

Trade Barriers or Catalysts?

Non-Tariff Measures and Firm-Level Trade Margins in Africa

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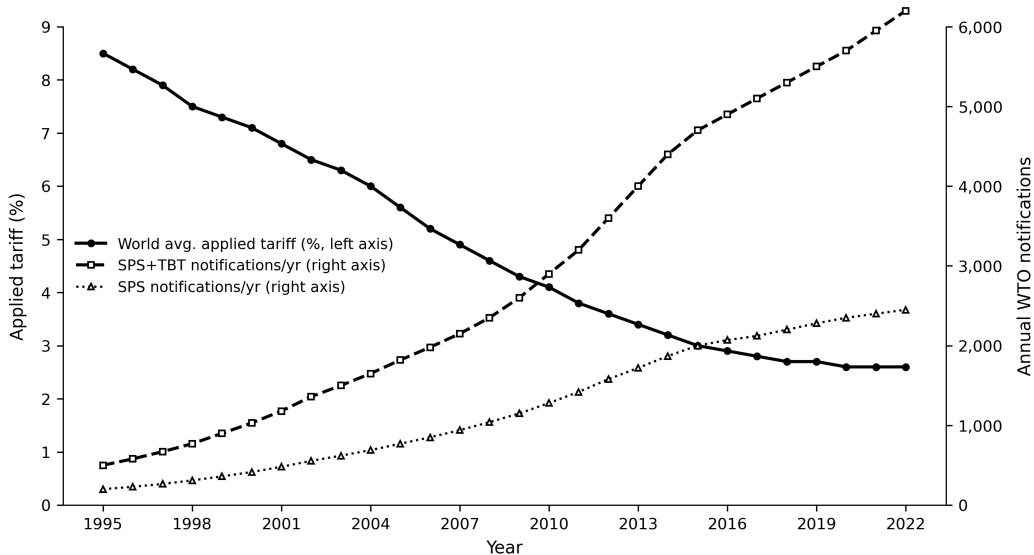
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The Trade Policy Landscape Has Shifted



Sources: World Bank WDI; WTO SPS/TBT Annual Reviews.

Motivation

- Technical measures (SPS and TBT) can correct market failures by safeguarding health and safety standards ([Disdier et al., 2020](#)).
- The same instruments can also function as de facto protection, increasing compliance and trade costs ([Baldwin et al., 2000](#); [De Melo and Shepherd, 2018](#)).
- Development implications are substantial:
 - Quality regulation can expand demand, but uneven compliance capacity may restrict market entry ([Zavala et al., 2023](#)).
 - Weak infrastructure and limited regulatory capacity constrain firms' ability to meet foreign standards and integrate into global value chains ([World Bank, 2025](#)).
 - The uneven proliferation of NTMs can induce “regulatory sorting,” widening productivity and competitiveness gaps ([Taglioni and Kee, 2025](#)).

Related Literature

NTMs as barriers

Standards raise compliance costs, reduce trade volumes, and disproportionately burden small firms and developing-country exporters

[Disdier et al. \(2008\)](#); [Fontagne et al. \(2015\)](#); [Fernandes et al. \(2019\)](#)

NTMs as catalysts

Standards signal quality, reduce information asymmetry between buyers and sellers, and can expand market access for compliant firms

[Moenius \(2004\)](#); [Maertens and Swinnen \(2009\)](#); [Henson et al. \(2011\)](#)

Heterogeneous firms and trade margins

Firm productivity determines who enters export markets, who stays, and how much they export—both intensive and extensive margins matter

[Melitz \(2003\)](#); [Helpman et al. \(2008\)](#); [Chaney \(2008\)](#)

NTMs and African trade

NTM compliance burdens are disproportionate for low-income exporters; evidence remains aggregate and product-level—firm-level responses are unobserved

[Cadot and Gourdon \(2014\)](#); [Disdier et al. \(2015\)](#)

