The role of non-tariff barriers and trading companies on customs duties evasion

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IIPF 2022 Congress

2022/08/10

Research Questions

Our goal is to provide the Tax Authority with information on evasion risk-factors

We have **two main questions** to answer

- Does the imposition of non-tariff barriers modify the elasticity of evasion of customs duties **?**

- Are trading companies, which specialize in foreign trade, exploiting their expertise for evasion **?**

Besides, we use a robust identification strategy to estimate the *elasticity of evasion with relation to tariffs* in Brazil,

and derive *optimal total tariff exposure*

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Related Literature

- Tax and Tariff Evasion:
    - Allingham and Sandmo (1972) and Yitzhaki (1974)
    - Fisman and Wei (2004)
    - Mishra, Subramanian, and Topalova (2008), Javorcik and Narciso (2008), Bouet and Roy (2012), Javorcik and Narciso (2017), Demir and Javorcik (2020) among others

- Non-Tariff Barrier:
    - Ferrantino (2006), Egger, Francois, Manchin, and Nelson (2015), Kee and Nicita (2016), Kinzius, Sandkamp, and Yalcin (2019), Grübler and Reiter (2021)

- Trading Companies:
    - Rauch (2001), Bernard, Grazzi, and Tomasi (2015), Liu, Shi, and Ferrantino (2016), Bernard, Jensen, Redding, and Schott (2018)

Contribution

- Use of rich administrative data
  - Universe of all Brazilian imports from 2003-2004

- Exploit the introduction of PIS/Cofins on imports
  - Exogenous shock
  - Enables a robust identification strategy

- Modulating effects on evasion
  - Non-tariff barriers
  - Presence of trading companies

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Theoretical framework

- Extends Mishra et al. (2008). Modified cost of evasion function

$$\tilde{C}(\gamma, E, T) = C(\gamma, E) + \underbrace{\bar{p}\theta\gamma M \cdot T}_{\text{expected penalty}} \tag{1}$$

- γ: evasion; E: modulator; T: tariff exposure; θ: penalty

- Then we expect the elasticity of evasion and its modulator to be:

$$\frac{\partial \gamma}{\partial T} > 0 \tag{2}$$

$$\frac{\partial^2 \gamma}{\partial T \partial E} \lessgtr 0 \tag{3}$$

- Results hold when imports depend on E, with minor assumptions

PIS/Cofins shock

- The taxes became active in May 1st, 2004, **less than 5 months after deemed constitutional**

- Unexpectedly brought into the legislation

- Rates of 1.65% (PIS) and 7.6% (Cofins), for virtually **all goods**. No room for lobbying against those taxes

- Their base contains other duties that vary according to the product, like II (a true tariff) and IPI (tax on industrialized products).

Flat rates of PIS/Cofins promote exogenous, across products **variation in total tariff exposure** making our identification strategy viable

Missing trade

- Following Fisman and Wei (2004), evasion is proxied by the "trade gap" at the import destination

- Literature standard for border duties evasion

- $gap_V = \log(XV) - \log(MV)$

  - Equivalent measure for quantitiy
  - We drop only 1.91% and 2.99% of value and quantity observations respectively, due to imports mismatch

- Also use "extreme" versions where missing MV is set to zero

Empirical Strategy

- Panel with origin country, c; HS6 product, p and year, $t \in \{2003, 2004\}$

- Interaction term to identify an elasticity modulator

- Tariff rate used is the average Effectively Applied Tariff Rate - EATR

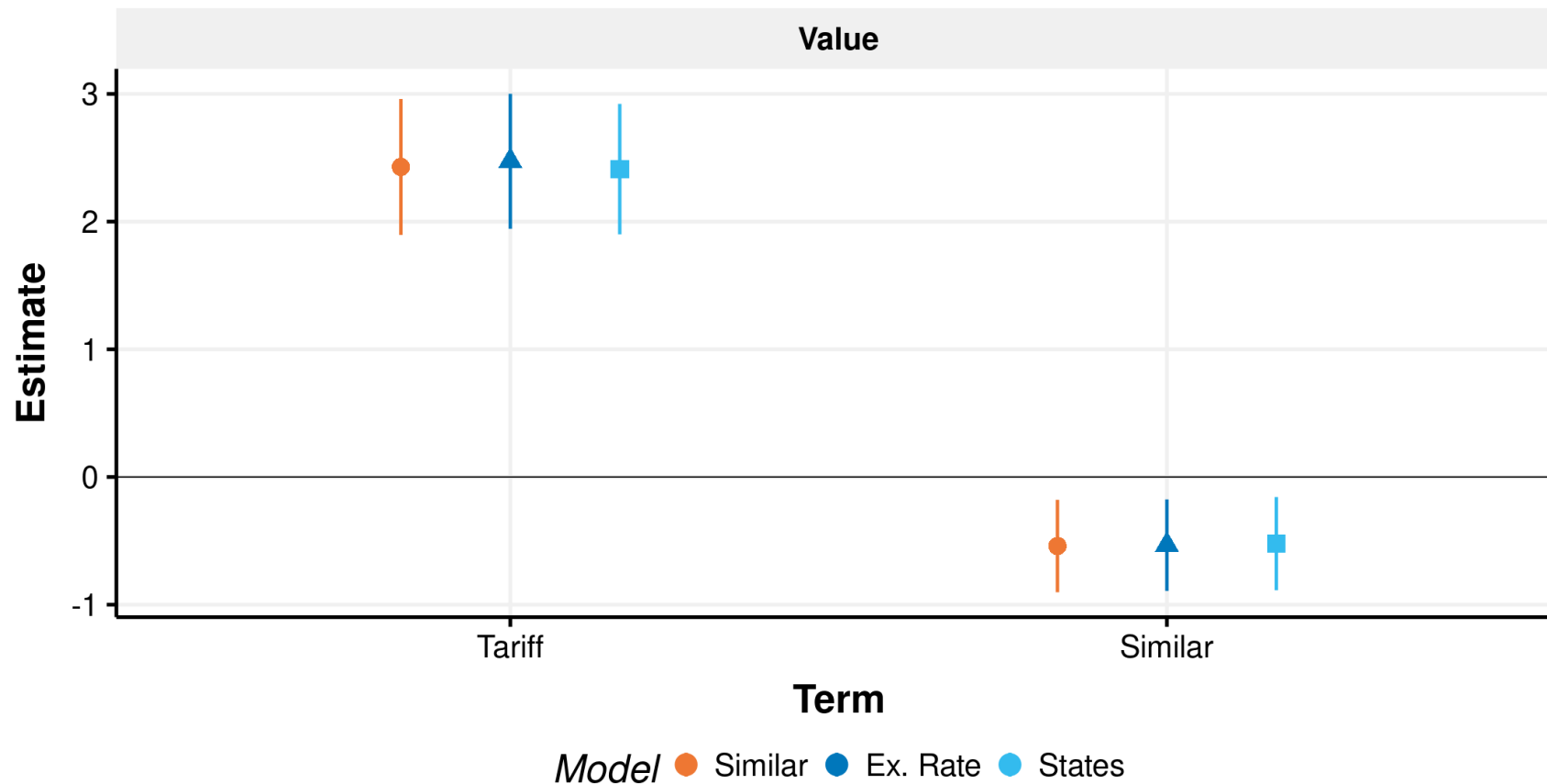- Misclassification through "similar" products. Same HS4

