

Trade Liberalization Along the Firm Size Distribution: The Case of the EU-South Korea FTA

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Roadmap

- 1 Introduction
- 2 Empirical Methodology
- 3 Regression Results
- 4 Extensions
- 5 Robustness Checks
- 6 Conclusion

Motivation

It has become increasingly difficult politically to conclude FTAs

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- Empirical evidence on FTA effects along size distribution is scarce
⇒ Compare response of superstars to intermediate and small firms
- Effects of tariff and NTB reductions studied separately
⇒ Jointly study impact of tariffs and NTB reductions
- Key methodological challenge in policy evaluation – firm anticipation of policy shocks
⇒ Exploit long panel data to directly examine anticipatory behavior along various margins

Some Remarks from Theory

.. favoring mid-size firms?

- Melitz (2003) CES environment predicts that firms with different productivities (and, thus, sizes) react with identical elasticities to lower trade costs (tariffs or icebergs); also true for GE effects

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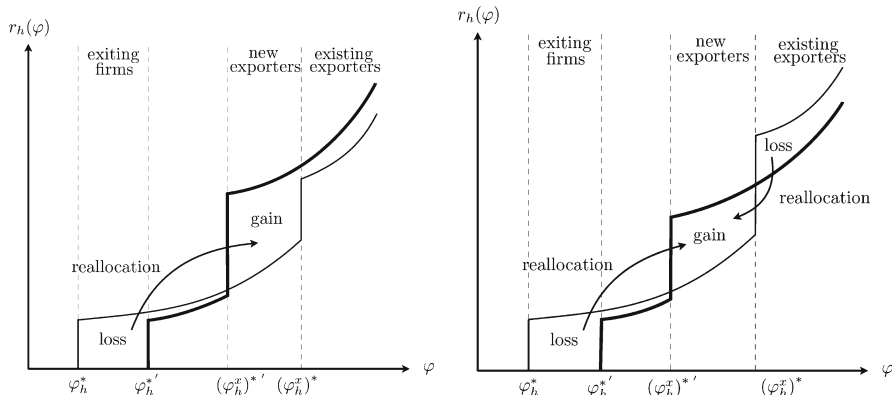
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- Action at extensive margin always tends to favor mid-size firms

Stylized Melitz-Type Responses

Lower variable trade costs Lower fixed entry costs



Felbermayr & Jung, OER 2011.

Preview of Results

Big is beautiful!

- Firm Heterogeneity \Rightarrow Larger firms better able to leverage agreement

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- Firm Heterogeneity \Rightarrow Larger firms better able to leverage agreement
- Margins \Rightarrow Size differential in both intensive and product margins
- Non-tariff barriers \Rightarrow Main driver of size differential
- Anticipation Effects \Rightarrow Entry of new firms during negotiation period

Related Literature

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- **Anticipation:** Magee (2008) on aggregate trade flows, Handley and Limao (2015) on Portugal's accession, Crowley, Exton, and Han (2020) on Brexit
- **Existing Evaluations:** European Commission (2017) using NQTT, Lakatos and Nilsson (2017) using product-level data, Kasteng and Tingvall (2019) using Swedish transactions-level import data

EUKFTA as a Prototypical 'New Generation' FTA

- Integrated two sizeable economies and was the largest EU FTA (in terms of combined market size) till CETA.
- First 'new generation' FTA and first EU FTA with an Asian economy – treated as benchmark model.
- Unprecedented in scope, depth and speed of liberalisation.
- Timeline: Official talks were launched in 2007, FTA signed in 2010 and entered into force in July 2011.

Provisions

- **Tariffs:** Within first year, 94% of EU tariff lines and 80% of Korean tariff lines became duty-free. Average duty faced by French exporters to Korea reduced from 12.1% in 2010 to 6.2% in 2011. [Graphs](#)
- **NTBs:** Range of provisions related to food and safety standards, customs procedures, certification requirements etc. Included 'horizontal' clauses that reduce trade frictions more broadly across sectors.