Gap and Contribution

What is missing

1. Whether NTMs act as barriers or catalysts depends on context—but **which context** matters is underexplored
2. Nearly all evidence is aggregate—**firm-level** responses are unobserved
3. Studies examine mostly one margin (usually intensive)—**entry and exit** dynamics are ignored
4. Africa-specific evidence is **scarce and aggregate**

What we do

1. First **firm-level** study of both trade margins under NTMs: 27 African countries
2. Three-way NTM decomposition: **SPS, TBT, Other NTMs**—quality standards vs others
3. Heterogeneity dimensions: **firm size, product type, market scope**

Theoretical Framework

Three channels through which quality standards affect firm-level trade:

1. Fixed compliance cost f_s

Testing, certification, traceability

⇒ Raises entry/survival threshold

⇒ **Barrier**: pushes marginal firms out

2. Variable cost $(1 + \kappa)$

Reformulation, packaging, labeling

⇒ Raises per-unit cost

⇒ **Barrier**: reduces export value for all firms

3. Quality revelation $A_s > 1$

SPS/TBT signal quality to buyers

⇒ Reduces information asymmetry

⇒ **Catalyst**: builds consumer trust and boosts demand

Core Trade off:

Demand Gain (A_s) vs Compliance Cost (f_s, κ)

► Predictions

Data: Firm Level Customs Transaction Data

- Firm-level customs transaction data is drawn from the World Bank Exporter Dynamics Database ([Fernandes et al., 2016](#)).
- Collected from customs agencies and statistical institutes of selected African countries.
- Each transaction includes firm ID, origin, destination, HS6 product code, year, FOB value and quantity.
- Unit of Analysis: Observations are structured at the firm–product–destination–year level.
- Country Coverage:
 - 27 countries (1997–2022)

Exporting Firms Characteristics

Table: Firm-level characteristics across countries and by sectors

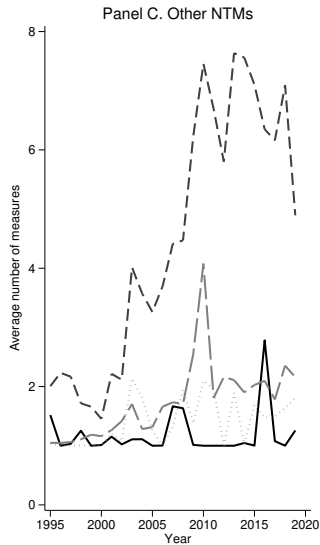
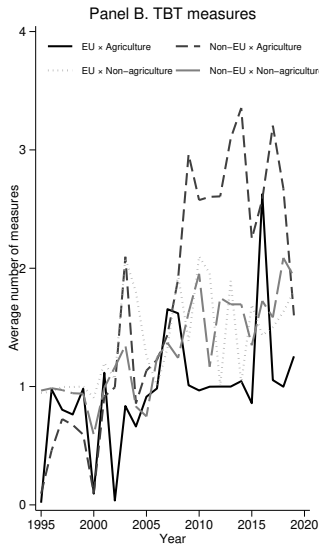
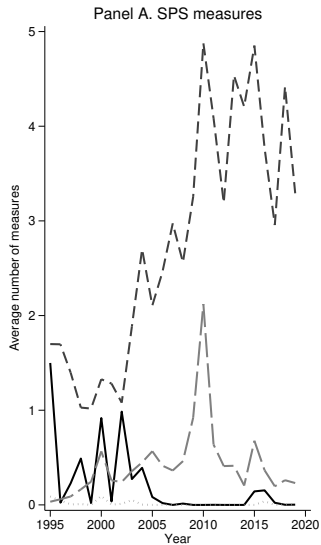
	<i>N</i>	Firms	HS6	Dest.	HI Dest.	Value (USD)	Per firm	
							Dest.	HS6
All sectors	4,257,254	233,799	4705	247	80	286,748	2.84	7.65
Agriculture	1,152,884	93,023	672	247	80	303,389	2.80	3.98
Manufacturing	3,104,370	173,259	4,033	247	80	280,568	2.6	8.18

Notes: *N* is the total number of observations. HS6 denotes the number of products defined at the HS6 digit level. Dest. denotes the number of unique destinations while HI Dest. denotes the number of unique high-income destinations.