$$y_{cpt} = \beta_1 T_{cpt} + \beta_2 T_{cpt} \cdot E_{cpt} + \beta_3 T_{cpt}^{sim} + \gamma E_{cpt} + D_{cp} + D_{ct} + D_{pt} + \varepsilon_{cpt}$$
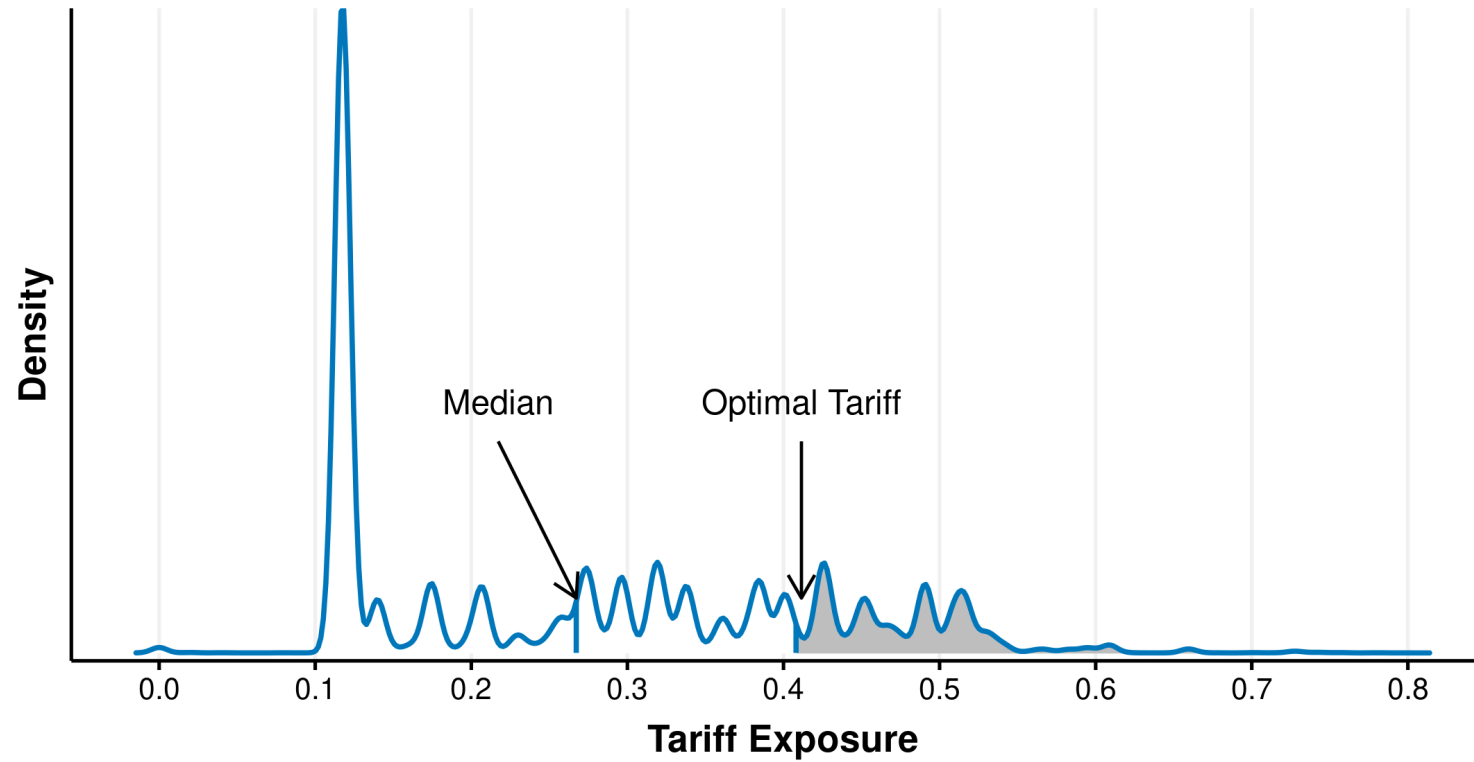
y is a trade gap measure

- We expect $\beta_1 > 0$ and $\beta_3 < 0$

- The sign of β_2 depends on what modulator we are analyzing, either the **non-tariff barrier** or **trading companies**