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Data

Customs:

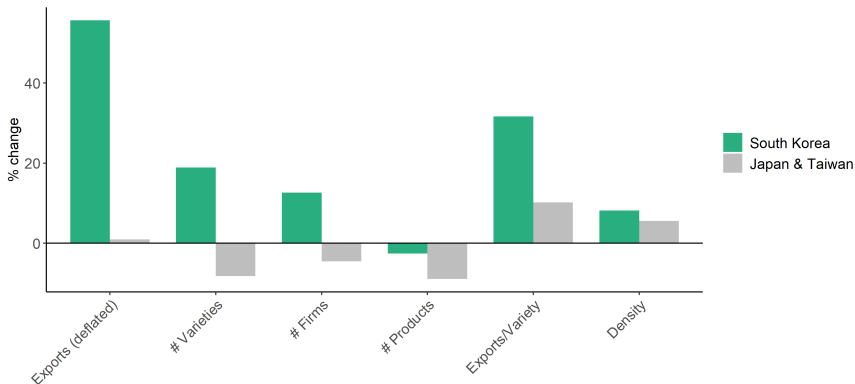
- Data from France spanning 2000-2016
- Covering 5000 HS-6 digit products and 194 countries
- Universe of exporting firms, no bias towards large firms
- Each firm assigned time-invariant unique identifier ('SIREN')
- Rich dimensionality: Exports of firm (f) disaggregated by export destination (d), product (p) and time (t)
- Split data into control (2000-2006), negotiation (2007-2010) and FTA (2011-2016) periods.

Data contd.

- Tariffs data:
 - Bilateral applied tariffs at HS-6 digit level, drawn from Felbermayr, Teti, and Yalcin (2019). Include the phasing-out of tariffs from FTAs and fill in missing MFN tariffs.
 - FTA tariff schedules through the WTO's RTA database.
- Destination characteristics: USTR Dynamic Gravity Database and World Bank Database.

First Glimpse

Graphical Diff-in-Diff



Bernard et al. (2009) decomposition. Density: Fraction of all possible firm-product pairs (varieties) with positive exports.

Measuring Firm Size

Trade-based Proxy

Firm's total trade across products and destinations over the control period (2000-2006), excluding trade with South Korea.

Rationale:

- Retains small firms in the sample. Firms with ≤ 25 employees excluded from French balance sheet databases and account for more than half of French exporters.
- Trade-based proxy supported by prior literature (Melitz and Redding, 2014).
- As robustness check, can define size at firm-industry level, differentiate between big conglomerates and industry leaders.

Summary Stats

Baseline Regression Specification

Intensive Margin

$$\log(\text{exports})_{fpdt} = \sum_k \beta^k (Kor_d \times FTA_t \times Size_f^k) + \theta + \varepsilon_{fpdt} \quad (1)$$

- Treated country - Kor_d takes 1 for South Korea
- Two period - control (2000-2006) and FTA (2011-2016)
- Heterogeneity - $Size_f^k$ dummies for size bins
- Focus on *differential* impact along size distribution
- Fixed effects - θ only triple interaction identified
- Clustering - ε_{fpdt} by product-destination

Results

Baseline Regressions contd.

Product Margin

$$\# \text{ products}_{fdt} = \exp\left(\sum_k \beta^k (Kor_d \times FTA_t \times Size_f^k)\right) + \theta + \varepsilon_{fdt} \quad (2)$$

- Negative binomial regressions
- Only firms that export to given destination continuously
- Fixed effects - θ only triple interaction identified

Results

Baseline Regressions contd.

Extensive Margin

$$\# \text{ firms}_{dt} = \exp(\beta(Kor_d \times FTA_t) + \theta + \varepsilon_{dt}) \quad (3)$$

- Negative binomial regressions
- Fixed effects - θ only interaction term identified
- Destination-time controls - GDP per capita, exchange rates, WTO membership, PTA [Results](#)

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Intensive Margin

Dependent Variable:	log(exports)		
Model:	(1)	(2)	(3)
<hr/>			
Kor × FTA ×			
log(size)	0.072*** (0.009)		
p50-p100		0.140*** (0.034)	
p75-p100			0.292*** (0.065)
p50-p74			0.216*** (0.065)
p25-p49			0.135** (0.063)
<hr/>			
Base category		≤ p49	≤ p24
<i>Fixed-effects</i>			
Firm-Prod-Dest	Yes	Yes	Yes
Firm-Prod-Time	Yes	Yes	Yes
Prod-Dest-Time	Yes	Yes	Yes
<hr/>			
Observations	1,758,158	1,758,158	1,758,158
R ²	0.9187	0.91869	0.91869