Data: Non-tariff measures

- Bilateral NTM measures are constructed using the wiiw NTM Database ([Ghodsi et al., 2017](#)) , based on WTO notifications via I-TIP and Bown (2016).
- Covers 100+ importers, 5,000+ products, and the period 1995–2019, including SPS, TBT, and other trade measures.
- Product codes are harmonized at the HS6-digit level, enabling consistent panel analysis.
- We compute the number of distinct SPS, TBT, and other NTM measures notified for a product–destination pair in a given year.
- A higher SPS (or TBT) count implies that exporters must satisfy more regulatory requirements to access that market in a given year, increasing regulatory intensity.

Variation in Regulatory Intensity across Destinations and Sectors



Empirical Strategy

Intensive margin (PPML):

$$v_{iopdt} = \exp \left[\beta_1 SPS_{pdt-1} + \beta_2 TBT_{pdt-1} + \beta_3 OthNTMs_{pdt-1} + \gamma Tariff_{opdt} + \alpha_{iopd} + \delta_{ipt} + \theta_{dt} \right] + \epsilon_{iopdt}$$

Extensive margin (LPM):

Same RHS; $y \in \text{probability of } \{ \text{entry}_{iopdt}, \text{exit}_{iopdt} \}$

Fixed effects:

α_{iopd} firm–origin–product–destination (e.g time-invariant bilateral trade costs, firm's time-invariant characteristics)

δ_{ipt} firm–product–year (e.g time-variant firm level supply shocks changes common across destinations)

θ_{dt} destination–year (destination country time-variant characteristics)

Identification

- Changes in the number of SPS/TBT measures imposed on a product by a destination over time within the same firm–product–destination relationship.
- β_1 (β_2) captures the net effect of a change in the number of SPS (TBT) measures imposed on a product by a destination on export margins within the same firm–product–destination relationship.
- Omitted variables: Rich set of fixed effects
- Reverse causality: Mitigated by lagging NTMs
- Product-level regulations may still respond to past import surges [▶ IV Strategy](#)

Intensive Margin: Average Effect and Product-Type Heterogeneity

	All sectors		All sectors	
	Coef.	SE	Coef.	SE
SPS_{pdt-1}	0.188	(0.141)	0.307**	(0.152)
TBT_{pdt-1}	0.183	(0.140)	0.316**	(0.153)
$OthNTMs_{pdt-1}$	-0.190	(0.141)	-0.311**	(0.152)
<i>Interactions (final goods = omitted)</i>				
$SPS_{pdt-1} \times Intermediate_p$			-0.167	(0.975)
$TBT_{pdt-1} \times Intermediate_p$			-0.303	(0.976)
Observations	5,616,752		5,616,752	

Interactions for tariffs and other NTMs are included in the model but omitted from the table for brevity. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

- SPS/TBT act as **catalysts** for final goods (**+36%**)
- → **Reduce information frictions & signal quality**
- → **Boost demand for consumer-facing products**

Intensive Margin: Market Scope Heterogeneity

	All sectors		Agriculture	
	Coef.	SE	Coef.	SE
<i>Baseline (less diversified = omitted)</i>				
SPS_{pdt-1}	0.233	(0.175)	0.487**	(0.201)
TBT_{pdt-1}	0.227	(0.174)	0.488**	(0.200)
$OthNTMs_{pdt-1}$	-0.230	(0.174)	-0.482**	(0.199)
<i>Interactions</i>				
$SPS_{pdt-1} \times \text{Multi-dest}$	-0.067	(0.202)	-0.472**	(0.231)
$TBT_{pdt-1} \times \text{Multi-dest}$	-0.063	(0.201)	-0.472**	(0.229)
<i>Net SPS/TBT: Less diversified (agric)</i>			+62.8%**	
<i>Net SPS/TBT: More diversified (agric)</i>			$\approx +1.5\%$	
Obs.	5,616,752		1,619,016	

