

Non-Tariff measures, competitiveness and firms' population

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Halle, 21-22 June 2018

Introduction

There is a large and influential body of research concerned with the analysis of the effects trade barriers for both imposing and affected country

- Trade flows across countries
- Exporter behavior
- Welfare gains
- Labor market outcomes
- Competition effects

In most of the cases trade barriers are perceived has tariffs or absence of trade agreements (RTA, PTA, etc)

Introduction

Non Tariff Trade Barriers

However there is a growing interest in the role of Non Tariff Measures (NTMs).

Similarly to tariff, technical standards can be trade barriers.

- Technical standards are regulated by WTO.
- While tariffs have been reduced over time, the NTMs continue to guarantee a certain degree of market protection (Orefice 2017).
- NTM are parts of Preferential Trade Agreements (PTAs) (Hofmann et al. 2017).

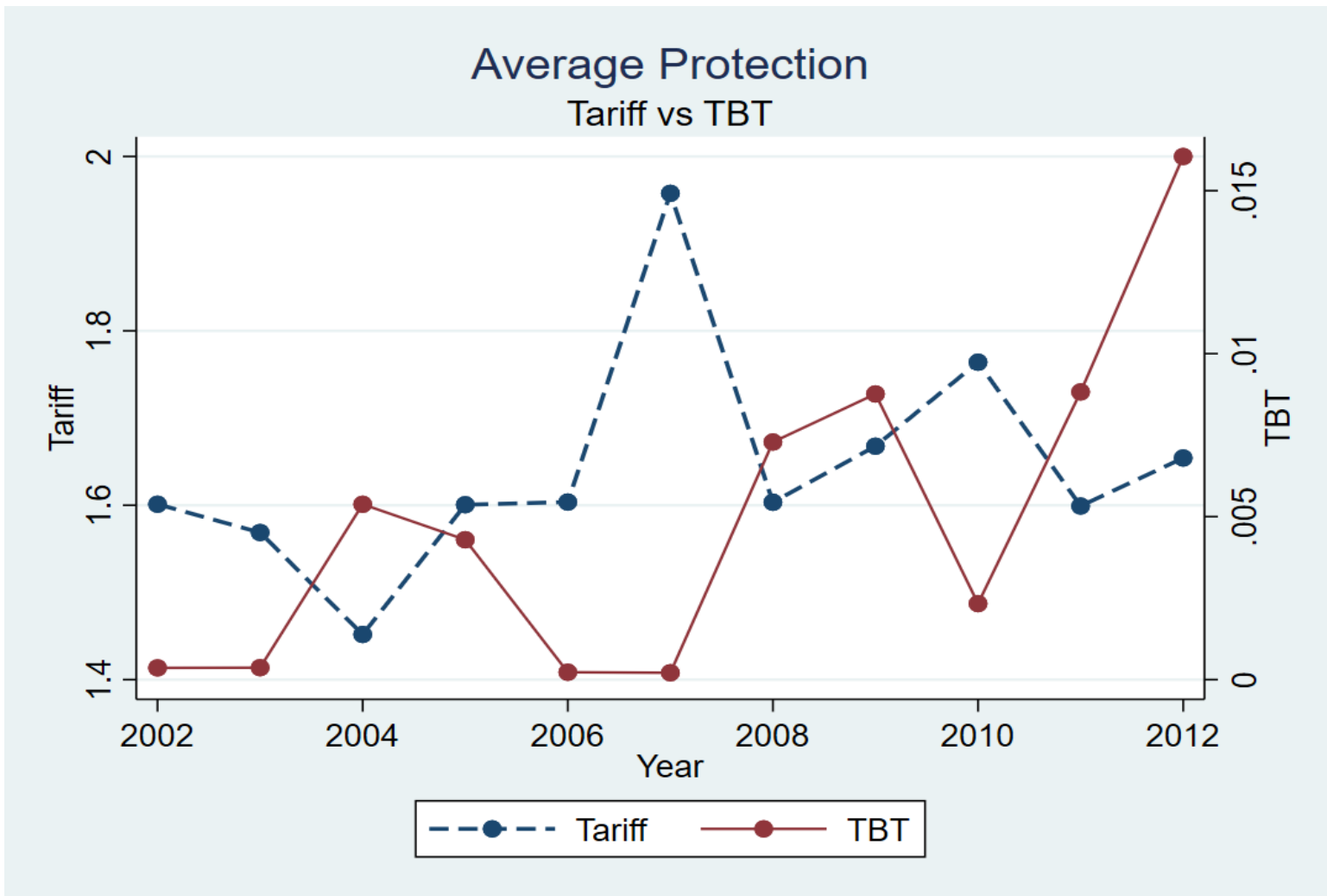
NTM (as technical standards) may be use as a measure of protectionism:

Do NTMs generate similar outcomes of tariffs?

