The heterogenous impact of tariff and NTM on total factor productivity of Indonesian firms

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Introduction

Introduction

- Indonesia insists on relying to manufacturing to boost its growth

- Emphasize on tech upgrade

- also on export-led

- The role of openness will be greater
  - financing R&D
  - import $\Rightarrow$ tech-upgrade (Castellani and Fassio 2019)

Source: kemenperin.go.id

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Introduction

- However, Protectionism is on the rise, including in Indonesia (Patunru 2018)

- While overall tariff went down, Non-Tariff Measures went up

- The role of Ministry of Industry is on the rise from National Standards (SNI) and Local Content Requirement (LCR) (Munadi 2018)

- Pandemic accelerates the trend, potentially using tariff as well

  > "Roadmap sedang disusun. Nanti output-nya **subtitusi impor** pada akhir **2022** sebesar **35%**," kata Menteri Perindustrian Agus Gumiwang dalam sebuah webinar, Selasa (28/7).
  >
  > Source: katadata.co.id

- Protectionism policies may lead to more policies:

  - US Case: iron $\Rightarrow$ appliances
  - Indonesian Case: corn & soybean $\Rightarrow$ chicken, mobile phone

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Introduction

- The straight forward question:

  > To what extent tariff and NTM affects firm's productivity?

- Further investigation is conducted:

  - does size matters? (core question since Melitz (2003))

  - how protectionism affects employment?

  - can NTM reduces firm's import in general?

- Building from Amiti and Konnings (2007), I estimate TFP and use it as the dependent variable

- Tariff is scrapped from MoF regulations, NTM from TRAINS database

- Firm's chara & trade: Survey Industri and Customs data from BPS from 2008 to 2012

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Brief Literature Review

On trade and industry

- On The role of international trade and trade policies to firm's performance, literature is abundant:

  - help firm access better inputs (Amiti and konings 2007; Bas and Strauss-Kahn 2014; Castellani and Fassio 2019; Ing, Yu and Zhang 2019)
  - help firms innovate and be more productive (Bas and Strauss-Kahn 2014, Pierola, Fernandez and Farole 2018; Ing, Yu and Zhang 2019; Pane and Patunru 2019)
  - Help firms from developing countries accessing the more lucrative foreign market (An and Maskus 2009; Cadot et al. 2015; Fugazza, Olarreaga and Ugarte 2017)

- How to measure performance of industries and firms:

  - most of the literature uses export (value, quantity, price, scope)
  - some criticism includes endogeneity and the role of export to more meaningful metrics (such as GDP, employment and wage)
  - The alternative is using TFP (Amiti and Konings 2007; Pane and Patunru 2019)

On Using TFP

- Using TFP is preferable (Indonesian context):

  - Trade policy is arguably 'less endogen' to Firm's TFP:

    - Indonesian government often aim for CAD (Patunru 2018), not firms TFP.
    - Manufacturing Firms' influence over tariff is less strong (Amiti and Konings 2007; Mobarak and Purbasari 2005)

  - Firm's TFP is a more meaningful metric than export

- TFP estimation:

  - non-linear method (Henningsen and Henningsen 2012) have less restriction, but harder to converge and contain less economic intuition.
  - Linear method is preferable but endogeneity needs to be treated:
    - using investment proxy (Olley and Pakes 1998)
    - using intermediate input proxy (Amiti and Konings 2007; Levinsohn and Petrin 2003)

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On Trade Policies

- The impact of tariff is established, but NTM's impact is mixed (Kee et al. 2009; Cadot et al. 2015)

On NTMs:

- Price-difference method & Indonesian context (Marks 2018):

  - NTMs correlate with higher domestic price
  - Hard to get consistent data on price
  - possibility that price reflects quality

- Most are using categorical variable with AVE-style estimation

- UNCTAD (2017) built an NTM database called TRAINS:

  - Less judgmental (NTM vs NTB)
  - lack depth (Cadot et al. 2015)

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Data

Firms

- Survey Industri (SI), BPS

  - follows many Indonesian manufacturing since 1970s
  - infos include factor used, foreign ownership, output, fraction of export and import
  - unbalanced, unfortunately
  - Inconsistent fixed asset and energy consumption

- Customs data

  - 2008-2012 with firm id to integrate with SI
  - varies with countries and HS-8-digit
  - not exactly match one-on-one with SI
  - can't say for sure if the import is directly used for production

- Not all firms reporting export and import in SI exist in the customs data, and vice-versa

  - may be using third party traders

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What Indonesian firms are trading?

