

# The Trade Effect of Regional Trade Agreements in the Presence of Duty Drawbacks

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# Background

## ■ Conventional Wisdom of Regional Trade Agreements (RTAs)

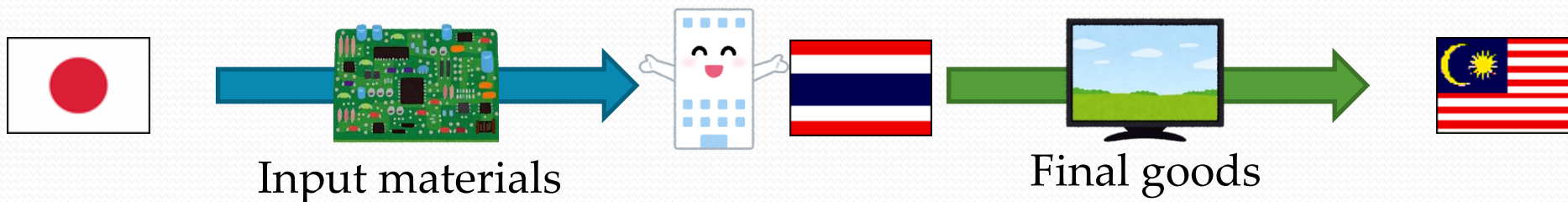
- Tariff elimination within member countries will increase trade between them.



## ■ Duty Drawbacks (DD) / Processing Trade

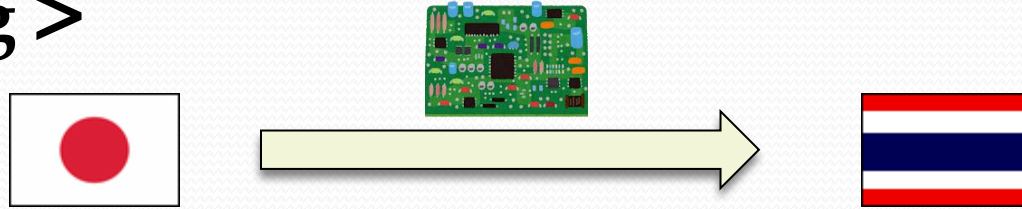
- “Rebate of import duties when the imported good is re-exported or used as input to the production of an exported good.” (A. Deardorff, *Terms of Trade*, 2014)
- Many countries have introduced this or similar system.

Argentina, Brazil, Chile, the Dominican Republic, Egypt, Guatemala, India, Indonesia, Kenya, Malawi, Malaysia, Nigeria, South Africa, Slovakia, Turkey, and Uganda, South Korea, Cambodia, Sri Lanka, Taiwan, **Thailand**, Vietnam, Australia, Canada, the United States, Colombia, Peru, the European Union, Iran, and Ethiopia.



# Are Trade Creation Effects of RTAs Positive??

## < Standard Setting >



Before an RTA

MFN rate: 10%

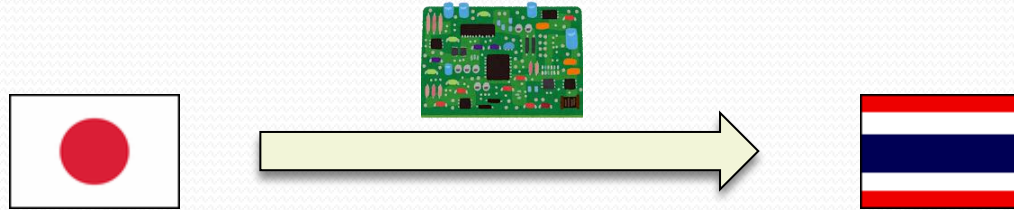
**10% Down**

After an RTA

RTA rate: 0%

**→ Increase Trade!**

## < Our Setting >



Before an RTA

Duty drawback rate: 0%

**No changes...**

After an RTA

RTA rate: 0%

**→ Increase Trade?**

# Some Critical Differences between RTA & DD

	Applied import duties	Purpose of imports	Administrative works to claim	Origin requirement
<b>RTA</b>	Almost zero	For any purposes	Exporters	YES (Rules of Origin)
<b>DD</b>		The production of export goods	Importers	No