Presentation outline

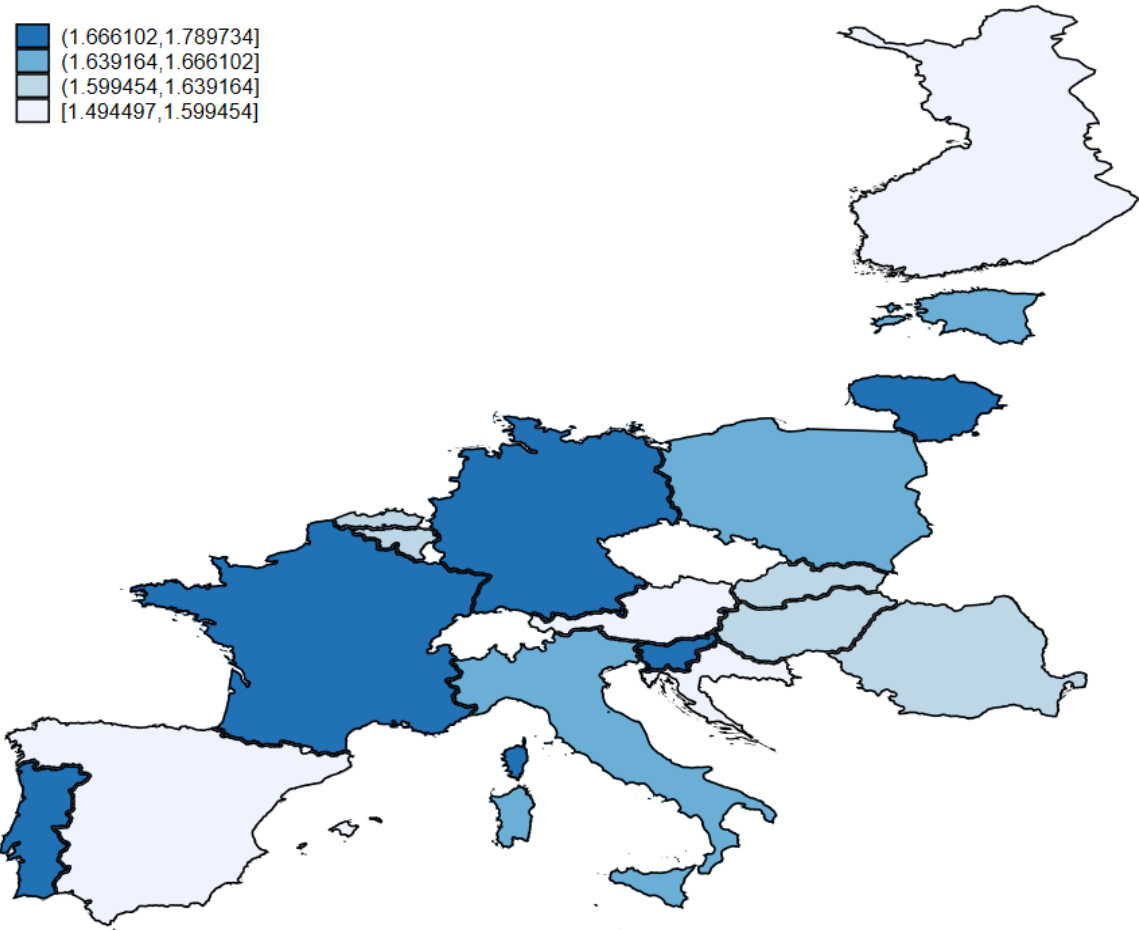
- Stylized facts and motivation
- Literature
- Theoretical model and testable predictions
- Data
- Empirical Analysis
- Results

Motivation: Tariff vs NTMs as trade barriers?