Results

$$y_{cpt} = \beta_1 T_{cpt} + \beta_2 T_{cpt}^{sim} + \lambda' X_{cpt} + D_{cp} + D_{ct} + D_{pt} + \varepsilon_{cpt}$$
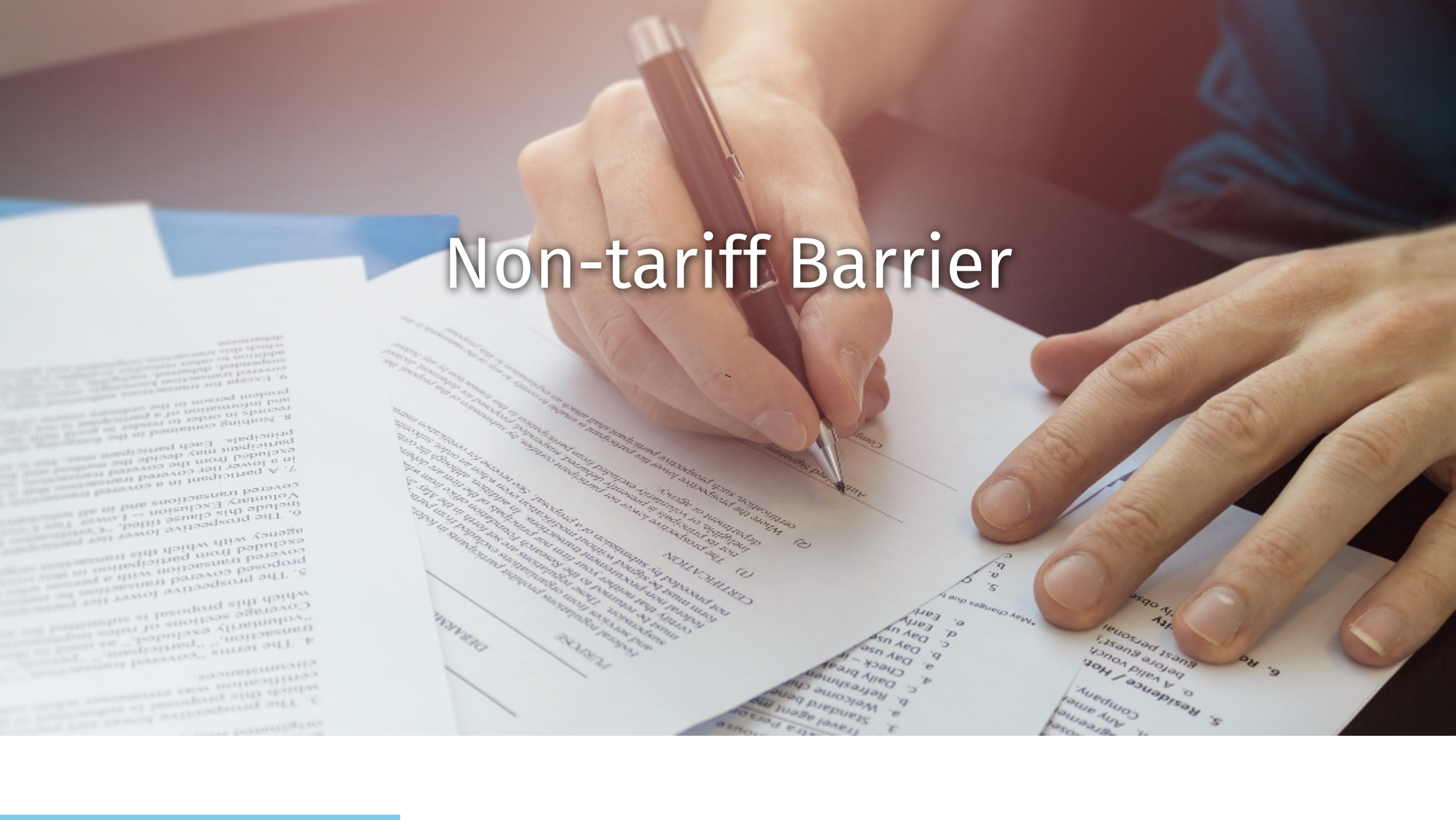
Results - Optimal Tariff Exposure

- Elasticity of evasion at 2.43 implies an optimal total tariff exposure of 41.15%
- Data from 2021 show that ≈ 22.03% of Brazilian imports had a tariff exposure over the optimal

Non-tariff Barrier

Import Licensing

- Non-technical measure levied upon ≈ 28% of Brazilian imports

- Depends on the **product**, country of **origin**, condition (used or brand new), and taxation regime

- Electronic form. Filed **prior to the shipment**.

- Detailed information: importer ID, country of origin, clearance port, exporter information, and goods information

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Non-tariff Barrier - *results*