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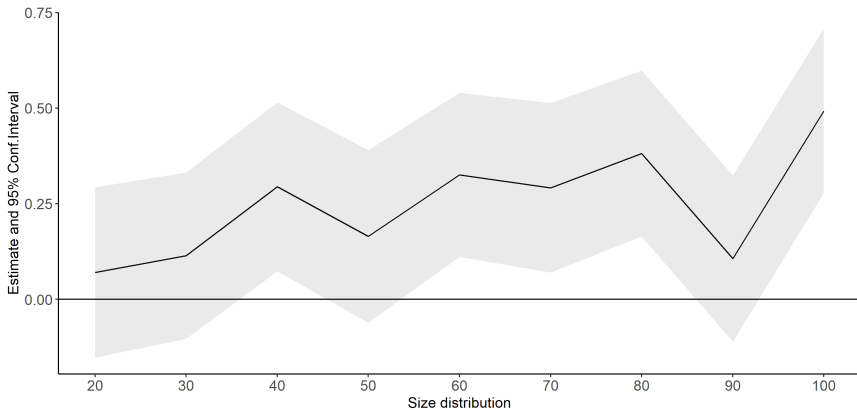
- FTA boosts exports by 15% more in upper half of size distribution, relative to lower half.
- Firms in top quartile increased export sales by 33.9% relative to bottom quartile.

Specification

Changing FE

Comparison with Lowest Decile

Top 10% exporters with 65%-points additional export growth advantage over bottom 10%.



Product Margin

Negative binomial model

Dependent Variable:	# products		
Model:	(1)	(2)	(3)
<hr/>			
Kor × FTA ×			
log(size)	0.026*** (0.003)		
p50-p100		0.011 (0.015)	
p75-p100			0.087*** (0.019)
p50-p74			-0.009 (0.019)
p25-p49			0.018 (0.017)
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Firm-Dest	Yes	Yes	Yes
Firm-Time	Yes	Yes	Yes
Dest-Time	Yes	Yes	Yes
<hr/>			
Observations	5,445,072	5,445,072	5,445,072
Pseudo R ²	0.38112	0.38111	0.38112
Overdispersion	66.29	66.27	66.28

Product Margin

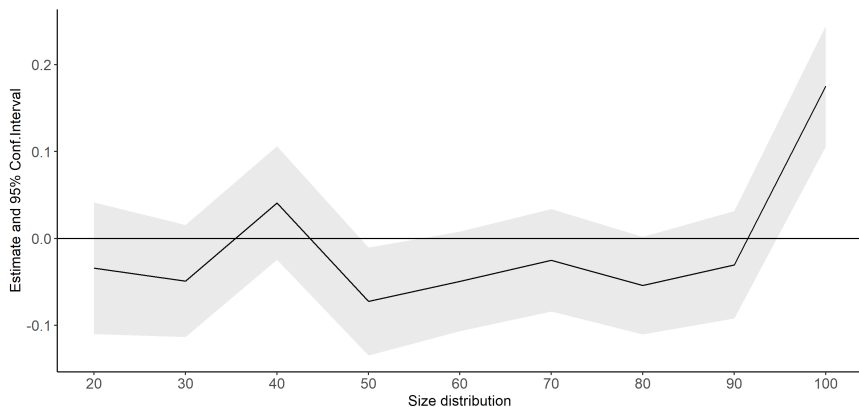
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Firm-Dest	Yes	Yes	Yes
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Dest-Time	Yes	Yes	Yes
Observations	5,445,072	5,445,072	5,445,072
Pseudo R ²	0.38112	0.38111	0.38112
Overdispersion	66.29	66.27	66.28

- Over-dispersion parameter confirms choice of NB model
- Size positively linked to product diversification
- Again, we can examine if relationship is monotonic

Specification

Product Margin



Extensive Margin

Dependent Variables:	# firms	# varieties
Model:	(1)	(2)
Kor \times FTA	0.171*** (0.027)	0.073*** (0.027)
<i>Fixed-effects</i>		
Dest	Yes	Yes
Time	Yes	Yes
Overdispersion	85.48	74.57
Observations	234	234
Pseudo R ²	0.25679	0.23871

Specification

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Disentangling the Effects of NTBs and Tariffs

Prior literature uses explicit measures of NTBs. Our 'umbrella' approach:

- Side-steps NTB measurement issues
- Attributes all trade creation not explained by tariffs to NTBs
- Accounts for horizontal and sector-specific provisions

$$\log(\text{exports})_{f\text{pdt}} = \sum_k \beta^k (Kor_d \times FTA_t \times Size_f^k) + \sum_k \gamma^k (\text{tariff}_{\text{pdt}} \times Size_f^k) + \sum_k \mu^k (Kor_d \times \text{tariff}_{\text{pdt}} \times Size_f^k) + \theta + \varepsilon_{f\text{pdt}}$$