PPML estimates. Manuf.: all insignificant. FE: $iopd$, ipt , dt . SE clustered at origin–dest–product

Multi-destination firms are defined at the firm–product level as those serving more than the 10th percentile of the destination count distribution in their first year of the sample. $*p < 0.1$, $**p < 0.05$, $***p < 0.01$.

Interactions for tariffs and other NTMs are included in the model but omitted from the table for brevity.

- SPS/TBT act as **catalysts** for less diversified exporters
- Less diversified firms **lack information on requirements**
- → SPS makes rules **clear and predictable**
- → Compliance signals **quality and reliability**
- Diversified firms already **informed and trusted** → little effect

Extensive Margin: Exit and the Multiproduct Shield

	Average Effect		Multiproduct Status	
	All (1)	Agric. (2)	All (3)	Agric. (4)
<i>SPS</i>	0.009* (0.006)	0.011* (0.007)	0.021** (0.011)	0.024* (0.014)
<i>TBT</i>	0.009* (0.006)	0.012* (0.007)	0.021** (0.011)	0.024* (0.014)
<i>OthNTMs</i>	-0.009* (0.006)	-0.011* (0.007)	-0.166 (0.252)	-0.033 (0.241)
<i>SPS</i> × Multi-prod			-0.020* (0.012)	-0.021 (0.015)
<i>TBT</i> × Multi-prod			-0.020* (0.012)	-0.021 (0.015)
Observations	17.4M	4.6M	17.4M	4.6M

Multi-product firms are defined at the firm–destination level as those exporting more than the 10th percentile of the product count distribution in their first year of the sample. Participation and entry: no significant effects

- SPS/TBT raise **fixed costs** → higher exit
- Exit driven by **marginal (less diversified) firms**
- Multi-product firms can **spread costs and adjust product mix**
- → “**Multi-product shield**”: little or no exit effect

Extensive Margin: Exit and the Size Advantage

	All sectors		Agriculture	
	Coef.	SE	Coef.	SE
<i>Baseline (small firms = omitted)</i>				
SPS_{pdt-1}	0.091**	(0.042)	0.097**	(0.044)
TBT_{pdt-1}	0.089**	(0.042)	0.094**	(0.044)
$OthNTM_{spdt-1}$	-0.091**	(0.042)	-0.096**	(0.044)
<i>Interactions</i>				
$SPS \times \text{Large}$	-0.087**	(0.042)	-0.091**	(0.044)
$TBT \times \text{Large}$	-0.085**	(0.042)	-0.089**	(0.044)
$SPS \times \text{Medium}$	-0.071**	(0.031)	-0.077**	(0.032)
$TBT \times \text{Medium}$	-0.068**	(0.031)	-0.074**	(0.032)
<i>Net SPS effect: Small</i>	+9.1%**		+9.7%**	
<i>Net SPS effect: Medium</i>	+2%**		+2%**	
<i>Net SPS effect: Large</i>	+0.4%**		+0.6%**	
Observations	17.4M		4.6M	

Size terciles by initial export value within origin. Manuf.: all insignificant

Participation and entry: no significant effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

- Decreases with firm size
- → Exit mostly among **small firms**
- SPS/TBT raise the **bar for exporting**
- Small firms often **can't meet the new bar** → exit
- Large firms **can adjust easily**

Synthesis: Who Benefits, Who Exits?