$$y_{cpt} = \beta_1 T_{cpt} + \beta_2 T_{cpt} \cdot NTB_{cpt} + \beta_3 T_{cpt}^{sim} + \gamma NTB_{cpt} + \lambda' X_{cpt} + D_c + D_p + D_t + \varepsilon_{cpt}$$
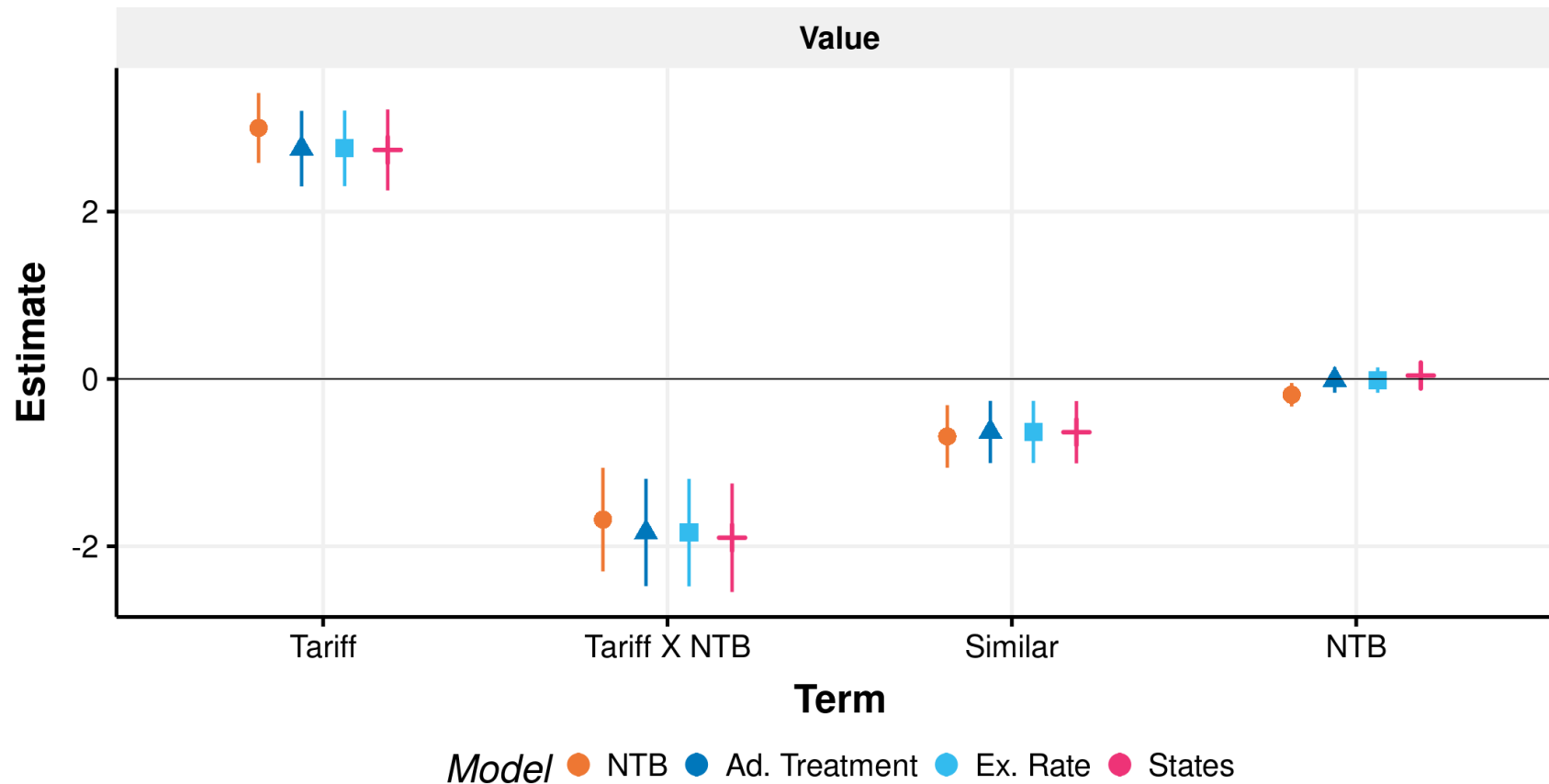
NTB as Enforcement

- NTB counteracts the effect of tariffs on evasion

- Provision of detailed information is faced as increased enforcement

- Creates a verifiable paper trail that can be cross-checked

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Trading Companies

Trading Companies

- Our goal is to study the behavior of companies **specialized in international trade**

- Two criteria to identify those companies:
    1. Their imports are made on *behalf of a third party*, the purchaser. **Intermediary** company
    2. *"Pervasiveness"* in international trade. Many *different products* each imported many *times* in a given year. **Expert** company.
- A **trading company** is either an intermediary or expert. We flag all transactions made by trading companies

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Trading Companies - *results*