# What We Do

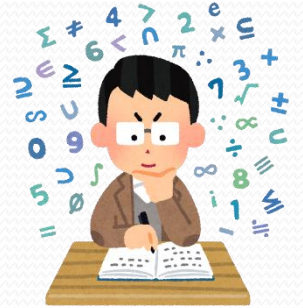
## ◆ Theoretical part

**Q:** Who switches from the **DD** regime to the **RTA** regime?

→ **A:** The importers in a medium range of productivity

**Q:** Do the switching importers increase imports? → **A:** It could go either way.

- Decreasing force: Rise of import prices due to the compliance of RoO
- Increasing force: Rise of import demands to serve the domestic market



## ◆ Empirical part

- Empirically investigate the questions above
- Firm-level trade data in Thailand for 2007 and 2011
- **DD**: Duty drawback, Bonded warehouses, Free zones, and Investment promotion
- The **DD** importers in 2007 account for 40% of total imports in 2011.

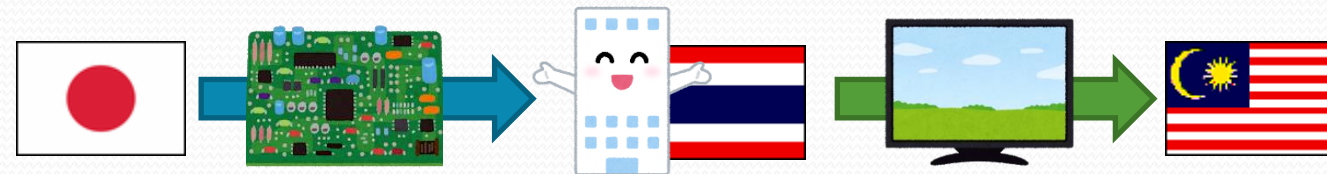




# Our Findings

## ◆ Empirical findings from the PSM analyses for Thailand

- Smaller-sized importers (in terms of total exports) switch from the **DD** to the **RTA**.
- Imports **increase or do not change**.
- Exports **do not change**.
  - The rise of the domestic sales share
  - Expanding to the domestic market



## ◆ Implications

- ✓ Large-sized importers do not change tariff regimes and trade!
- ✓ Small impacts of RTAs on national trade

# Our Contributions

## ◆ Studies on the DD regimes

### Theoretical studies

Hamada (1974), Panagariya (1992), Sargent and Matthews (2001), Cadot, de Melo, and Olarreaga (2003), Ianchovichina (2004, 2007), Egger and Egger (2005), Mah (2007), Brandt and Morrow (2017)

### Empirical studies

➤ **Many!**

Egger and Egger (2005), Brandt and Morrow (2017)

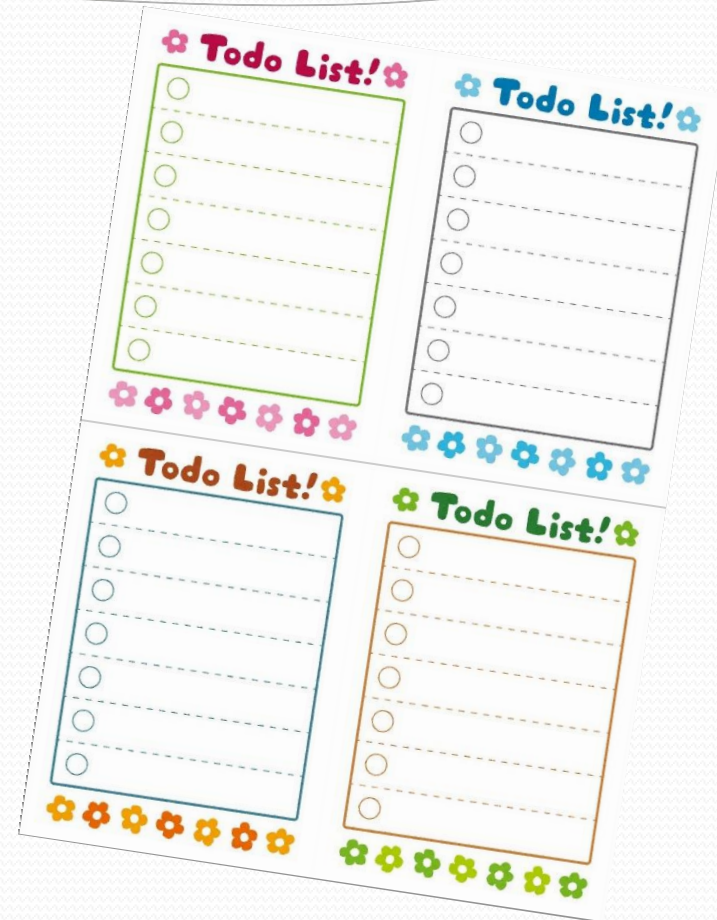
### The features of this study

- ✓ Introducing RTA regimes
- ✓ Firm-level analyses
- ✓ Not only determinants but also impacts



