.935	0.014	-1.000
Vegetable plaiting materials	0.786	1.264	0.841	1.213	-0.927	0.000	-
Animal or vegetable fats and oils	0.654	1.646	0.654	1.795	-0.823	0.028	-0.914
Preparations of meat, of fish	0.620	0.857	0.772	0.982	-0.866	0.014	-0.993
Sugars	0.705	1.204	0.678	1.471	-0.769	0.000	-
Cocoa	0.551	1.004	0.662	1.191	-0.778	0.006	-0.917
Preparations of cereals, flour, starch or milk	0.583	1.996	0.560	2.166	-0.638	0.062	-0.840
Preparations of vegetables, fruit, nuts	0.657	1.244	0.606	1.501	-0.795	0.008	-0.894
Miscellaneous edible preparations	0.628	1.363	0.614	1.633	-0.728	0.026	-0.993
Beverages, spirits and vinegar	0.303	2.329	0.620	3.213	-0.921	0.051	-0.981
Residues and waste from the food industries	0.461	1.922	0.472	3.394	-0.827	0.048	-1.000
Tobacco	0.451	0.933	0.497	1.340	-0.772	0.059	-0.929
Salt	0.503	1.482	0.669	1.917	-0.904	0.019	-0.998
Ores, slag and ash	0.685	0.859	0.820	0.922	-0.900	0.073	-0.931
Mineral fuels, mineral oils	0.508	4.069	0.648	5.914	-0.777	0.067	-0.878
Inorganic chemicals	0.378	1.612	0.572	1.985	-0.863	0.013	-0.900
Organic chemicals	0.344	1.715	0.549	2.468	-0.906	0.013	-0.969
Pharmaceutical products	0.318	2.609	0.224	2.579	-0.869	0.016	-0.975
Fertilizers	0.343	1.176	0.380	1.643	-0.825	0.128	-0.975
Tanning or dyeing extracts	0.485	1.186	0.379	1.788	-0.667	0.000	-
Essential oils and resinoids	0.255	0.897	0.388	1.338	-0.856	0.016	-0.961
Soaps	0.302	0.890	0.317	1.462	-0.822	0.000	-
Albuminoidal substances	0.210	0.598	0.320	0.904	-0.901	0.005	-1.000
Explosives	0.443	1.338	0.387	2.780	-0.862	0.026	-0.994
Photographic, cinematographic goods	0.501	1.193	0.570	1.561	-0.889	0.018	-0.985
Miscellaneous chemical products	0.362	1.096	0.503	1.003	-0.885	0.008	-0.903
Plastics	0.574	1.203	0.545	1.552	-0.802	0.000	-
Rubber	0.508	2.098	0.469	1.258	-0.843	0.000	-
Raw hides and skins	0.525	1.567	0.784	1.793	-0.919	0.040	-1.000
Leather	0.521	1.096	0.736	1.235	-0.938	0.044	-1.000
Fur skins and artificial fur	0.560	0.536	0.640	0.661	-0.757	0.000	-
Wood	0.573	0.851	0.658	1.016	-0.838	0.063	-0.958
Cork	0.935	1.587	0.690	1.720	-0.968	0.000	-
Straw	0.614	0.478	0.629	0.567	-0.631	0.000	-

Pulp of wood	0.527	1.454	0.584	2.072	-0.877	0.043	-1.000
Paper	0.460	1.021	0.456	1.591	-0.828	0.010	-0.910
Printed books, newspapers	0.739	0.798	0.449	0.980	-0.708	0.000	-
Silk	0.622	3.579	0.786	4.399	-0.941	0.059	-1.000
Wool	0.569	2.714	0.639	3.937	-0.768	0.026	-0.958
Cotton	0.456	1.177	0.618	1.582	-0.812	0.050	-0.946
Other vegetable textile fibres	0.637	1.367	0.716	1.657	-0.798	0.021	-0.826