$$y_{cpt} = \beta_1 T_{cpt} + \beta_2 T_{cpt} \cdot TC_{cpt} + \beta_3 T_{cpt}^{sim} + \gamma TC_{cpt} + D_{cp} + D_{ct} + D_{pt} + \varepsilon_{cpt}$$
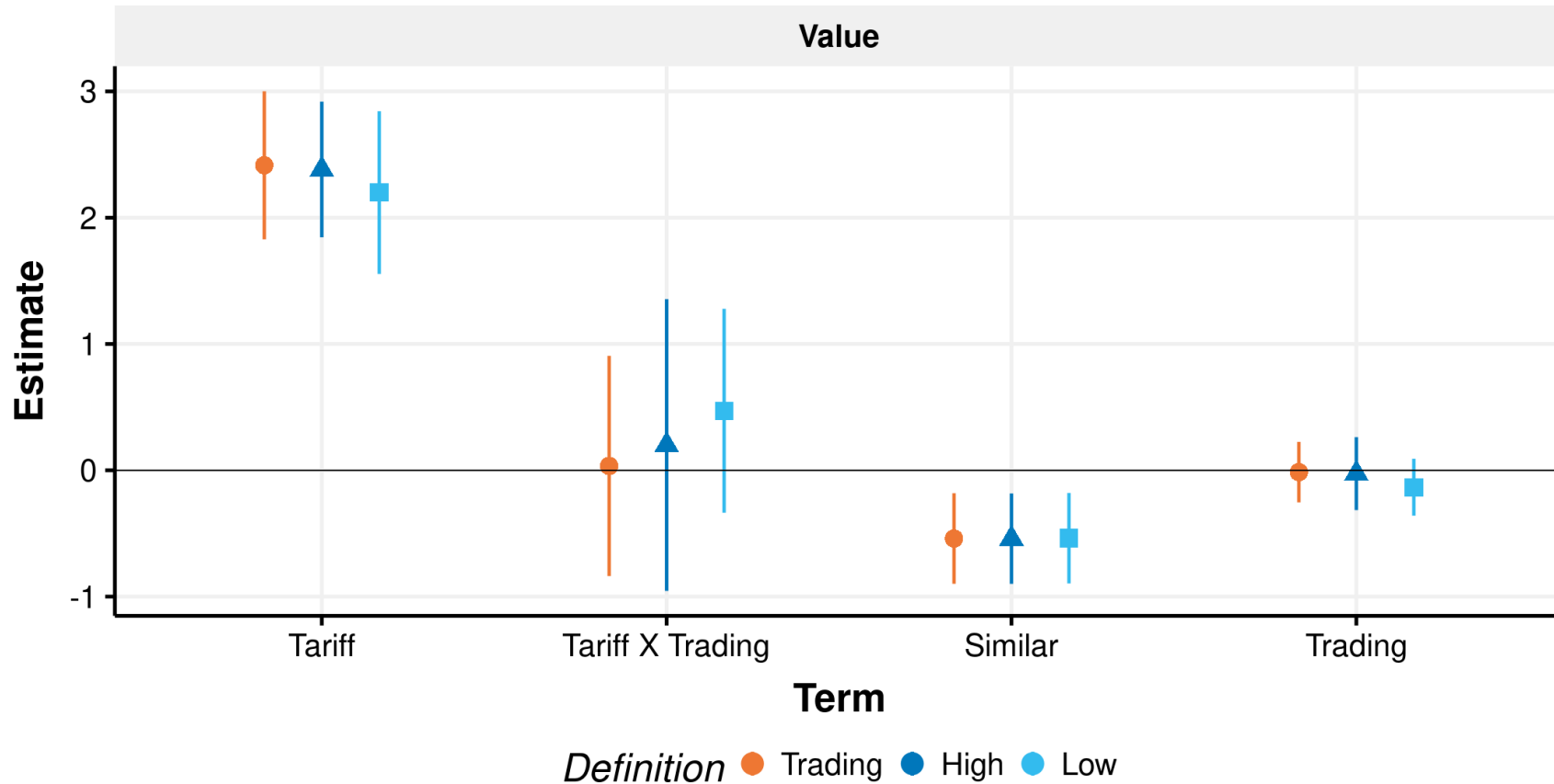
Trading Companies - *efficiency*

$$Trading_{cpt} = \beta_1 Audits_{cpt} + \beta_2 Clearance_{cpt} + \beta_3 Activity_{cpt} + D_{cp} + D_{ct} + D_{pt} + \varepsilon_{cpt}$$

	Trading	High	Low
Audits	-0.0036	0.0071	-0.0134
	(0.0085)	(0.0072)	(0.0087)
Clearance Time	-0.1570**	-0.1785***	-0.1261**
	(0.0700)	(0.0658)	(0.0598)
Activity Time	0.3347***	0.1661***	0.4761***
	(0.0620)	(0.0570)	(0.0524)
Num.Obs.	112696	112696	112696
R2 Adj.	0.748	0.747	0.739
FE: cp	✓	✓	✓
FE: ct	✓	✓	✓
FE: pt	✓	✓	✓

* p < 0.1, ** p < 0.05, *** p < 0.01

Notes:
The dependent variable is the proportion of transactions made by trading companies, one model for each definition. All standard errors are two-way clustered at country and product.

Conclusion

- Brazil's value evasion elasticity is in line with other countries, $\eta_v = 2.43$
  - Administrative data should be used for a complete evasion analysis
- Quantity evasion is also detected in Brazil, $\eta_q = 1.45$
  - Possible combination of Customs Value Agreement and high tariff rates
- Import license NTB reduces the elasticity of evasion
  - $\eta_v = 0.91$ and $\eta_q = -0.06$
  - Unintended consequence of NTB
  - Detailed information to authorities. Can be cross-checked
  - Faced as higher level of enforcement
- Trading companies have the same elasticity of evasion than ordinary importers
  - Not a result of greater level of enforcement
  - Reduced clearance times and longer activity suggest efficiency concerns

Thank
You

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Backup Slides

Data

Two samples: *trade* and *administrative*

- trade sample from UN COMTRADE. Exports figures
- administrative sample comprises **all brazilian imports** at transaction-level. Imports only.

- Values, quantities, importer, purchaser, exporter, most favored nation tariff level, **effectively applied tariff**

- Customs regimes and administrative treatment: exemption status, preferential trade agreement, **import license**, drawback, etc.

- Customs clearance procedures: audit, clearance time

- **Only source** for other border duties, such as IPI, PIS and Cofins on imports

- Product codes at HS 8-digit following the NCM standard

Data - *Example*

Two samples: *trade* and *administrative*

- Trade sample comes from UN COMTRADE

- Values and Quantities. Yearly figures, by trading partner for relevant years

- Product codes at HS 6-digit

Exports table

Year	Product	Partner	Flow	Value
2003	401110	GER	Export	3045.00
2003	401110	ARG	Export	30046.59

Imports table

Year	Product	Partner	Flow	Value
2003	401110	GER	Import	3231.39
2003	401110	ARG	Import	29970.50

401110: Pneumáticos novos, de borracha. Do tipo utilizado em automóveis de passageiros (incluindo os veículos de uso misto (station wagons) e os automóveis de corrida).

