

A Pragmatic Approach to Estimating Nondiscriminatory Non-tariff Trade Costs

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¹The views expressed in this work are strictly those of the author and do not represent the opinions of the United States International Trade Commission or any of its commissioners.

NTMs in Trade Policy

- ▶ In recent years, trade policy has increasingly turned its focus towards non-tariff measures (NTMs).
- ▶ MFN tariffs are low in most countries, implying that the bulk of potential gains to trade stem from the reduction in NTM trade costs.
- ▶ For example, the recent USMCA agreement contained no tariff reductions but many significant changes to NTM policies.

The Challenges of Quantifying NTMs

- ▶ Despite increased focus on NTMs in modern trade policy, quantification remains a challenge.
- ▶ Established Methodologies face limitations:
 - ▶ Require uncommon, specialized data or methods
 - ▶ Produce non-specific aggregate trade costs
 - ▶ Difficult to disentangle nondiscriminatory policies from other country-level effects
- ▶ In this work, I describe a new methodology that mitigates these limitations and provides a pragmatic approach to quantifying the effects of specific NTMs

Contribution

- ▶ The model builds on earlier work by Fontagné, Guillin, and Mitaritonna (2011)
 - ▶ Gravity fixed effects absorb all unobserved trade costs, which are used to infer aggregate NTM costs
- ▶ I suggest a second stage extension that decomposes the aggregate estimates into two types of components
 1. Costs associated with specific NTMs of interest
 2. Incorrectly inferred costs associated with non-cost factors

Specific NTM Costs

An application of the methodology using UNCTAD data on individual NTMs demonstrates that:

- ▶ In agriculture and food sectors, SPS and TBT measures represent average AVE trade costs of 7.0% and 6.3%, respectively
- ▶ Neither type of NTM appears to have a significant effect on costs in other sectors
- ▶ Despite their prominence, SPS and TBT measures represent only a small share (less than 10% on average) of the estimated aggregate costs
- ▶ Other non-cost factors account for a significant share of the aggregate cost estimates

Methodology

- Step 1: Estimate a structural gravity model to derive an estimate of an aggregate trade cost index
- Step 2: Translate the aggregate cost index into an ad valorem equivalent (AVE) trade cost
- Step 3: Econometrically decompose the aggregate cost into the costs associated with specific factors

Structural Gravity

$$X_{ij} = \frac{E_j Y_i}{Y} \left(\frac{t_{ij}}{P_j \Pi_i} \right)^{1-\sigma}$$

- ▶ The standard structural gravity model contains Multilateral Resistance (MR) terms that represent aggregate trade cost indices (P_j and Π_i).
- ▶ The conventional empirical version of the model estimates these terms via importer and exporter fixed effects.
 - ▶ $\mathbf{z}_{ijt}$ is a vector of bilateral gravity covariates

$$\frac{X_{ijts}}{0.6 * Y_{jt}} = \exp\{\alpha \mathbf{z}_{ijt} + \mu_{its} + \nu_{jts}\} + \epsilon_{ijts}$$

Deriving Aggregate Costs (Fontagné et al., 2011)

$$\ln(1 + \hat{\tau}_{jts})^{1-\sigma} = \hat{\nu}_{jts} - \hat{\nu}_{*ts}$$

- ▶ Using fixed effect estimates of the MRs, the structure of the gravity model can be used to derive aggregate, ad valorem equivalent (AVE) trade costs ($\hat{\tau}_{jts}$)
- ▶ Because cost-free trade is unidentifiable, cost estimates are relative to a baseline country that exhibits the lowest estimated aggregate costs ($\hat{\nu}_{*ts}$).

Decomposing Aggregate Costs

- ▶ MRs, and therefore the aggregate cost estimates, inherently reflect more than just NTMs
 - ▶ Preferences, domestic shipments, MFN tariffs, income levels, etc.
- ▶ Individual costs of each component can be identified using a second stage regression
 - ▶ $\mathbf{E}_{jts}$ is a vector of non-cost controls, $\mathbf{N}_{jts}$ is a vector of trade costs/NTMs