Man-made filaments	0.482	0.970	0.692	1.047	-0.860	0.032	-0.979
Man-made staple fibres	0.559	1.250	0.670	1.492	-0.803	0.041	-0.917
Wadding	0.504	2.470	0.582	3.567	-0.799	0.033	-0.959
Carpets	0.509	2.091	0.537	3.445	-0.810	0.038	-0.936
Special woven fabrics	0.475	2.971	0.662	1.787	-0.880	0.009	-0.896
Impregn., coated, covered, laminated textile fabrics	0.572	1.249	0.715	1.503	-0.848	0.000	-
Knitted or crocheted fabrics	0.521	1.473	0.694	1.741	-0.877	0.033	-0.917
Apparel & clothing accessories, knitted/ crocheted	0.511	2.694	0.676	0.995	-0.861	0.015	-0.917
Apparel & clothing access., not knitted/ crocheted	0.405	1.453	0.587	1.694	-0.849	0.018	-0.888
Other made-up textile articles	0.412	1.635	0.467	2.417	-0.822	0.015	-0.966
Footwear	0.561	0.961	0.485	1.422	-0.800	0.013	-0.803
Headgear	0.760	2.371	0.467	1.471	-0.903	0.000	-
Umbrellas	0.508	0.569	0.600	0.724	-0.745	0.034	-0.862
Feathers	0.867	2.452	0.712	3.244	-0.987	0.125	-1.000
Stone	0.489	1.282	0.492	1.992	-0.829	0.030	-0.998
Ceramic products	0.565	1.022	0.454	1.596	-0.752	0.071	-0.941
Glass	0.616	1.136	0.513	1.543	-0.879	0.017	-1.000
Pearls	0.364	0.703	0.900	0.736	-0.974	0.057	-1.000
Iron & steel	0.459	2.262	0.530	3.700	-0.862	0.030	-0.975
Articles of iron or steel	0.557	0.975	0.420	1.433	-0.761	0.016	-0.917
Copper	0.409	1.063	0.497	1.575	-0.888	0.011	-0.981
Nickel	0.641	1.358	0.683	1.719	-0.937	0.000	-
Aluminum	0.489	0.800	0.451	1.109	-0.825	0.015	-0.840
Lead	0.489	1.197	0.818	1.304	-0.888	0.000	-
Zinc	0.513	1.207	0.590	1.137	-0.840	0.000	-
Tin	0.556	0.592	0.600	0.696	-0.922	0.000	-
Other base metals	0.763	2.305	0.818	2.622	-0.898	0.000	-
Tools	0.629	0.925	0.565	1.191	-0.800	0.003	-1.000
Miscellaneous articles of base metal	0.601	0.852	0.513	1.031	-0.855	0.006	-1.000
Nuclear reactors	0.621	1.574	0.503	1.483	-0.807	0.022	-0.955
Electrical machinery & equipment	0.578	1.254	0.481	1.540	-0.817	0.011	-0.949
Railway	0.827	1.509	0.955	1.567	-0.810	0.000	-
Vehicles	0.388	1.311	0.418	1.639	-0.810	0.034	-0.925
Aircraft	0.477	1.126	0.704	1.075	-0.903	0.000	-
Ships, boats	0.504	1.055	0.672	1.039	-0.794	0.053	-0.997
Optical, photog., measuring, precision, medical instr.	0.495	1.099	0.437	1.539	-0.856	0.007	-0.930
Clocks and watches	-	-	-	-	-	-	-
Musical instruments	0.652	0.988	0.773	1.149	-0.940	0.000	-
Arms	0.186	0.739	0.581	0.971	-0.936	0.051	-0.973
Furniture	0.676	2.193	0.724	2.624	-0.904	0.000	-
Toys	0.583	1.086	0.699	1.269	-0.889	0.000	-
Miscellaneous manufactured articles	0.528	1.053	0.488	1.333	-0.860	0.004	-1.000