Aggregating the administrative sample

- Trade gap, $Ev = \log(X) - \log(M)$, needs both samples, *trade* and *administrative*
- Export figures comes from COMTRADE at 6-digits level
- Imports from administrative sample at 8-digits

⚠️ We need to aggregate the administrative sample to make them compatible

- There are two options:

    1. Weighted averages by FOB value
    2. Simple average (number of transactions)

- The weighted average may introduce endogeneity concerns and is left as a robustness check

PIS/Cofins shock - *more on exogeneity*
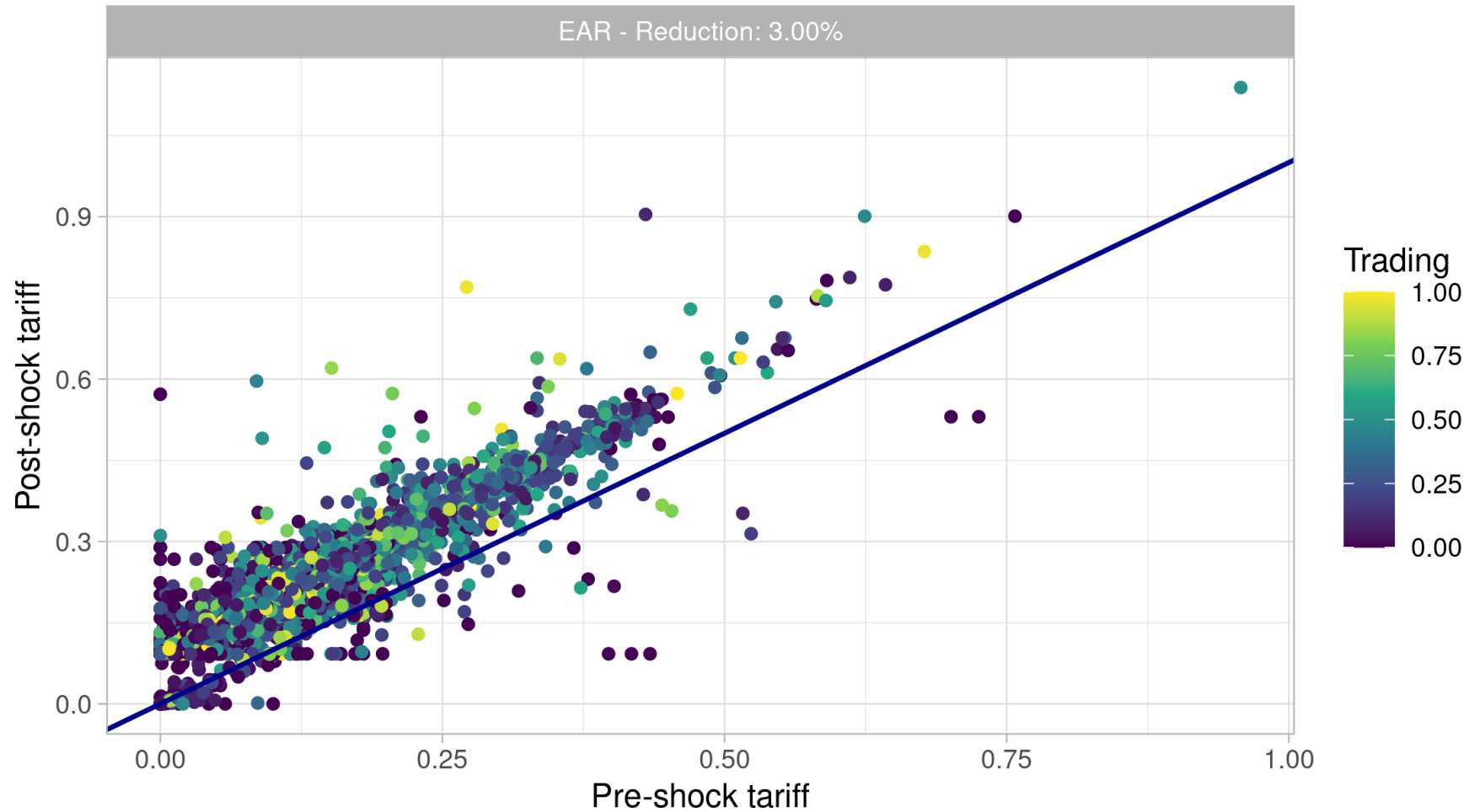
Period	Obs.	Importers	Partners	Products	Ports	Avg. FOB	Med. FOB	FOB month
Pre (16 m.)	5,867,541	25,121	211	8,682	103	13.2801	0.749	4,870,095
Post (8 m.)	3,569,570	20,837	201	8,396	104	14.4424	0.799	6,444,132

Notes:
The pre-shock period ranges from 1/01/2003 to 4/30/2004 and post-shock covers the dates from 5/01/2004 to 12/31/2004. Values expressed in thousand dollars.

values in thousands of US dollars. Pre-shock period: jan/2003 to apr/2004 and post-shock period: may/2004 to dec/2004. regressions will be carried on years!

- Trading companies concentrate the bulk of imports. 71% of all transactions and more than 54% of total FOB value.

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Administrative Treatment

- Different **special customs regimes** and **administrative treatments** (herein administrative treatments)

- Administrative treatment concerns:
    - exemption status from all or some duties,
    - tariff agreements
    - anti-dumping duties
    - drawback (import exemption for further re-export)
    - ex-tariffs (specific changes in tariffs)
    - **non-automatic import licensing**

- Only the last one is an NTB

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Administrative treatment summary

	Pre-shock		Post-shock	
Admin. Treatment	Average	Std. Dev.	Average	Std. Dev.
Anti-dumping	0.0001	0.0110	0.0001	0.0089
Audits	0.2030	0.4022	0.1680	0.3738
Drawback	0.0750	0.2633	0.0818	0.2740
Ex-II	0.0031	0.0552	0.0038	0.0619
Ex-IPI	0.0077	0.0874	0.0037	0.0610
Import License	0.2788	0.4484	0.2805	0.4492
PIS/Cofins exemption	0.0296	0.1695	0.0297	0.1698
Tariff Agreement	0.0374	0.1896	0.0365	0.1875

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Border duties *summary statistics*

Duty	Pre-shock				Post-shock			
	Avg.	W. Avg.	Median	Std. Dev.	Avg.	W. Avg.	Median	Std. Dev.
II	0.0901	0.0408	0.105	0.0786	0.0841	0.0386	0.0960	0.0876
IPI	0.0431	0.0210	0.000	0.0599	0.0421	0.0198	0.0000	0.0588
PIS	0.0000	0.0000	0.000	0.0000	0.0160	0.0147	0.0165	0.0028
Cofins	0.0000	0.0000	0.000	0.0000	0.0737	0.0675	0.0760	0.0129

Notes:
Values in decimal points. Weighted average is based on FOB values.