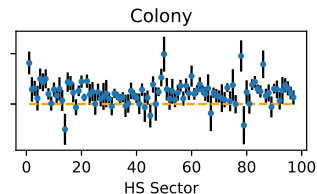
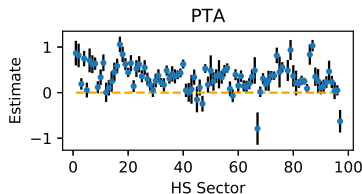
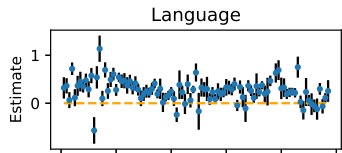
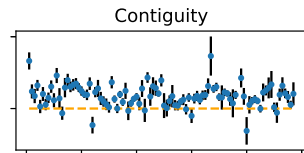
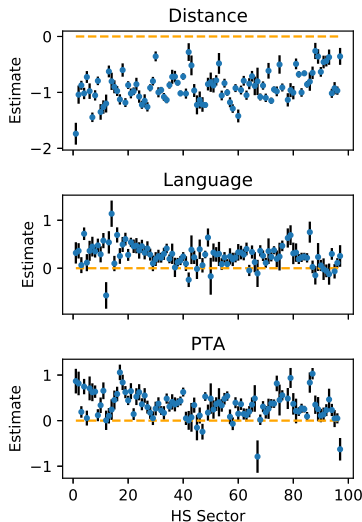
$$\hat{\tau}_{jts} = \gamma \mathbf{E}_{jts} + \delta \mathbf{N}_{jts} + \rho_s + \xi_{jts}$$

Estimating the Costs of Technical NTMs

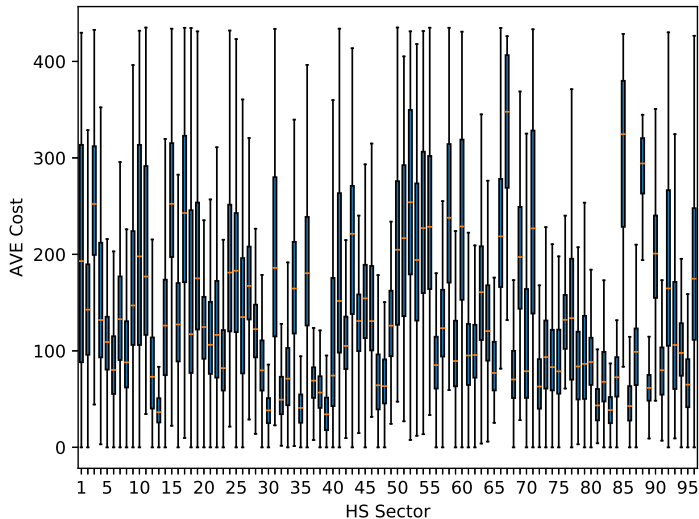
I test the methodology using publicly available trade, gravity, and NTM data

- ▶ BACI Trade Data (Gaulier and Zignago, 2010)
 - ▶ 96 2-digit HS sectors
 - ▶ Panel covering 2012, 2015, and 2018
- ▶ TRAINS NTM Data (UNCTAD, 2017)
 - ▶ Records for almost 100 countries
 - ▶ List of individual NTMs in each country and sector
- ▶ Dynamic Gravity covariates (Gurevich and Herman, 2018)
 - ▶ Distance, contiguity, language, PTA, colony
- ▶ Assumed elasticity value of $\sigma = 5$ based on the literature

Step 1: Gravity Estimates



Step 2: Aggregate Trade Cost Estimates



Second Stage Variables

- ▶ NTM variables ($\mathbf{N}_{jt}$)
 - ▶ Average number of each type of "technical" NTM in each country and sector
 - ▶ SPS: Plant, animal, and human health measures
 - ▶ TBT: Labeling, environment, conformity assessment, testing, inspection, certification, etc.
- ▶ Non-cost Controls ($\mathbf{E}_{jt}$)
 - ▶ Estimated exporter fixed effects ($\hat{\mu}_{it}$)
 - ▶ Capture strength of domestic production
 - ▶ GDP per capita (GDPPC)

Decomposition Results

Variable	(1)	(2)	(3)	(4)	(5)
SPS	0.380*** (0.031)	0.309*** (0.029)	0.355*** (0.026)		
TBT	0.467*** (0.049)	0.167*** (0.048)		0.461*** (0.043)	
ln(GDPPC)		5.990*** (0.543)	6.171*** (0.541)	6.148*** (0.543)	6.219*** (0.544)
Exporter F.E.		4.896*** (0.244)	4.935*** (0.243)	5.000*** (0.245)	4.882*** (0.243)
SPS × Ag					0.207*** (0.041)
TBT × Ag					0.633*** (0.106)
SPS × Not Ag					-0.034 (0.061)
TBT × Not Ag					-0.009 (0.047)
R ²	0.4289	0.4667	0.4664	0.4633	0.4681
Obs.	18609	18417	18417	18417	18417