# Contents

- Theoretical Analysis
- Empirical Framework
  - Empirical Results
  - Concluding Remarks





# Contents

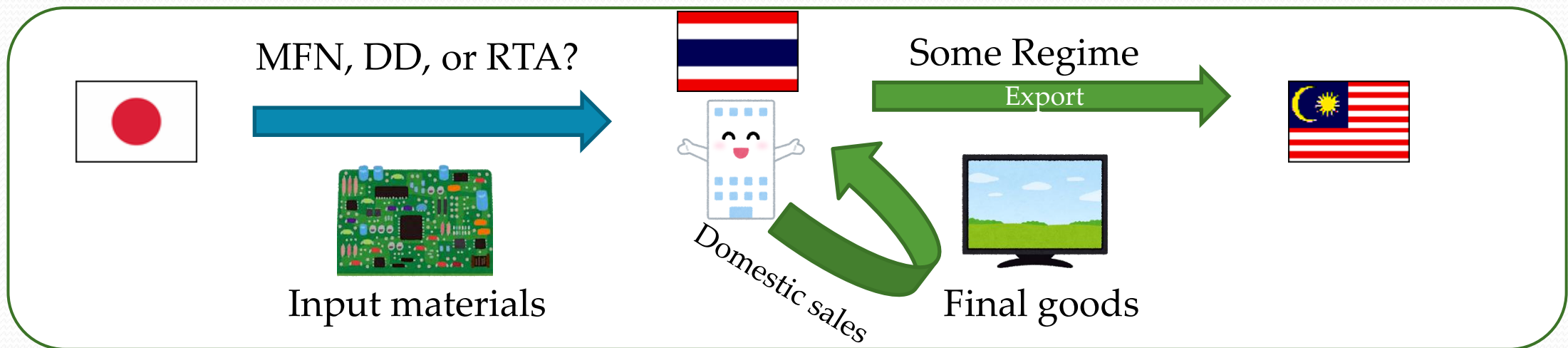
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# Theoretical Analysis: Outline

## ■ Basic Setting

- Focus on the decision by firms in a middle country
- Firm heterogeneity in terms of productivity
- Importers' choice of a tariff regime in importing materials
  - Pre-RTA: Most-Favored Nation (MFN) or DD
  - Post-RTA: MFN, DD, or RTA



# Theoretical Analysis: Demand & Supply of Final Product

- Demand for variety  $i$  of final product  $s$  in country  $j$  (CES utility)

$$c_{js}(i) = \frac{p_{js}(i)^{-\sigma_s}}{P_{js}^{1-\sigma_s}} \beta_s E_j$$

- Production function of variety  $j$  of final product  $s$  (Cobb-Douglas)

$$y_s(i) = \varphi_s(i) l_s(i)^{1-\alpha} M_s(i)^\alpha$$

- CES composite of intermediate inputs:

$$M_s(i) = \left[ \int_{k \in K_s(i)} m_{ks}(i)^{\frac{\nu_s-1}{\nu_s}} dk \right]^{\frac{\nu_s}{\nu_s-1}}$$

An input used to produce variety  $i$  of product  $s$

# Theoretical Analysis: Demand & Supply of Final Product

- The input demands ← Cost minimizations of the final-product producers

$$m_{kS}(i) = \gamma \left( \frac{\boxed{Z_S(i)^{\nu_S - (1-\alpha)}}}{\varphi_S(i)} \right) \boxed{z_{kS}(i)}^{-\nu_S}$$

Input-price index

- The (f.o.b.) price ← Profit minimizations of the final-product producers

$$\tilde{p}_S(i) = \left( \frac{\sigma_S}{\sigma_S - 1} \right) \Gamma \frac{Z_S(i)^\alpha}{\varphi_S(i)}$$

- Consumer price in country  $j$ :

$$p_{jS}(i) = \boxed{T_{jS}} \tilde{p}_S(i)$$

1+Ad valorem tariff rate ( $T_{jS} = 1$  if sold domestically)