Table 1a. Import

HS2	Description	M2008	M2009	M2010	M2011	M2012
72	Iron and steel	2,060	1,070	1,810	2,280	2,660
84	Mechanical Machinery	2,030	1,520	2,580	3,360	4,130
85	Electrical Machinery	1,610	1,580	2,300	2,880	2,540
29	Organic Chemicals	1,180	925	1,250	1,560	1,850
39	Plastics and articles	875	753	1,110	1,560	1,680
23	Food Waste	642	616	597	1,080	1,270
52	Cotton	571	465	710	1,090	854

Table 1b. Export

HS2	Description	X2008	X2009	X2010	X2011	X2012
85	Electrical Machinery	2,070	2,990	4,340	4,890	4,750
40	Rubber and Articles	1,760	1,590	3,680	5,770	4,130
15	Animal or Vegetable Fats	1,330	1,700	2,730	4,270	4,540
87	Non-railway Vehicles	1,150	1,370	2,060	2,290	3,500
84	Mechanical Machinery	986	993	1,440	1,790	1,660
61	Knitted apparels	636	989	1,040	1,370	1,320
62	Non-knitted apparels	643	1,150	1,360	1,560	1,290

Suggests integration with Global Value Chain, which is not surprising.

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Firm's Characteristics

Table 2. Firm's characteristics, 2018-2012

Characteristics	All_SI	Non_customs	Customs_only
foreign ownership (%)	8.15	5.96	34.77
	(26.17)	(22.60)	(45.06)
fraction of output exported (%)	22.51	0.21	0.4
	(37.52)	(0.37)	(0.42)
fraction of input imported (%)	0.08	0.07	0.31
	(0.24)	(0.21)	(0.38)
no. of labour employed	191.07	162.75	535.44
	(711.73)	(602.46)	(1,457.65)
capital stock (Million IDR)	198	194	250
	(44,800.00)	(46,500)	(10,400)
total intermediate input (Million IDR)	50.8	41	170
	(617.00)	(515)	(1,330)
total output (Million IDR)	90.3	73.3	296
	(958.00)	(861)	(1,740)
total value added (Million IDR)	38.5	31.6	123
	(455.00)	(414)	(789)
value added per labour (IDR)	137,987.10	126,074	282,857
	(2,515,300.00)	(2,600,177)	(1,012,159)
No. of observation	117,598	108,662	8,915

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Trade Policies

Tariff

- Tariff is scrapped from Ministry of Finance's regulations from 2008 to 2012.
- For practicality, also used are source from FTA partners.
- FTAs during 2008-2012 includes with ASEAN, China, Japan, South Korea, India, Australia and New Zealand.

NTMs

- TRAINS (UNCTAD 2017) is used for NTM
- Count data (=1 if an NTM is applied to a good in HS-6-Digit)
  - neutral, but lack depth
- Doesn't really follow (cross section)
  - but do have `Start Date` and `End Date`

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TRAINS database

Table 3. Indonesia's NTM, TRAINS 2015 set

NTM	Codes	N2008	N2009	N2010	N2011	N2012	Examples
Sanitary & Phytosanitary (SPS)	A	1.715	2.337	2.222	2.255	2.774	Authorization requirements
		(2.644)	(4.018)	(3.950)	(4.054)	(5.128)	Quarantine requirements
Technical Barrier to Trade (TBT)	B	0.481	0.455	0.641	0.682	0.663	Testing requirements
		(0.962)	(0.978)	(1.334)	(1.361)	(1.352)	labeling requirements
Pre-shipment inspections and other formalities	C	0.562	0.466	0.443	0.462	0.776	pre-shipment inspection
		(1.202)	(1.081)	(1.059)	(1.046)	(1.075)	only trough specific ports
Non-automatic licensing, quotas, QC, etc	E	0.623	0.56	0.605	0.618	0.594	licensing
		(0.809)	(0.818)	(0.873)	(0.861)	(0.853)	quota
Price-control measures, extra taxes, charges	F	0	0	0.015	0.014	0.016	customs service fee
		(0.000)	(0.000)	(0.168)	(0.165)	(0.168)	consumption tax
Measures affecting competition	H	0.019	0.052	0.05	0.048	0.046	Only SOEs
		(0.139)	(0.238)	(0.233)	(0.229)	(0.224)	-
Export-related measures	P	0.901	0.704	0.708	0.683	1.172	export permit
		(1.172)	(1.132)	(1.109)	(1.098)	(1.465)	export quota
observations	-	1,675	2,204	2,318	2,400	2,510	-