Theoretical framework - extension

- Net benefit of evasion, $B = \gamma M(E) \cdot T - C(\gamma, E)$

- First-order condition, $M(E) \cdot T = C_1(\gamma^*, E)$

- Elasticity of evasion, $\partial \gamma^* / \partial T = M(E)/C_{11}(\gamma^*, E) > 0$

- $\dfrac{\partial \gamma^*}{\partial E} = \dfrac{\sigma_M^E C_1/E - C_{12}}{C_{11}} < 0$, since we expect $\sigma_M^E < 0$

- $\dfrac{\partial^2 \gamma^*}{\partial E \partial T} = \dfrac{M}{E \cdot C_{11}} \left[\sigma_M^E - \sigma_C^E \right] < 0, \sigma_C^E \equiv \dfrac{\partial C_{11}}{\partial E} \dfrac{E}{C_{11}}$

- If $\sigma_C^E > 0$, since $\sigma_M^E < 0$. Same result as inelastic imports

⚠️ Why is trade gap a good proxy for evasion?

- Exporters have no incentive to overstate their revenues. Profit taxes.
  - Rebates on IVA are limited to what they have paid
  - Profit shifting: transactions between related companies would not interfere with the trade gap. Export and import value move in tandem

- Little incentive to underreport.
  - Dealing with unaccounted balances
  - Underreporting would make the trade gap x tariff relation flat

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$$y_{cpt} = \beta_1 T_{cpt} + D_{cp} + D_{ct} + D_{pt} + \varepsilon_{cpt}$$

Table 11: Regression results comparing effective applied against MFN tariffs

| | Effective applied tariff | | | | MFN tariff | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Tariff	2.18699***	1.73590***	1.29614***	1.16046***	0.84724	0.91723**	-0.35299	-0.42414
	(0.32176)	(0.21204)	(0.39932)	(0.34939)	(0.56644)	(0.38141)	(0.69847)	(0.59678)
Num.Obs.	63462	64719	57467	59238	63462	64719	57467	59238
Dep. Var.	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity
R2 Adj.	0.532	0.564	0.543	0.616	0.530	0.563	0.542	0.615
FE: cp	✓	✓	✓	✓	✓	✓	✓	✓
FE: ct	✓	✓	✓	✓	✓	✓	✓	✓
FE: pt	✓	✓	✓	✓	✓	✓	✓	✓

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:
Tariff is calculated as a simple average from transaction-level data by origin country, year and 6-digit product or the most favored nation accordingly. All standard errors are two-way clustered at country and product.

Results - *table*

Table 19: Robustness assessment to the inclusion of average exchange rate and State

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	2.43***	1.92***	1.46***	1.32***	2.47***	1.95***	1.49***	1.35***	2.41***	1.95***	1.54***	1.43***
	(0.32)	(0.23)	(0.42)	(0.38)	(0.32)	(0.23)	(0.42)	(0.37)	(0.31)	(0.23)	(0.43)	(0.38)
Similar	-0.54**	-0.42***	-0.37	-0.36	-0.53**	-0.41***	-0.37	-0.35	-0.52**	-0.40**	-0.34	-0.32
	(0.22)	(0.16)	(0.33)	(0.30)	(0.22)	(0.15)	(0.33)	(0.29)	(0.22)	(0.16)	(0.33)	(0.30)
Num.Obs.	63458	64715	57463	59234	63458	64715	57463	59234	63458	64715	57463	59234
Dep. Var.	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity
R2 Adj.	0.532	0.565	0.543	0.616	0.533	0.565	0.543	0.616	0.535	0.567	0.544	0.617
FE: cp	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: ct	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: pt	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:
Incremental inclusion of the average exchange rate, models 5 to 8 and proportion each State had in the import value, models 9 to 12. Tariffs on similar products and its own are calculated as a simple average from transaction-level data by origin country, year and 6-digit product. Similar products have the same first 4-digits. All standard errors are two-way clustered at country and product.

Trading Companies - *summary statistics*

Period	Obs.	Importers	Partners	Products	Ports	Avg. FOB	Med. FOB	FOB month
Trading Companies								
Pre (16 m.)	3,996,345	589	183	6,797	77	9.5410	0.5400	2,383,061
Post (8 m.)	2,483,944	548	176	6,361	76	11.1540	0.5959	3,463,246
High Pervasiveness								
Pre (16 m.)	3,465,070	392	170	6,229	70	9.1794	0.5178	1,987,964
Post (8 m.)	2,165,694	358	167	5,779	72	10.9238	0.5700	2,957,208
Low Pervasiveness								
Pre (16 m.)	4,602,010	1,157	194	7,501	83	10.4166	0.5848	2,996,080
Post (8 m.)	2,840,831	1,099	180	7,128	84	12.1396	0.6369	4,310,813

Notes:
The pre-shock period ranges from 1/01/2003 to 4/30/2004 and post-shock covers the dates from 5/01/2004 to 12/31/2004. Values expressed in thousand dollars. Pervasiveness in international trade for trading companies is defined as a firm that in a given year imports at least 20 different HS 8-digit products 20 times or more. High pervasiveness definition sets the bar high at 25 products 35 times or more, and low pervasiveness considers companies that internalize 10 products 15 times a year or more.