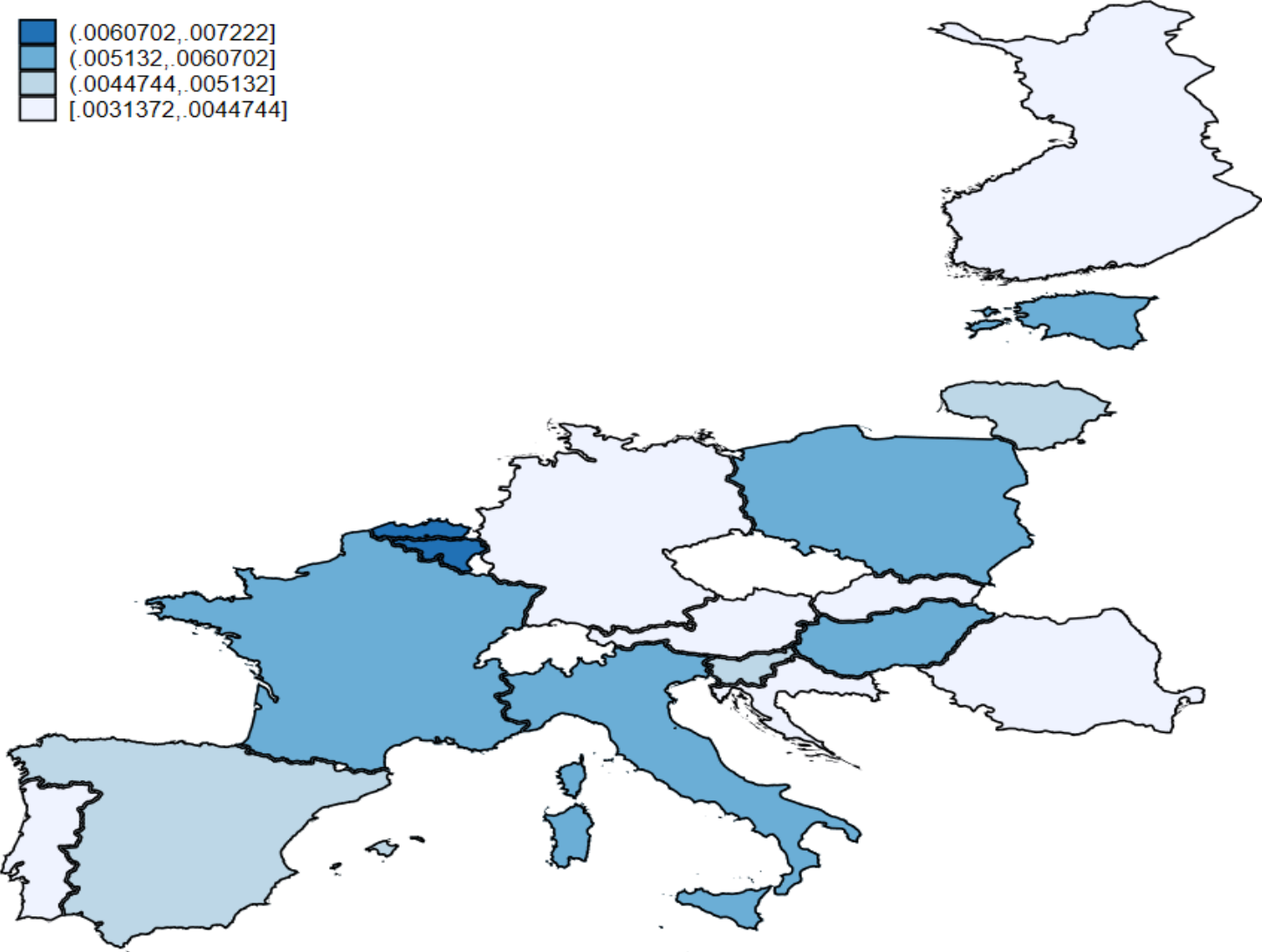
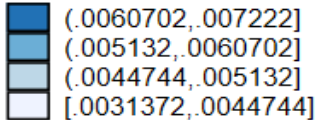
Heterogeneity across Europe: tariffs

Average Tariff Protection



Heterogeneity across Europe: NTMs

Average TBT Protection



Motivation

NTMs are not introduced with a protectionist aim. The scope is to increase safety and welfare by imposing standards to producers (local and foreign).

However, NTMs can be perceived by trade partners as an obstacle. WTO established committees to solve concerns related to standard perceived as discriminatory.

We focus on **Technical Barriers to Trade (TBT)**

“The Technical Barriers to Trade (TBT) Agreement aims to ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade.”