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Tariff from 2008-2012

Table 4. Tariff from MoF regulations (left) compared to WITS (right)

MoF regulations

Kind	T2008	T2009	T2010	T2011	T2012
MFN	7.049	7.612	6.928	6.975	6.96
	(12.213)	(12.536)	(8.037)	(7.231)	(7.145)
ASEAN	2.478	2.49	0.15	0.15	0.15
	(11.094)	(11.206)	(4.559)	(4.559)	(4.559)
China	7.049	3.819	2.193	2.208	1.941
	(12.213)	(12.673)	(7.941)	(7.941)	(7.927)
South Korea	7.049	2.624	1.912	1.912	1.542
	(12.213)	(12.265)	(7.131)	(7.131)	(7.102)
India	7.049	7.612	6.394	5.874	5.341
	(12.213)	(12.536)	(7.809)	(7.517)	(7.322)
Japan	6.11	4.639	3.274	2.618	2.23
	(11.967)	(12.356)	(7.353)	(7.114)	(6.487)
ANZ	7.049	6.446	2.948	2.278	1.545
	(12.213)	(11.922)	(6.765)	(6.318)	(6.065)

WITS

Kind	T2008	T2009	T2010	T2011	T2012
MFN	7.762	7.595	7.564	7.051	7.053
	(12.631)	(12.456)	(12.412)	(7.015)	(7.016)
ASEAN	1.84	1.843		0.152	0.152
	(11.079)	(11.067)		(4.285)	(4.287)
China	3.665	2.743		1.85	1.579
	(12.342)	(12.392)		(6.853)	(6.823)
South Korea	-	2.564	2.56	1.698	1.326
		(12.087)	(12.084)	(6.395)	(6.349)
India				5.409	4.991
				(6.726)	(6.620)
Japan	-	-			
ANZ				-	-

Method

TFP estimation

The framework is using two-stage regression:
first, estimating TFP

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_k k_{it} + \beta_m m_{it} + \beta_n n_{it} + \epsilon_{it}$$

where:
y_{it} = Revenue of firm i at time t
l_{it} = number of labour
k_{it} = fixed assets
m_{it} = intermediate materials
n_{it} = energy consumption

Use the coefficient to predict TFP:

$$TFP_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_m m_{it} - \hat{\beta}_n n_{it}$$

then estimate the second stage:

$$TFP_{it} = \gamma_0 + \gamma_{tariff} tariff_{it} + \gamma_{NTM} NTM_{it} + \eta_{it}$$

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Some problems

let

$$\epsilon_{it} = \omega_{it} + \mu_{it}$$

where μ_{it} is iid, while ω_{it} is a productivity shock observed only by managers and may correlates with production decisions.

Olley and Pakes (1996) suggest ω_{it} follows a first order markov process and affects a firm's decision on how much to invest (or divest)

$$I_{it} = i(k_{it}, \omega_{it})$$

inversed:

$$\omega_{it} = \phi(I_{it}, k_{it})$$

Weaknesses of using investment (Levinsohn and Petrin 2003):

- zero investment featured in many datasets (including SI)
- less flexible compared to intermediate input

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LP Method

Levinsohn and Petrin (2003) suggest using intermediate input

$$\omega_{it} = \phi(m_{it}, k_{it})$$

Therefore, the first-stage becomes:

$$y_{it} = \beta_0 + \beta_l l_{it} + \beta_n n_{it} + \phi(m_{it}, k_{it}) + \mu_{it}$$

Then proceed as follows to estimate TFP.

$$TFP_{it} = y_{it} - \hat{\beta}_l l_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_m m_{it} - \hat{\beta}_n n_{it}$$

The command `levpet` in STATA allows for practical use of the LP method (Petrin, Poi and Levinsohn 2005).