	Intensive margin (export value)	Extensive margin (exit probability)
Average	≈ 0	+0.9 pp
SPS/TBT $\times$ final goods	+36%	—
SPS/TBT $\times$ less diversified (agri)	+62.7%	—
SPS/TBT $\times$ Multiproduct firms	—	Insulated
SPS/TBT $\times$ small firms	—	+9.1pp
Manufacturing	Insignificant	Insignificant

Conclusion

- Average NTM effect on export value is **zero**—barrier and catalyst channels cancel in the aggregate
- SPS/TBT are **catalysts** for final goods (**+36%**) and especially for less diversified agricultural exporters (**+48.7%**)
- SPS/TBT **increase exit** probability by **+0.9 pp**, mainly for small firms (**+9.1%**) and concentrated in agriculture
- Multi-product firms are **insulated** from NTM-induced exit
- The net effect depends on **who** exports, **what** they sell, and **which margin** you examine

Policy Implications

- **Lower compliance costs** through investments in testing, certification, and traceability infrastructure.
- **Strengthen SPS capacity in agriculture**, where both the gains and losses from standards are concentrated.
- **Encourage product diversification** to enhance resilience to NTM-induced exit.
- **Target support to small exporters**, who bear the largest compliance burden.
- **Design policies around heterogeneity**: NTMs are neither purely barriers nor facilitators—their effects depend on firm characteristics and adjustment margins.

Thank you

Export Margins

◀ Back

- Extensive Margin
 - inserting zero export values for the years when exports within the firm-product-destination grouping do not take place ([Fernandes et al., 2016](#)).
 - firm entry: takes the value of 1 if firm i in country c exports product p to destination d in year t but did not do so in year $t - 1$, and zero otherwise
 - We exclude
 - firms that have exported to a product-destination market every year
 - the initial year of the sample
 - firm exit: takes the value of 1 if firm i in country c did not export product p to destination d in year t but did so in year $t - 1$, and zero otherwise.
 - exclude firms that exported solely to a product-destination market in the last year of the sample
- Intensive Margin
 - the FOB export value in USD of firm i in country c of product p to destination d in year t .

Extensive Margin: Export Participation and Exit

Heterogeneous Firms

- Firms differ in productivity φ_i
- Firms differ in initial quality λ_{ip}

Export Cutoff Under Standards

$$\varphi_s^* = \left[\frac{\sigma(f_x + f_s)}{A_s R \bar{\lambda}^{(\sigma-1)(1-\alpha)}} \right]^{\frac{1}{\sigma-1}} (1 + \kappa)$$

Standards:

- Raise cutoff via f_s and $\kappa \rightarrow$ exit
- Lower cutoff via $A_s \rightarrow$ entry/expansion

Extensive-Margin Predictions

- Ambiguous average effect on export participation
- Higher exit among low-productivity firms

Intensive Margin: Export Values

$$\ln r_{ipd}^s = \ln A_s - (\sigma - 1) \ln(1 + \kappa) + (\sigma - 1) \ln \varphi_i + (\sigma - 1)(1 - \alpha) \ln \lambda_{ip}$$

Intensive-Margin Tradeoff

- Demand effect: $\uparrow r_{ipd}$
- Variable cost effect: $\downarrow r_{ipd}$

Intensive-Margin Predictions

- Ambiguous average effect on export values
- Ambiguous effect for final vs intermediate goods:
 - Final goods face higher safety costs,
 - But may benefit more from consumer trust.

Endogeneity Issues

Endogeneity concern

- NTMs respond to import surges or political pressure
- $\text{Cov}(NTM_{pdt-1}, \varepsilon_{icpdt}) \neq 0$

Instrument

- Leave-one-out global NTM average:

$$Z_{pdt-1} = \frac{1}{N_{pt-1} - 1} \sum_{j \neq d} NTM_{pj t-1}$$

- **Relevance:** Countries often harmonize and emulate SPS/TBT regulations. As a result, product-specific NTMs implemented elsewhere strongly predict NTMs adopted by a given destination.
- **Exclusion restriction:** Conditional on our rich fixed effects, foreign NTMs influence export margins only through destination d 's own regulations.