Disentangling the Effects of NTBs and Tariffs

Dependent Variable:		log(exports)		
Kor × FTA ×				
log(size)	0.128*** (0.017)			
p50-p100		0.441*** (0.059)		
p75-p100			0.701*** (0.108)	
p50-p74			0.573*** (0.094)	
p25-p49			0.252*** (0.094)	
<i>Additional Controls</i>				
tariff × size bins	Yes	Yes	Yes	
Kor × tariff × size bins	Yes	Yes	Yes	
Observations	1,758,158	1,758,158	1,758,158	
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[Full table](#)
[Sector-wise](#)
[Alt. sizes](#)

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- NTB reductions contributed two-fold increase in exports of top quartile firms relative to bottom quartile.
- New dimension of firm heterogeneity.

[Full table](#)
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Anticipation Effects

Second extension of baseline model:

- Split sample into three periods
- Control (2000-2006); **negotiation (2007-2010)** and FTA (2011-2016)
- Introduce new time dummy for the negotiation period
- Examine anticipation across margins - intensive, product, extensive

Anticipation Effects

Dependent Variables:	log(exports)	# products	# firms	# varieties
Model:	(1)	(2)	(3)	(4)
Family	OLS	Neg. Bin.	Neg. Bin.	Neg. Bin.
Kor × Neg	-0.015 (0.045)	-0.009 (0.022)	0.176*** (0.022)	0.075*** (0.016)
Kor × FTA	0.044 (0.029)	-0.011 (0.018)	0.161*** (0.025)	0.073*** (0.022)
<i>Fixed-effects</i>				
Firm-Prod-Dest	Yes			
Firm-Prod-Time	Yes			
Firm-Dest		Yes		
Firm-Time		Yes		
Dest			Yes	Yes
Time			Yes	Yes
Overdispersion	–	19.03	89.64	78.47
Observations	1,880,337	892,762	403	403
Clustering	Prod-Dest-Time	Dest-Time	Dest-Time	Dest-Time
(Pseudo) R ²	0.89399	0.32488	0.27437	0.25623

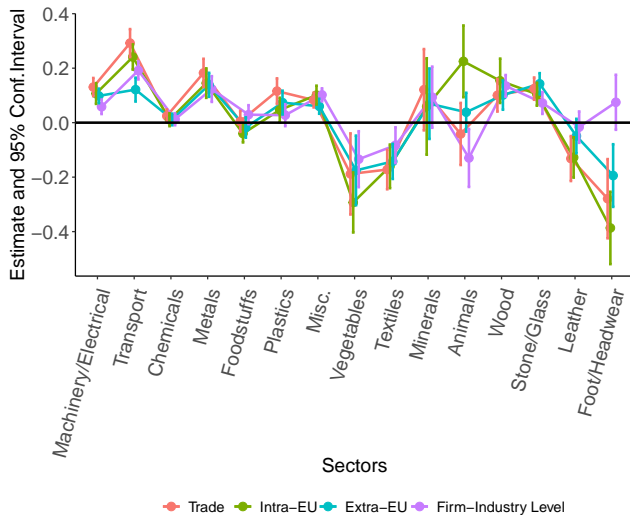
Recap of Results

- Larger firms better able to leverage FTAs.
- Size differentials are significant for intensive and product margins.
- Size effect in intensive margin strongly driven by NTB reductions.
- NTB provisions lowered variable trade costs as well.
- Substantial anticipation observed in firm entry.

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Size effect from NTB reductions

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Alternative Size Measures - Industry Size

Dependent Variable:	log(exports)		
Model:	(1)	(2)	(3)
Kor × FTA ×			
log(size by industry)	0.054*** (0.007)		
p50-p100		0.094*** (0.030)	
p75-p100			0.302*** (0.063)
p50-p74			0.149** (0.062)
p25-p49			0.199*** (0.064)
Base category		≤ p49	≤ p24
<i>Fixed-effects</i>			
Firm-Prod-Dest	Yes	Yes	Yes
Firm-Prod-Time	Yes	Yes	Yes
Prod-Dest-Time	Yes	Yes	Yes
Observations	1,757,724	1,757,724	1,757,724
R ²	0.9187	0.91869	0.91869