Trade policy variable

The dataset allows for multiple goods imported for each firm. The most practical way is to use coverage ratios.

$$T_{it} = \frac{\sum tariff_{sc} V_{sc}}{\sum V_{sc}} * 100$$

where:

- T_{it} = tariff coverage ratio of firm i at time t,
- $tariff_{sc}$ = tariff imposed on good s from country c at time t
- V_{sc} = value of good s imported from country c by firm i at time t

And for NTMs:

$$C_{\theta it} = \frac{\sum NTM_{\theta sc} V_{sc}}{\sum V_{sc}} * 100$$

where $NTM_{\theta sc}$ is the number of NTM θ imposed on good s from country c

Coverage ratio

- Table 5 shows simple mean and coverage ratios

- As expected, tariff lies between MFN and FTAs

- Import licensing and quotas is more important than SPS and TBT

- Coverage ratios vs simple mean:

  - no visual difference on tariff
  - firms import more goods with NTMs

Table 5. Coverage ratios

Variable	Obs	Mean	St.Dev.	Min	Max
Tariff	407,532	3.503	4.971	0	150
Tariff Coverage Ratio (T)	407,532	3.420	5.646	0	150
SPS (A)	407,532	0.108	0.718	0	29
TBT (B)	407,532	0.140	0.663	0	13
Pre-shipment inspection (C)	407,532	0.028	0.214	0	5
Licensing, quota, etc (E)	407,532	0.321	0.550	0	6
Price control etc (F)	407,532	0.000	0.008	0	2
Competition measures (H)	407,532	0.007	0.083	0	2
Export-related (P)	407,532	0.063	0.376	0	7
Coverage ratio A	407,532	0.246	0.931	0	19
Coverage ratio B	407,532	0.202	0.478	0	9
Coverage ratio C	407,532	0.059	0.237	0	4
Coverage ratio E	407,532	0.337	0.468	0	6
Coverage ratio F	407,532	0.000	0.001	0	0
Coverage ratio H	407,532	0.014	0.083	0	1
Coverage ratio P	407,532	0.110	0.353	0	7

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Second-Stage

The second stage regression then:

$$tfp_{it} = \gamma_0 + \gamma_T t_{it} + \sum_{\theta} \gamma_\theta c_{\theta it} + FO_{it} + \alpha_i + ISIC_i + \eta_{it}$$

Where:

- $tfp_{it} = log(TFP_{it})$
- $t_{it} = log(1 + T_{it})$
- $c_{\theta it} = log(1 + C_{\theta it})$
- $FO_{it} =$ foreign ownership of firm i at time t (%)

along with firm's fixed effect and ISIC dummy.

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Results

Zero capital problem

Zero capital and energy consumption exists both for SI observations (left) and customs data (right).
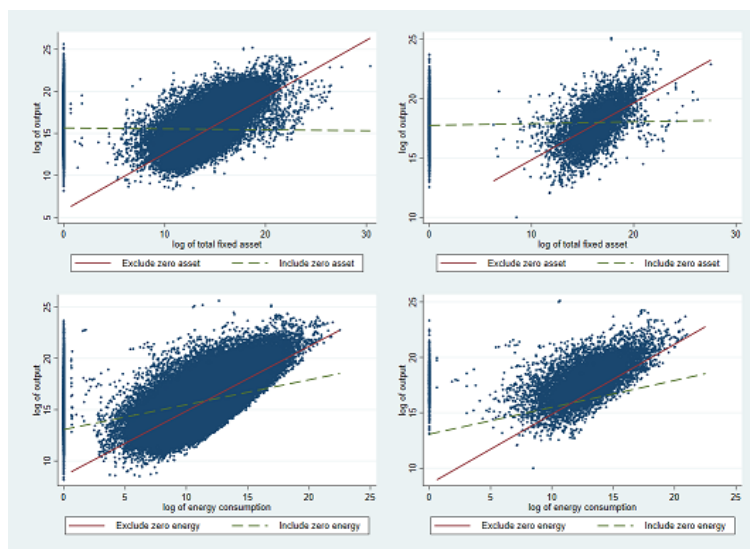
TFP Results

- $k, n = 0$ have smaller RTS and much smaller coefficient for k and n
- Lost $\pm$ 30% of observations

table 6a. Factor multipliers with $k, n = 0$

Variables	All_SI	Non_customs	Customs_only
Labour (l)	0.354***	0.355***	0.268***
	(0.005)	(0.005)	(0.011)
Capital (k)	0	0	0
	(0.000)	(0.000)	(0.002)
Energy (n)	0.035***	0.037***	0.019***
	(0.001)	(0.001)	(0.003)
input (m)	0.234***	0.251***	0.344***
	(0.013)	(0.017)	(0.056)
RTS	0.623	0.643	0.631
Obs	117,598	108,662	8,936