# Theoretical Analysis: Three Regimes in Procuring Inputs

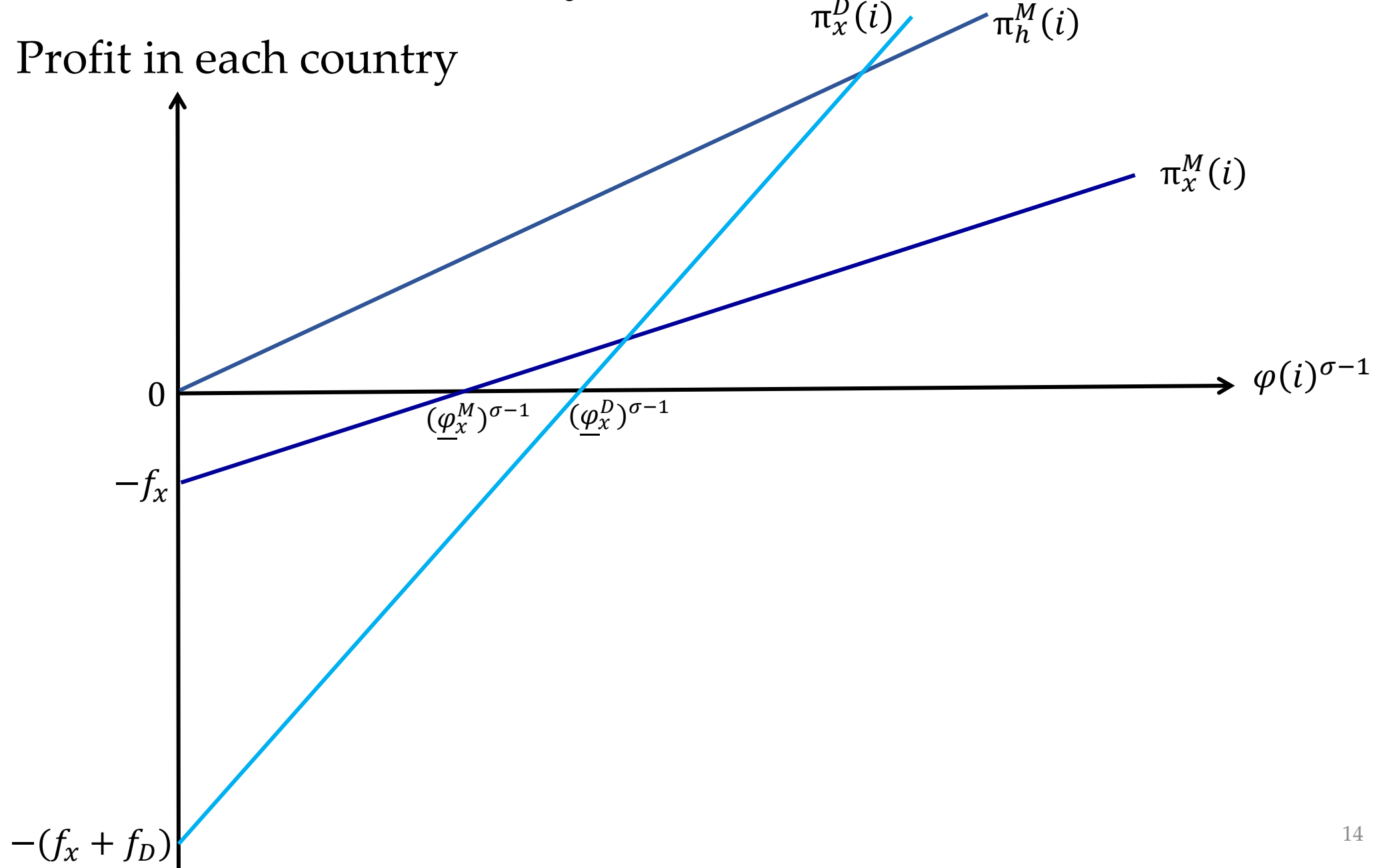
Regime	Import duties	Output Market	Variable costs	Fixed costs
MFN	Positive	Domestic & Foreign	No additional	No additional
DD	Zero	Only Foreign	No additional	Borne by importers
RTA	Zero	Domestic & Foreign	Rise due to the RoO	No additional (Borne by exporters)

■ Input costs ( $\tilde{z}_k$  : the fundamental price of imported inputs)