Extra-EU

Intra-EU

Summary Stats

Expanding Time Dimension

Dependent Variable:	log(exports)		
Model:	(1)	(2)	(3)
Kor × FTA ×			
log(size)	0.006 (0.022)		
p50-p100		0.336*** (0.065)	
p75-p100			0.236 (0.190)
p50-p74			0.256* (0.141)
p25-p49			-0.058 (0.138)
Base category		≤ p49	≤ p24
<i>Fixed-effects</i>			
Firm-Prod-Dest	Yes	Yes	Yes
Firm-Prod-Time	Yes	Yes	Yes
Prod-Dest-Time	Yes	Yes	Yes
Observations	1,354,794	1,354,794	1,354,794
R ²	0.95071	0.95071	0.95071

Dependent Variable:	# products		
Model:	(1)	(2)	(3)
Kor × FTA ×			
log(size)	0.047*** (0.003)		
p50-p100		0.058*** (0.019)	
p75-p100			0.085*** (0.029)
p50-p74			0.036 (0.026)
p25-p49			-0.007 (0.034)
Base category		≤ p49	≤ p24
<i>Fixed-effects</i>			
Firm-Dest	Yes	Yes	Yes
Firm-Time	Yes	Yes	Yes
Dest-Time	Yes	Yes	Yes
Observations	1,116,105	1,116,105	1,116,105
Pseudo R ²	0.36176	0.36174	0.36174

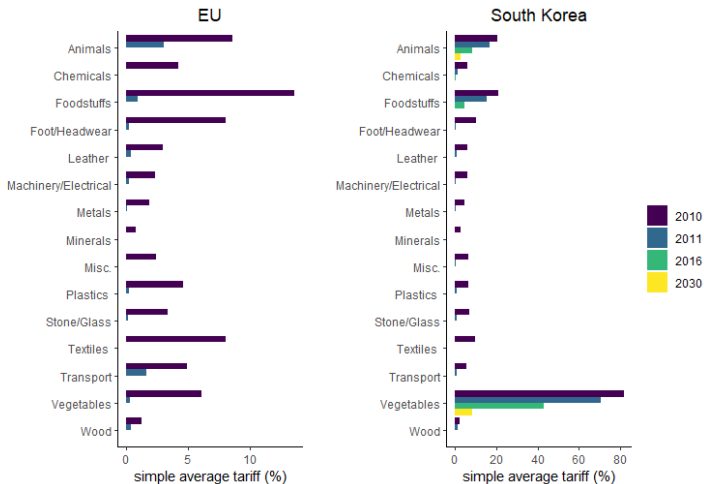
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Policy Implications & Future Research

- Latest FTAs include special chapters with provisions explicitly favoring SMEs - EUJEPA, USMCA
- Results show that intensive margin reacts to NTB reductions - suggests NTB provisions are not just about reducing fixed costs of market access but also variable trade costs.
- Future research can examine the mechanisms underpinning the size bias of FTAs, may require structural approach.

Tariff Phasing

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Size - Summary Statistics

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Table: Firm size (in million Euros)

	Mean	Q1	Median	Q3	Skewness
Importers from Korea	222.19	0.46	5.83	41.72	36.84
Exporters to Korea	213.72	1.13	9.89	59.45	39.45
Bi-traders with Korea	607.08	7.79	40.69	213.78	21.14
Remaining firms	4.80	0.006	0.042	0.520	167.32
All firms	12.30	0.007	0.049	0.69	197.22

Alternative Fixed Effects Combinations

Back

Dependent Variable:	log(exports)			
Model:	(1)	(2)	(3)	(4)
Kor x FTA	0.046 (0.045)			
Kor x FTA x log(size)		-0.0002 (0.0002)	0.072*** (0.009)	0.072*** (0.009)
<i>Fixed-effects</i>				
Firm-Prod-Dest	Yes	Yes		Yes
Firm-Prod-Time	Yes		Yes	Yes
Prod-Dest-Time		Yes	Yes	Yes
Observations	1,758,158	1,758,158	1,758,158	1,758,158
R ²	0.8894	0.85202	0.71558	0.9187