Table 6b. Factor multipliers with $k, n > 0$

Variables	All_SI	Non_customs	Customs_only
Labour (l)	0.307***	0.307***	0.254***
	(0.005)	(0.006)	(0.015)
Capital (k)	0.223***	0.219***	0.161***
	(0.014)	(0.015)	(0.038)
Energy (n)	0.114***	0.114***	0.097***
	(0.003)	(0.002)	(0.008)
input (m)	0.281***	0.255***	0.226***
	(0.024)	(0.024)	(0.075)
RTS	0.925	0.895	0.738
Obs	73,265	68,294	4,971

TFP Results

- table 7a over-estimates TFPs (not Indonesian miracle)
- 3 TFPs are used. 2 from the row customs only, table 7b:
  - TFP1 = estimated together with other firms in SI (all_SI)
  - TFP2 = estimated within customs only firms (customs_only)
  - Value added per labour is used for robustness

table 7a. TFP with $k, n = 0$

Variables	All_SI	Non_customs	Customs_only
TFP all SI	241,611.20	-	
	(4,444,240)		
Non customs	221,284.30	216,246.40	-
	(4,542,027)	(4,361,599)	
Customs only	488,787.80	-	341,643.80
	(3,000,124)		(8,542,388)
Va/L	137,987.1	126,073.5	282,856.5
	(2,515,300)	(2,600,177)	(1,012,159)
obs	117,598	108,662	8,936

Table 7b. TFP with $k, n > 0$

Variables	All_SI	Non_customs	Customs_only
TFP all SI	107,036.90	-	
	(2,792,543)		
Non customs	98,534.27	115,020.70	-
	(2,826,922)	(2,719,907)	
Customs only	210,429.20	-	177,280.20
	(2,331,985)		(4,609,524)
Va/L	111,455.8	100,510.9	261,822.6
	(2,538,721)	(2,614,048)	(1,043,383)
obs	73,265	68,294	4,971

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Trade policies vs TFP

observations = 4,971

- 1,512 firms
- only customs, $k, n > 0$
- TFP1 estimated with all SI
- TFP2 estimated only customs
- $VaL = \frac{ValueAdded}{Labour}$

Table 8a:

- Simple OLS
- robust standard error
- TBT is good?
- Price control is big
- others are not significant

Variables	TFP1	TFP2	VaL
tariff	-0.027	-0.025	-0.072***
	(0.020)	(0.019)	(0.023)
SPS	-0.094*	-0.079	-0.164**
	(0.048)	(0.049)	(0.073)
TBT	0.289***	0.254***	0.379***
	(0.092)	(0.078)	(0.099)
Pre-shipment inspection	0.082	0.067	0.295*
	(0.109)	(0.109)	(0.161)
licensing	-0.064	-0.036	-0.004
	(0.059)	(0.058)	(0.087)
price control	281.992***	585.429***	539.567***
	(87.628)	(111.394)	(134.382)
competition measures	0.114	0.084	0.111
	(0.320)	(0.315)	(0.348)
export-related	0.009	0.035	0.057
	(0.081)	(0.081)	(0.140)
dummy FDI	0.171***	0.176***	0.153**
	(0.059)	(0.054)	(0.074)
foreign ownership	0.039***	0.040***	0.044***
	(0.013)	(0.012)	(0.016)

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Trade policies vs TFP

observations = 4,971

- 1,512 firms
- only customs, $k, n > 0$
- TFP1 estimated with all SI
- TFP2 estimated only customs
- $VaL = \frac{ValueAdded}{Labour}$

Table 8b:

- Firm, year, and ISIC FE
- Only TBT remains significant

Variables	TFP1	TFP2	VaL
tariff	-0.019	-0.013	0.002
	(0.022)	(0.021)	(0.028)
SPS	-0.011	-0.025	-0.038
	(0.065)	(0.062)	(0.082)
TBT	0.182**	0.142*	0.184*
	(0.078)	(0.074)	(0.098)
Pre-shipment inspection	-0.063	-0.077	-0.057
	(0.114)	(0.107)	(0.143)
licensing	-0.093	-0.095	-0.116
	(0.076)	(0.072)	(0.096)
price control	138.837	374.367	116.246
	(1,557.471)	(1,469.290)	(1,957.694)
competition measures	0.27	0.238	-0.048
	(0.351)	(0.332)	(0.442)
export-related	0.073	0.094	0.04
	(0.105)	(0.100)	(0.133)
dummy FDI	0.079	0.08	-0.03
	(0.066)	(0.062)	(0.083)
foreign ownership	0.021	0.02	0.026
	(0.015)	(0.014)	(0.019)
R-sq	0.023	0.025	0.061

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Trade policy doesn't seem to matter

- Firms in the customs data (possibly) are different

  - they are generally bigger, and bigger firms may have ways to offset trade costs

- if size matters, it can be discovered using size interaction.