Motivation

Type of NTM

In principle, NTMs different from tariffs:

- A *tariff* works as a tax on import (wedge cost between domestic and foreign firms)
- *NTMs* may potentially affect the cost of both domestic and foreign producers.
 - NTMs for all (newly adopted by domestic firms and foreign exporters)
 - NTMs only for foreign exporters (already adopted by domestic firms)
- Even if *NTMs* impose a cost on foreign exporter it is not necessarily discriminatory

Motivation

Type of NTM

- NTMs for all (newly adopted by domestic firms and foreign exporters)
 - ✓ Eco-design requirements for air conditioners, as minimum energy performance. EU testing standard for judging compliance with the regulation had not yet been formulated, and the relevant ISO Standard was still under formulation: cost to adapt products in short time is a TBT (China STC vs EU, 2011, G/TBT/M/56)
 - ✓ Similar concern for battery capacity (Japan STC, 2008)
- NTMs only for foreign exporters (already adopted by domestic firms)
 - ✓ Labelling in wine products: “traditional expressions” (29 concerns since 2000).

Objectives

In this paper, we take the perspective of the domestic (protected) producers.

Impact of *NTMs* on domestic firms (including exporters), given underlying firms' heterogeneity

- What is the effect of protection raised by NTMs on domestic market?
- Are the effects of NTMs different from tariff ?

What do we do?

- We develop a theoretical framework (Melitz-Ottaviano) to analyze the effects of protectionism on firms' population and productivity in three cases
 1. The introduction of a tariff
 2. Introduction of NTM only affecting foreign firms
 3. Introduction of NTM affecting domestic and foreign producers
- Using several data sources (STC WTO-I-TIP, WTO TRAINS, CompNet) we test the model's implications for a sample of European economies and industries.
- Target variables:
 - Number of firms
 - Efficiency (labor productivity)

Literature

1. Cost of compliance might be different across countries (Disdier et al., 2008) and in particular in function of firms' size (Fontagné et al., 2015)
 - Exporters may satisfy standards at lower costs than domestic firms.
2. Standards improve good quality and information asymmetries (Jouanjean, 2012)
3. Evidence of NTM on trade flows is mixed
 - Exports (both margins) of small firms are negatively affected by NTM in the destination markets (Fontagné et al., 2015)
 - Mixed effects for exporters in developing countries (+ Henson et al., 2011; - Schuster & Maertens, 2015).
 - Increase the price of imported goods (Cadot & Gourdon, 2016)
4. NTM protection mitigates labor disruption due to import (Leonardi & Meschi 2017)
5. Effects of changes in trade policy depend on theoretical setup and type of trade costs
 - Nataraj (2011), Spearot (2013)

None focus on the effects of NTM protection on industrial structure

Theoretical Model

Closed Economy

We follow Melitz-Ottaviano (2008) with quasi-linear utility function and Pareto distribution. We define the long run equilibrium.

While tariff is model as traditional iceberg trade cost, the introduction of a standard leads to an increase in marginal costs equal to s that translate marginal cost distribution and

- $c \in [0, M]$ while $q = c + s$ with $q \in [s, M + s]$
- $G(q) = \left(\frac{q-s}{M}\right)^k$
- $z = c_D - s$ is the new cutoff

In a closed economy, the introduction of a standard

- Reduces the after entry profits
- Entry is less attractive, reduction in number of firms
- Average price increases, less varieties.

Theoretical Model

Open Economy

With iceberg trade cost exporters' cutoff in A is $c_X^A = \frac{c_D^B}{\tau}$. In an open economy (with 2 countries A and B), the domestic cutoff in A is

$$(c_D^A)^{k+2} = \frac{\gamma\phi}{L_A} \frac{1 - \rho_B}{1 - \rho_B\rho_A} \quad \text{with} \quad \rho_j = 1/\tau_j \quad \forall j = A, B$$

Moving from a situation of free trade, the unilateral introduction of a tariff in country A generates the following (short run) results:

- The cutoff cost for the home country (A) increases (average productivity decreases).
- Number of entrants in A increases.

What is the effect of an introduction of a standard in country A ?