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

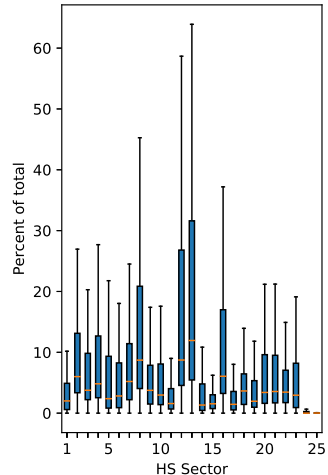
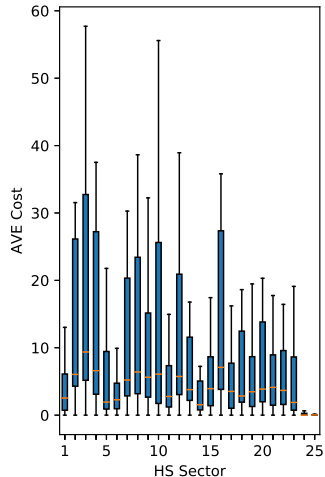
HS 2-digit sector fixed effects included but not reported.

Findings

- ▶ NTMs represent significant shares of aggregate trade costs
 - ▶ Both TBTs and SPS increase trade costs in many sectors
- ▶ However, non-cost factors also influence aggregate estimates
 - ▶ GDPPC estimates are consistent with the belief that developed countries use NTMs as protection
 - ▶ Exporter F.E. estimates confirm the concern that the availability of domestic products may incorrectly suggest import barriers
- ▶ There appears to be some overlap in the effects of SPS and TBTs
- ▶ Heterogeneity of NTM effects across sectors
 - ▶ The NTMs are mostly impactful in **agriculture and food sectors**

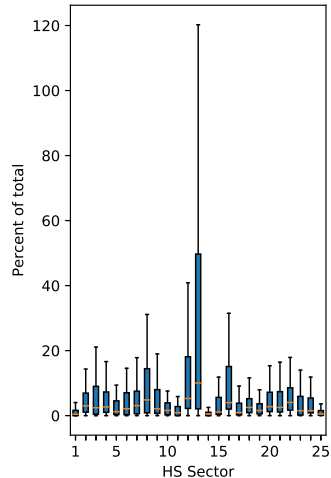
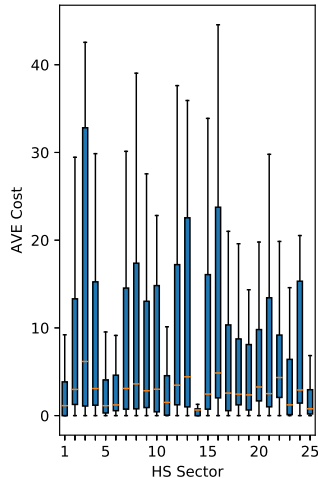
SPS Costs in Agriculture Sectors (SPS x Ag)

- ▶ Agriculture and food sectors exhibit 33.6 SPS measures on average.
- ▶ In these sectors, SPS measures represent a 7.0% AVE import cost on average (8.5% of total AVE estimate).



TBT Costs in Agriculture Sectors (TBT x Ag)

- ▶ Agriculture and food sectors exhibit 10.0 TBT measures on average.
- ▶ In these sectors, TBT measures represent a 6.3% AVE import cost on average (7.3% of total AVE estimate).



Robustness and Sensitivities

- ▶ Most of the general results are robust to alternative specifications such as different non-cost controls (e.g. RCA) or the omission of sector fixed effects.
- ▶ The results are sensitive to two notable modeling choices:
 - ▶ The elasticity of substitution, which magnifies or shrinks aggregate cost estimates
 - ▶ Outlier aggregate costs estimates:
 - ▶ The estimation of aggregate trade costs can produce extreme values for certain countries in certain sectors
 - ▶ The presented results excludes values exceeding the 95th percentile and TBT estimates are sensitive to this choice

Conclusion

- ▶ Measuring the trade costs of NTMs is more important than ever.
- ▶ Aggregate trade cost estimates reflect much more than NTMs, implying that specific estimates are needed in many applications.
- ▶ My methodology provides a practical approach for estimating the costs associated with NTMs.
- ▶ The empirical test demonstrates its ability to derive improved measures for use in trade policy analysis.

Future Work

- ▶ Sector level heterogeneity
 - ▶ Cross sector differences in NTM effects (e.g. the agricultural vs non-agricultural sector dichotomy)
 - ▶ Sector-specific substitution elasticities
- ▶ Improved fit in decomposition
 - ▶ R^2 values suggest there is still a large portion of aggregate cost estimates that remain unexplained
- ▶ Applications