- $l_{it} = log(Labour_{it})$ is used as a proxy

$$size\_tfp_{it} = tfp_{it} + \gamma_T t_{it} * l_{it} + \sum_\theta c_{\theta it} * l_{it}$$

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Size Matters (Right=Left with FE)

Variables	TFP1	TFP2	VaL		Variables	TFP1	TFP2	VaL
tariff	-0.357***	-0.630***	0.071		tariff	-0.205**	-0.371***	0.259**
	(0.067)	(0.065)	(0.090)			(0.083)	(0.077)	(0.104)
tariff.l	0.061***	0.112***	-0.026		tariff.l	0.036**	0.068***	-0.048**
	(0.012)	(0.011)	(0.017)			(0.015)	(0.014)	(0.019)
SPS	-0.250	-0.517**	-0.124		SPS	-0.260	-0.381	0.103
	(0.234)	(0.260)	(0.381)			(0.297)	(0.278)	(0.372)
SPS.l	0.026	0.076*	-0.008		SPS.l	0.043	0.062	-0.029
	(0.042)	(0.046)	(0.067)			(0.051)	(0.048)	(0.064)
TBT	0.213	0.194	0.486		TBT	0.124	0.074	0.462
	(0.483)	(0.419)	(0.408)			(0.330)	(0.310)	(0.415)
TBT.l	0.014	0.012	-0.019		TBT.l	0.011	0.013	-0.051
	(0.083)	(0.072)	(0.067)			(0.058)	(0.055)	(0.073)
Pre-shipment inspection	0.418	0.749	-0.005		Pre-shipment inspection	-0.115	0.16	-0.637
	(0.531)	(0.558)	(0.758)			(0.520)	(0.488)	(0.652)
Pre-shipment inspection.l	-0.058	-0.116	0.051		Pre-shipment inspection.l	0.01	-0.043	0.1
	(0.094)	(0.098)	(0.134)			(0.093)	(0.087)	(0.117)
licensing	-0.650**	-1.444***	0.640*		licensing	-0.451	-0.896***	1.477***
	(0.266)	(0.263)	(0.371)			(0.311)	(0.292)	(0.390)
licensing.l	0.107**	0.258***	-0.119*		licensing.l	0.065	0.147***	-0.295***
	(0.047)	(0.046)	(0.064)			(0.056)	(0.052)	(0.070)

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Size Matters (Right=Left with FE)

Variables	TFP1	TFP2	VaL
price control	-8,559***	-12,147***	-29,052***
	(3,235)	(2,984)	(4,029)
price control.l	1,383***	1,985***	4,718***
	(514)	(474)	(640)
competition	-1.155	-0.693	-2.269*
	(1.152)	(1.095)	(1.194)
competition.l	0.228	0.129	0.434**
	(0.216)	(0.210)	(0.213)
export-related	-0.341	-0.475	0.343
	(0.357)	(0.385)	(0.679)
export-related.l	0.066	0.095	-0.049
	(0.062)	(0.066)	(0.125)
dummy FDI	0.157***	0.152***	0.156**
	(0.059)	(0.052)	(0.073)
foreign ownership	0.039***	0.040***	0.045***
	(0.013)	(0.012)	(0.016)
R-sq	-	-	-

Variables	TFP1	TFP2	VaL
price control	-7,559	-10,221	-25,902
	(41,100)	(38,558)	(51,565)
price control.l	1,214	1,666	4,154
	(6,533)	(6,129)	(8,197)
competition	-2.027	-2.204*	-4.609***
	(1.277)	(1.198)	(1.602)
competition.l	0.393*	0.413**	0.834***
	(0.220)	(0.206)	(0.276)
export-related	-0.096	-0.291	0.48
	(0.476)	(0.446)	(0.597)
export-related.l	0.036	0.075	-0.073
	(0.083)	(0.078)	(0.104)
dummy FDI	0.066	0.061	-0.022
	(0.066)	(0.062)	(0.083)
foreign ownership	0.023	0.024*	0.025
	(0.015)	(0.014)	(0.019)
R-sq	0.029	0.041	0.07

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Employment effect

Results from VaL is confusing

- Perhaps employment is more sensitive to change in production cost compared to reported value added?