Theoretical Model

Open Economy

Assuming that change in standards does not modify preferences, the introduction of a standard in home country (A) has the following effects:

1. Standard that follows already adopted practices

If regulators in A impose a standard already adopted, the zero profit condition for country B changes ($\Delta_s = s^B - s^A \geq 0$)

- Unkown

2. Standard new to A and B ($s > 0$)

- Number of entrants and firms selling in A increases
- Average productivity decreases (cutoff increases)

Data CompNet

- The “CompNet database” is a database of competitiveness indicators for 17 EU countries built by members of CompNet using firm level data
- It consists of two samples:
 - All firms 1996-2012 → “full sample”
 - Firms with more than 20 employees 2001-2011 (comparable across countries) → “20E sample”
- Main source: Central Banks and NSI micro level databases
- The database reports information on
 - Number of firms
 - Average productivity (labor productivity)

Data

CompNet – 20E

- *Countries:* Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain.
- *Sectors:* manufacturing sectors at NACE 2-digit rev.2 (with the exclusion of Coke and Petroleum #19, and Tobacco #12)
- *Time period:* 2002-2012
- Productivity measured as “labor productivity” (value added per worker)
- We eliminate observational units that are obtained with less than 10 observations (at least 10 firms by sector, year, and country).
- Unbalanced panel.

Data

Specific Trade Concerns (STC)

The STC database (Ghodsi et al, 2015) collects information at the H 6 digit level about SPS and TBT notifications at WTO committees

- If a country defines a standard (TBT), it has to be notified to WTO.
- If a TBT measure create "an unnecessary obstacles to trade", one ore more WTO member states may raise a concern to the committees in order to ask the removal of the measure.
- STC identifies a measure which is perceived by exporters (from B) as an obstacle to export (to A)

Data

Specific Trade Concerns Database (STC)

- For each concern we have,
 1. Country or countries raising the concerns (B)
 2. The country imposing the measure (A)
 3. Product codes (HS 6 digit)
 4. The year in which the concern was raised to WTO
- *If there is a concern (TBT) in year t , then a product (HS 6 digit) is protected.*
- In this case a dummy $STC=1$ if a concern is raised, otherwise zero.
- Protection ends at $t+2$

WITS

Information on effectively applied tariff (AHS - lowest available tariff.) at HS-6 digit level for each year and country pairs.

Measure of protection (1)

In order to construct a measure of protection of home economies due to tariffs and NTMs, we face two problems

1. We need to merge STC- Tariff (HS 6 digit) database with CompNet (Nace Rev2 2 digit).
2. We need to compute the level of protection granted by a common EU policy to an individual country-sector pair.

Measure of protection (2)

Using correspondence tables, we construct an exposure index in two steps

1. The degree of protection for EU country c from exporting country j in sector s

$$T_{js}^c = \sum_{p(s)=1}^{P(s)} t_{jp}^{EU} \frac{\text{import}_{jp}^c 2000}{\text{import}_{js}^c 2000}$$

Where t_{jp}^{EU} is a generic measure of protection imposed by EU for imports from j in product p (HS 6d) which belongs to sector s (Nace rev2 2d).

- **Tariff:** t_{jp}^{EU} is the tariff (AHS) imposed by EU for product p sourced by origin j
- **NTM:** t_{jp}^{EU} is a dummy variable equal to 1 if country j raised a STC against EU for a specific product p . We define t_{jp}^{EU} for TBT

As a rule of thumb, we consider closed a concern after two years.

Measure of protection (3)

2. Second, we aggregate T_{js}^c across all the origins j to compute a single index of average protection of sector s in country c

$$PIndex_s^c = \sum_{j=1}^J T_{js}^c \frac{import_{js}^{c 2000}}{import_{tot,s}^{c 2000}}$$

Which is equivalent to:

$$PIndex_s^c = \sum_{j=1}^J \sum_{p(s)=1}^{P(s)} t_{jp}^{EU} \frac{import_{jp}^{c 2000}}{import_{tot,s}^{c 2000}}$$

We compute PI for both tariff and TBT.