Are trading companies more audited?

- Well known companies, frequently importing and having contact with customs officials

- Due to the nature of Brazilian legislation, all imports are subject to a randomized system of audits

in theory …

- Contrary to our initial belief, trading companies have **lower probability** of being audited

- Correlation of TC dummy and physical inspection is negative at -0.0678

- Not likely that authorities' higher level of scrutiny over trading companies is driving their results

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Trading Companies - *bottom line*

- **No evidence** that tradings have higher evasion elasticity with relation to tariffs than regular importers
- Tradings do have **lower clearance times** and are **active longer** than other importers
- This suggests a concern about their efficiency in the import process.
- Imports idle time costs money (storage, fines, losing clients, etc.)

- Intermediaries make money on high **turnover** of small fees on imports. It's not in their interest to evade more custom duties when the proceedings are passed along to clients

- **Policy question:** **Should we further investigate trading companies? How?**

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Trading Companies results

	Trading Companies				High Pervasiveness				Low Pervasiveness			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	2.41***	1.94***	1.45***	1.36***	2.38***	1.92***	1.54***	1.43***	2.20***	1.76***	1.17**	1.09**
	(0.36)	(0.25)	(0.46)	(0.42)	(0.33)	(0.23)	(0.45)	(0.40)	(0.39)	(0.27)	(0.51)	(0.45)
Tariff X Trading	0.03	-0.10	0.18	0.02	0.20	-0.01	-0.10	-0.23	0.47	0.32	0.72	0.58
	(0.53)	(0.32)	(0.61)	(0.52)	(0.70)	(0.43)	(0.71)	(0.62)	(0.49)	(0.32)	(0.59)	(0.53)
Trading	-0.01	-0.02	0.19	0.20	-0.03	-0.02	0.36*	0.37**	-0.13	-0.11	0.04	0.09
	(0.15)	(0.10)	(0.17)	(0.16)	(0.18)	(0.12)	(0.18)	(0.17)	(0.14)	(0.09)	(0.15)	(0.13)
Similar	-0.54**	-0.42***	-0.38	-0.36	-0.54**	-0.41***	-0.40	-0.38	-0.54**	-0.41***	-0.38	-0.36
	(0.22)	(0.16)	(0.32)	(0.29)	(0.22)	(0.16)	(0.32)	(0.29)	(0.22)	(0.16)	(0.32)	(0.29)
Num.Obs.	63458	64715	57463	59234	63458	64715	57463	59234	63458	64715	57463	59234
Dep. Var.	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity
Avg. Tariff	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Avg. Trading	0.35	0.35	0.34	0.34	0.26	0.26	0.25	0.25	0.48	0.48	0.47	0.47
R2 Adj.	0.532	0.565	0.543	0.616	0.532	0.565	0.543	0.616	0.532	0.565	0.543	0.616
FE: cp	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: ct	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: pt	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:
Tariff is the simple average from transaction-level data by origin country, year and 6-digit product. Trading is the proportion of imports made by trading companies for a given triplet, country, year and product. All standard errors are two-way clustered at country and product.

Non-tariff Barrier results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	2.66***	2.23***	1.75***	1.71***	2.66***	2.23***	1.75***	1.72***	2.65***	2.23***	1.75***	1.75***
	(0.27)	(0.19)	(0.38)	(0.36)	(0.27)	(0.19)	(0.38)	(0.36)	(0.29)	(0.21)	(0.38)	(0.36)
Tariff X NTB	-1.91***	-1.45***	-2.01***	-1.82***	-1.91***	-1.45***	-2.01***	-1.82***	-1.97***	-1.49***	-2.06***	-1.87***
	(0.42)	(0.29)	(0.52)	(0.50)	(0.42)	(0.29)	(0.52)	(0.50)	(0.43)	(0.29)	(0.52)	(0.50)
Similar	-0.69***	-0.65***	-0.81***	-0.77***	-0.69***	-0.65***	-0.81***	-0.77***	-0.70***	-0.65***	-0.83***	-0.78***
	(0.23)	(0.16)	(0.28)	(0.28)	(0.23)	(0.16)	(0.28)	(0.28)	(0.23)	(0.16)	(0.29)	(0.28)
NTB	0.02	-0.02	0.20	0.16	0.02	-0.02	0.20	0.16	0.07	0.01	0.26*	0.20
	(0.10)	(0.07)	(0.14)	(0.13)	(0.10)	(0.07)	(0.14)	(0.13)	(0.10)	(0.07)	(0.14)	(0.13)
Num.Obs.	63457	64714	57462	59233	63457	64714	57462	59233	63457	64714	57462	59233
Dep. Var.	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity	Value	Ext. Value	Quantity	Ext. Quantity
Avg. Tariff	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Avg. NTB	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
R2 Adj.	0.116	0.182	0.180	0.307	0.116	0.182	0.180	0.307	0.118	0.183	0.182	0.308
FE: c	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: p	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FE: t	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes:
Tariff is calculated as a simple average from transaction-level data by origin country, year and 6-digit product from the administrative dataset. NTB is the proportion of imports subject to non-automatic licensing for a given triplet, country, product, and year. All standard errors are two-way clustered at country and product.

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PIS/Cofins law modifications

- Federal Act nº 10.865/2004 has undergone through several subsequent changes, most of them from 2005 onward
  - Act nº 10.925 of 7/23/2004
  - Act nº 11.033 of 12/21/2004
  - Act nº 11.051 of 12/29/2004
  - MPV nº 252 of 6/15/2005
  - Act nº 11.196 of 11/21/2005
  - Act nº 11.488 of 6/15/2007
  - MPV nº 413 of 1/03/2008

and many, many others …

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Elasticity modifiers' distributions