Use change in labour as LHS with the consequence of losing 2008

$$\Delta l_t = log(L_t) - log(L_{t-1})$$

Four regressions are conducted, involving:

- No size interaction (L0) and with size interaction (L1)
- with firm,year,ISIC FE and without FE

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Employment effect

Variables	L0	L0FE	L1	L1FE
tariff	-0.008	-0.028	-0.260***	-1.368***
	(0.009)	(0.021)	(0.047)	(0.063)
SPS	-0.028	-0.120*	-0.176	-1.650***
	(0.020)	(0.066)	(0.153)	(0.230)
TBT	0.034	-0.075	0.064	0.452*
	(0.038)	(0.075)	(0.236)	(0.257)
Pre-shipment	-0.041	0.121	0.066	1.997***
	(0.040)	(0.100)	(0.349)	(0.370)
licensing	-0.015	-0.042	-0.818***	-4.455***
	(0.033)	(0.073)	(0.190)	(0.237)
Price-control	135	1,543	14,832***	6,015
	-88	-1,185	(4,381)	-25,570
competition	0.072	0.094	-0.999	-2.788***
	(0.289)	(0.387)	(1.563)	(1.006)
Export-related	-0.017	0.097	-0.246	-0.617*
	(0.028)	(0.091)	(0.203)	(0.333)
foreign dummy	0.031	0.147**	0.028	0.091*
	(0.030)	(0.065)	(0.031)	(0.053)
obs	3,726	3,726	3,726	3,726

Variables	L0	L0FE	L1	L1FE
tariff*l			0.043***	0.251***
			(0.008)	(0.011)
SPS*l			0.021	0.288***
			(0.027)	(0.041)
TBT*l			-0.008	-0.095**
			(0.043)	(0.045)
Pre-shipment*l			-0.008	-0.345***
			(0.061)	(0.066)
licensing*l	-	-	0.140***	0.809***
			(0.036)	(0.042)
Price-control*l			-2,312***	-802
			(695)	(4,064)
competition*l			0.207	0.360**
			(0.335)	(0.163)
Export-related*l			0.042	0.132**
			(0.036)	(0.059)
% foreign	-0.008	-0.026*	-0.009	-0.007
	(0.007)	(0.014)	(0.007)	(0.011)
R-sq	-	0.028	-	0.355

Import value, TFP, and trade policies

- Lastly, I investigate if the main driver of the TFP changes is import.

- I use PPML (Silva and Tenreyro 2008) to regress import value (LHS) against the three different TFPs and trade policies.

  - TFPs are used for interaction as well.

- Gravity variables are sourced from CEPII.

- The regression is conducted in HS-8-digit level.

- Fixed effects (right table) are ISIC, country of origin, and year[1].

[1] the regression did not converge when the firm fixed effect was used.

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Import value, TFP, and trade policies

Variables	tfp1	tfp2	VaL
tfp	0.113***	0.312***	0.331***
	(0.013)	(0.017)	(0.032)
tariff	-0.546***	-0.600***	-0.841***
	(0.100)	(0.144)	(0.247)
SPS	1.076***	1.577***	2.026***
	(0.277)	(0.280)	(0.324)
TBT	-1.090***	-1.106***	-1.903***
	(0.286)	(0.281)	(0.301)
Pre-shipment	-1.852***	-1.910***	-2.655***
	(0.581)	(0.588)	(0.751)
licensing	1.211***	2.612***	2.065***
	(0.419)	(0.436)	(0.520)
Price-control	25.021***	22.841***	27.486***
	(6.582)	(7.251)	(7.961)
competition	3.581***	2.027*	4.164***
	(1.159)	(1.140)	(1.264)
Export-related	0.509	0.926*	1.234*
	(0.525)	(0.540)	(0.668)