Notice that weights are out of estimation sample (year 2000)

Measure of protection (4)

Alternatively, we define a protection index of TBT using the share of protected goods

$$TBT\ Share_{cst} = \sum_{j=1}^J \underbrace{\sum_{p=1}^{P(s)} \frac{NTM_{jpt}^{EU}}{N.Prod(s)}}_{\text{Share of protected products in sector } s \text{ sourced from } j} \frac{IMP_{j,s}^{c,2000}}{IMP_{tot,s}^{c,2000}}$$

Descriptive statistics

Country verage protection index			
Country	Tariff	TBT	TBT(share)
Austria	1.5995	0.0039	0.0034
Belgium	1.6378	0.0072	0.0030
Croatia	1.5591	0.0043	0.0029
Estonia	1.6661	0.0055	0.0030
Finland	1.4945	0.0045	0.0030
France	1.7897	0.0058	0.0037
Germany	1.6819	0.0031	0.0032
Hungary	1.6096	0.0059	0.0040
Italy	1.6553	0.0061	0.0029
Lithuania	1.6912	0.0050	0.0035
Poland	1.6405	0.0052	0.0034
Portugal	1.7012	0.0040	0.0035
Romania	1.6316	0.0043	0.0027
Slovakia	1.6325	0.0037	0.0035
Slovenia	1.7035	0.0051	0.0039
Spain	1.5933	0.0051	0.0034
Total	1.6430	0.0049	0.0033

Sector average protection Index

Sector	Nace rev.2 code	Tariff	TBT	TBT(Share)	
Food		10	1.7134	0.0067	0.0036
Beverages		11	1.1666	0.0080	0.0030
Tobacco		12	0.1643	0.0000	0.0000
Textile		13	3.7671	0.0026	0.0005
Wearing Apparel		14	6.6400	0.0000	0.0000
Leather		15	3.3266	0.0000	0.0000
Wood		16	0.6771	0.0000	0.0000
Paper		17	0.0730	0.0000	0.0000
Printing		18	0.5031	0.0104	0.0104
Coke/Petroleum		19	0.0968	0.0000	0.0000
Chemicals		20	2.2779	0.0093	0.0031
Pharmaceuticals		21	0.1712	0.0045	0.0037
Rubber/Plastic		22	1.7368	0.0033	0.0003
Non Metallic Minerals		23	2.2155	0.0007	0.0003
Basic Metals		24	1.3236	0.0000	0.0000
Fabricated Metals		25	1.6052	0.0005	0.0024
Computer/Electronics		26	1.0203	0.0038	0.0007
Electrical Equipment		27	1.0183	0.0016	0.0028
Machinery		28	0.8103	0.0120	0.0103
Motor Vehicles		29	4.8104	0.0202	0.0123
Other Transport		30	1.6176	0.0005	0.0003
Furniture		31	0.1179	0.0000	0.0000
Other Manufacturing		32	0.9354	0.0292	0.0223
Total			1.6430	0.0049	0.0033

Empirical Analysis

We estimate the following model

$$\log Y_{cst} = a_0 + a_1 \log P.Index_{cst-1} + a_2 \mathbf{X}_{cst-1} + \mathbf{u}_c + \mathbf{u}_s + \mathbf{u}_t + e_{cst}$$

Where Y accounts for number of firms, or average productivity. According to the theoretical model, we expect

1. Unilateral introduction of a tariff is positively associated with number of firms, and negatively average productivity
2. NTM already adopted by domestic firm: unknown
3. New NTM for both domestic and foreign firms has an effect equivalent to tariffs

\mathbf{X} is a vector of control variables (for the moment total amount imports within EU 27 partners). \mathbf{u}_c , \mathbf{u}_s , and \mathbf{u}_t are country, sector, and year fixed effects.

Number of firms (log)

	(1)	(2)	(3)	(4)	(5)
Tariff	.01675*** (1.6e-03)		.01686*** (1.6e-03)		.0166*** (1.7e-03)
TBT		.00098*** (3.0e-04)	.00109*** (2.8e-04)		
TBT(Share)				.00354*** (2.0e-04)	.00352*** (1.8e-04)
Obs	2963	2964	2963	2964	2963
R ²	.88748	.88751	.88748	.88755	.88753

Country, sector, and year fixed effects. Robust standard errors are clustered at country year level

1 sd increase in TBT: +0.34% firms

1 sd increase in Tariff: 3% firms

Number of firms (log) – Inclusive index

	(1)	(2)	(3)	(4)	(5)
Tariff	.01675*** (1.6e-03)		.01686*** (1.6e-03)		.0166*** (1.7e-03)
TBT		.00098*** (3.0e-04)	.00109*** (2.8e-04)		
TBT(Share)				.00354*** (2.0e-04)	.00352*** (1.8e-04)
Obs	2963	2964	2963	2964	2963
R ²	.88748	.88751	.88748	.88755	.88753

Country, sector, and year fixed effects. Robust standard errors are clustered at country year level