Disentangling Tariffs and NTBs

Back

Kor × FTA × log(size)	0.128*** (0.017)		
p50-p100		0.441*** (0.059)	
p75-p100			0.701*** (0.108)
p50-p74			0.573*** (0.094)
p25-p49			0.252*** (0.094)
log(1+tariff) × log(size)	-0.078* (0.045)		
p50-p100		-0.088 (0.148)	
p75-p100			-0.168 (0.281)
p50-p74			-0.096 (0.162)
p25-p49			-0.049 (0.162)
Kor × tariff × size bins	Yes	Yes	Yes
Observations	1,758,158	1,758,158	1,758,158
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Size as Extra-EU Trade

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Dependent Variable:	log(exports)		
Model:	(1)	(2)	(3)
Kor × FTA ×			
log(size)	0.075*** (0.008)		
p50-p100		0.179*** (0.033)	
p75-p100			0.346*** (0.080)
p50-p74			0.260*** (0.072)
p25-p49			0.134* (0.073)
<i>Fixed-effects</i>			
Firm-Prod-Time	Yes	Yes	Yes
Prod-Dest-Time	Yes	Yes	Yes
Firm-Prod-Dest	Yes	Yes	Yes
Observations	1,741,437	1,741,437	1,741,437
R ²	0.91832	0.91832	0.91832

Size as Intra-EU Trade

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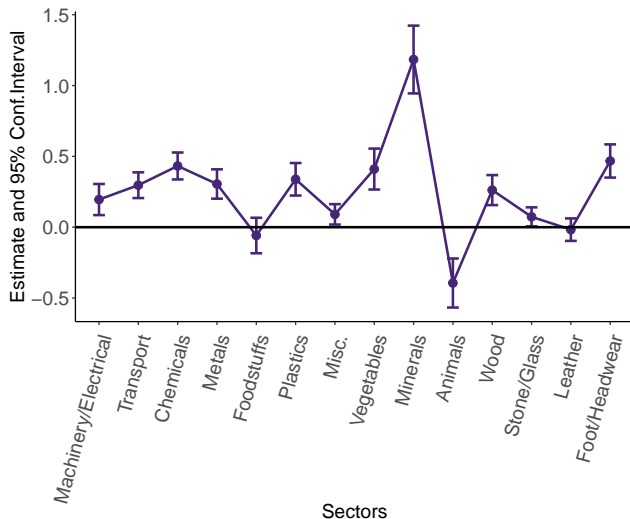
Dependent Variable:	log(exports)		
Model:	(1)	(2)	(3)
<i>Kor × FTA ×</i>			
log(size)	0.058*** (0.010)		
p50-p100		0.048 (0.036)	
p75-p100			0.129** (0.059)
p50-p74			0.078 (0.058)
p25-p49			0.069 (0.051)
<i>Fixed-effects</i>			
Firm-Prod-Time	Yes	Yes	Yes
Prod-Dest-Time	Yes	Yes	Yes
Firm-Prod-Dest	Yes	Yes	Yes
Observations	1,708,106	1,708,106	1,708,106
R ²	0.91842	0.91842	0.91842

Industry Size

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Industry	Mean	p50	p75	p90	p95	p99	Share
Minerals	7710.00	20.54	122.33	792.67	2582.41	37531.13	7.26
Transport	5240.48	23.45	172.49	995.30	2934.45	33070.82	17.02
Chemicals	3482.83	24.74	185.08	1443.58	5351.90	63751.48	12.61
Machinery/Electrical	2528.14	37.09	263.08	1442.54	4059.37	34502.77	23.20
Animals	2408.79	148.12	863.44	4162.85	10426.43	42972.01	2.61
Foodstuffs	1785.63	41.93	267.99	1533.59	4561.76	30076.20	4.75
Vegetables	1427.27	76.39	396.26	1990.90	5025.31	23982.36	2.73
Metals	1330.67	27.50	191.39	1046.46	2812.07	17826.24	7.55
Textiles	1034.32	23.16	161.73	1033.39	3073.74	18341.55	4.67
Plastics	972.96	23.54	144.88	792.72	2309.28	14625.98	5.01
Misc.	794.90	22.09	133.89	635.02	1759.05	12589.96	5.60
Wood	677.12	17.02	109.64	570.54	1533.87	10565.68	3.53
Stone/Glass	576.52	16.27	99.68	485.59	1266.93	8464.09	1.95
Foot/Headwear	551.27	14.29	82.59	399.54	1196.64	8655.35	0.75
Leather	487.52	11.79	67.78	399.35	1184.26	6522.19	0.74

Sector-wise NTB Reductions - Relative to Textiles

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Impact of NTBs vs Tariffs - Relative to Textiles