Variables	tfp1	tfp2	VaL
tfp	0.136***	0.342***	0.226***
	(0.017)	(0.021)	(0.033)
tariff	-0.464***	-0.433***	-0.743***
	(0.121)	(0.163)	(0.248)
SPS	1.191***	1.632***	1.771***
	(0.299)	(0.309)	(0.331)
TBT	-1.100***	-1.071***	-1.698***
	(0.284)	(0.279)	(0.304)
Pre-shipment	-2.632***	-2.658***	-3.145***
	(0.649)	(0.658)	(0.768)
licensing	1.359***	2.650***	1.636***
	(0.457)	(0.470)	(0.521)
Price-control	33.873***	31.596***	32.040***
	(7.584)	(7.985)	(7.898)
competition	3.241***	1.892*	3.855***
	(1.080)	(1.080)	(1.163)
Export-related	0.815	1.300*	1.347*
	(0.649)	(0.676)	(0.722)

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Import value, TFP, and trade policies

Variables	tfp1	tfp2	VaL
tariff*tfp	0.035***	0.030**	0.045**
	(0.012)	(0.014)	(0.021)
SPS*tfp	-0.044	-0.114***	-0.179***
	(0.041)	(0.042)	(0.049)
TBT*tfp	0.157***	0.159***	0.273***
	(0.038)	(0.037)	(0.040)
Pre-shipment*tfp	0.387***	0.395***	0.488***
	(0.082)	(0.083)	(0.108)
licensing*tfp	-0.172***	-0.372***	-0.306***
	(0.056)	(0.058)	(0.072)
Price-control*tfp	-4.530***	-4.204***	-4.890***
	(0.995)	(1.096)	(1.201)
competition*tfp	-0.372**	-0.161	-0.476***
	(0.162)	(0.157)	(0.177)
Export-related*tfp	-0.139*	-0.197***	-0.247**
	(0.074)	(0.076)	(0.097)
observations	192,928	192,928	192,928
R-sq	0.009	0.009	0.011

Variables	tfp1	tfp2	VaL
tariff*tfp	0.027*	0.016	0.038*
	(0.015)	(0.016)	(0.021)
SPS*tfp	-0.073	-0.135***	-0.155***
	(0.045)	(0.046)	(0.050)
TBT*tfp	0.172***	0.167***	0.256***
	(0.038)	(0.036)	(0.041)
Pre-shipment*tfp	0.458***	0.461***	0.535***
	(0.092)	(0.092)	(0.110)
licensing*tfp	-0.217***	-0.402***	-0.258***
	(0.062)	(0.064)	(0.073)
Price-control*tfp	-5.759***	-5.423***	-5.507***
	(1.138)	(1.199)	(1.184)
competition*tfp	-0.370**	-0.185	-0.464***
	(0.150)	(0.149)	(0.161)
Export-related*tfp	-0.173*	-0.241**	-0.253**
	(0.093)	(0.097)	0.106
observations	192,928	192,928	192,928
R-sq	0.012	0.013	0.013

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Discussion and Policy Recommendation

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Discussions

Trade policies and TFPs

- tariff is negatively affecting TFPs, and the impact is less profound for bigger firms:
  - consistent when fixed effects are used
- Only two NTMs are significant after fixed effects: licensing and competition measures.
- More productive firms import more
- NTM have mixed results: Only TBT and preshipment reduces import

Employment

- Tariff also reduces employment, but bigger firms have smaller effect.
- Not all NTMs show a visible significance:
  - SPS, licensing, and export-related measures have the same directional impact as tariff.
  - Pre-shipment inspection have different direction

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Policy recommendation

- More import restriction isn't great

  - especially if the goal is manufacturing growth.
  - firms have many problems. Import isn't one of them.

- Sometimes, less is more

  - Intervening with trade is usually inefficient
  - at what (who's) cost?
  - may lead to more intervention

- If the goal is CAD, find other ways

  - become more attractive to business (both domestic and foreign)
  - Make non-commodity export viable
  - let IDR weaken?
  - bad debt management $\Rightarrow$ costing manufacturers and consumers

- Commodities are still the main driver of export, and halting GVC may lead to even more reliance on commodities to keep CA > 0

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Caveats

- NTMs have mixed results.

  - Count data isn't ideal
  - May have different impact for different types of NTMs
  - May have different impact on different goods
  - More in-depth studies are needed

- The sample is quite restrictive.

  - Importers are different compared to general firms
  - the number of importers is very small

- Data isn't perfect.

  - NTM collected in 2015 have slight variation compared to 2018
  - SI have many problems
  - Customs have not go beyond 2012 yet

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The End

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