Log Labor productivity					
	(1)	(2)	(3)	(4)	(5)
Tariff	-.01896*		-.01867*		-.01924*
	(9.7e-03)		(9.8e-03)		(9.5e-03)
TBT		.00307*	.00302*		
		(1.6e-03)	(1.5e-03)		
TBT(Share)				.00627***	.00635***
				(1.1e-03)	(1.0e-03)
Obs	2961	2962	2961	2962	2961
R ²	.88085	.88045	.8809	.88062	.88107

Country, sector, and year fixed effects. Robust standard errors are clustered at country year level

1 sd increase in TBT: +0.9% firms

1 sd increase in Tariff: 3.3% firms

Empirical Analysis

We estimate the following model

$$y_{cst} = a_0 + a_1 \sum_{j=1}^J \sum_{p=1}^{P(s)} \tau_{jpt}^{EU} \frac{IMP_{j,p(s)}^{c,2000}}{IMP_{tot,s}^{c,2000}} + u_{cst} + e_{cst}$$

The empirical model may suffer of endogeneity problem if τ_{jpt}^{EU} is related to omitted variables u_{cst} at sector country (year) level.

- L.h.s. variables may affect EU decisions on trade policy t_{jp}^{EU} , or some unobserved characteristics may determine both market outcome (Y) and protectionism measures.

Omitted variable bias may not be strong due to different level of aggregation. However, we control with a larger pool of fixed effects

- Country by year and sector
- Sector by country and year fixed effects (within estimator)

Number of firms (log)					
	(1)	(2)	(3)	(4)	(5)
Tariff	.01813*** (1.0e-03)		.01822*** (9.8e-04)		.01798*** (9.9e-04)
TBT		.00082*** (2.4e-04)	.00093*** (2.4e-04)		
TBT(Share)				.00327*** (1.1e-04)	.00323*** (8.5e-05)
Obs	2963	2964	2963	2964	2963
R ²	.89147	.8915	.89148	.89154	.89151

CountryXyear and sector fixed effects. Robust standard errors are clustered at country year level

Number of firms (log)

	(1)	(2)	(3)	(4)	(5)
Tariff	.00363 (3.1e-03)		.00395 (3.1e-03)		.00346 (3.1e-03)
TBT		.00293** (9.3e-04)	.00296** (9.4e-04)		
TBT(Share)				.00259** (1.1e-03)	.00259** (1.1e-03)
Obs	2961	2962	2961	2962	2961
R ²	.9901	.99015	.99014	.99014	.99013

CountryXsector and year fixed effects. Robust standard errors are clustered at country year level

Log Labor productivity					
	(1)	(2)	(3)	(4)	(5)
Tariff	-.01648 (.011)		-.01616 (.011)		-.01677 (.01)
TBT		.00336* (1.6e-03)	.00333* (1.6e-03)		
TBT(Share)				.0063*** (1.2e-03)	.00637*** (1.1e-03)
Obs	2961	2962	2961	2962	2961
R ²	.88532	.88501	.88538	.88517	.88555

CountryX year and sector fixed effects. Robust standard errors are clustered at country year level

Log Labor productivity

	(1)	(2)	(3)	(4)	(5)
Tariff	-.00859* (3.9e-03)		-.00834* (3.8e-03)		-.00885* (3.9e-03)
TBT		.00242 (1.7e-03)	.00243 (1.6e-03)		
TBT(Share)				.00377* (1.8e-03)	.00385* (1.8e-03)
Obs	2959	2960	2959	2960	2959
R ²	.98574	.98551	.98577	.98555	.98582

CountryXsector and year fixed effects. Robust standard errors are clustered at country year level

Conclusions

- Effects of NTMs on domestic firms equivalent to tariff
- Effects of NTMs on average productivity is different to tariff
- Endogeneity issue not yet sorted out

Number of firms (log) by size class

	(1)	(2)	(3)	(4)	(5)
			N. Small Firms (20-49)		
Tariff	.01723*** (1.5e-03)		.01748*** (1.9e-03)		.01699*** (1.8e-03)
TBT		.0026*** (2.2e-04)	.00269 (2.0e-03)		
TBT(Share)				.00429*** (1.1e-04)	.00424*** (1.0e-03)
Obs	2122	2122	2122	2122	2122
R ²	.90428	.90425	.90431	.9043	.90435

Country Sector and Year fixed effects included