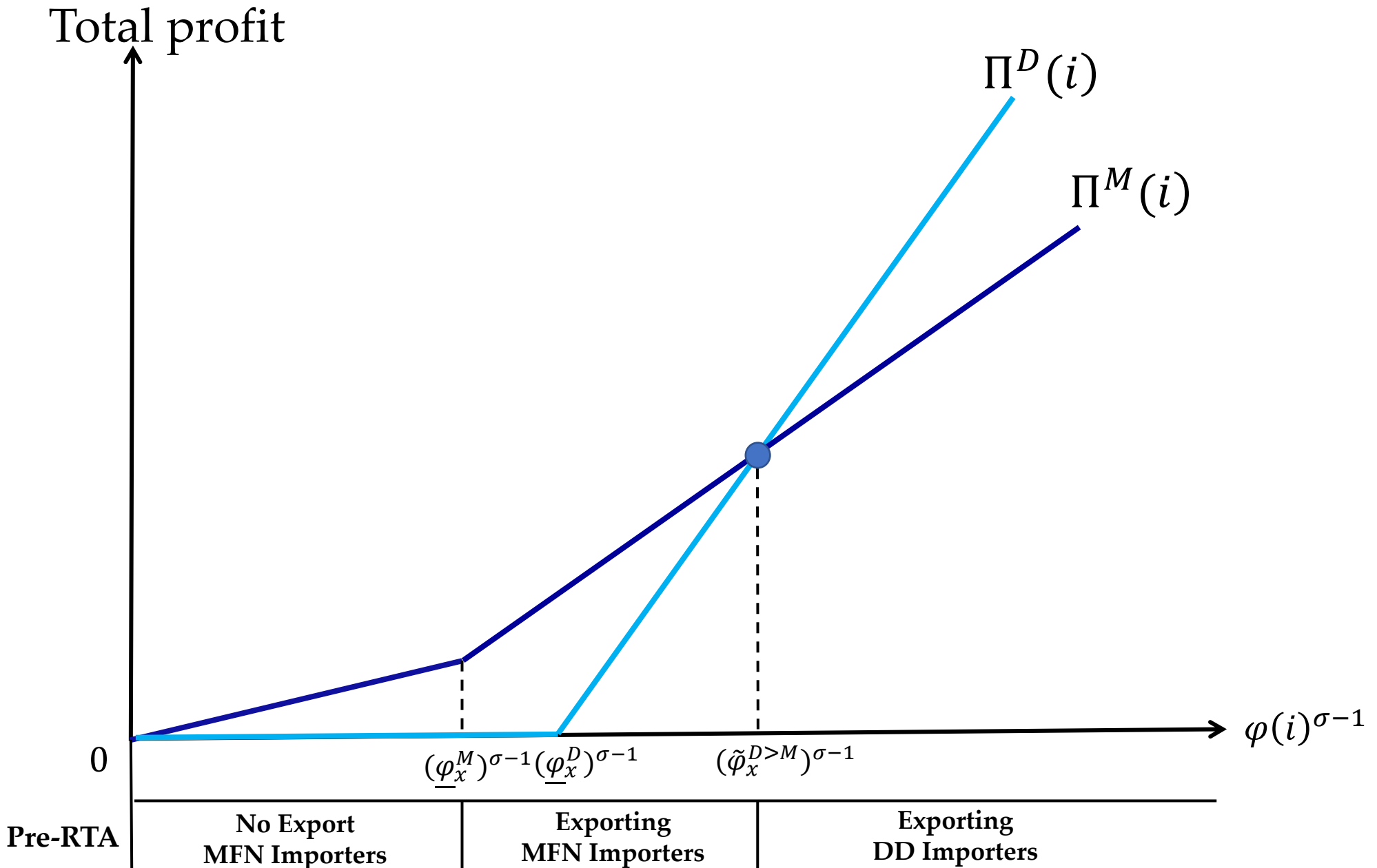
- MFN :  $z_k^{MFN}(i) = \tau_k^{MFN} \tilde{z}_k$  ( $\tau_k^{MFN} \geq 1$ )
  - DD :  $z_k^{DD}(i) = \tilde{z}_k$
  - RTA :  $z_k^{RTA}(i) = \tau_k^{RTA} \theta_k \tilde{z}_k$  ( $\tau_k^{RTA} \in [1, \tau_k^{MFN})$ ,  $\theta_k \geq 1$ )
- Cost of adjusting the procurement sources of inputs to meet RoO

$$z_k^{MFN}(i) > z_k^{RTA}(i) > z_k^{DD}(i)$$

**Figure 1(a): Profit in Each Country before the Formation of RTAs**

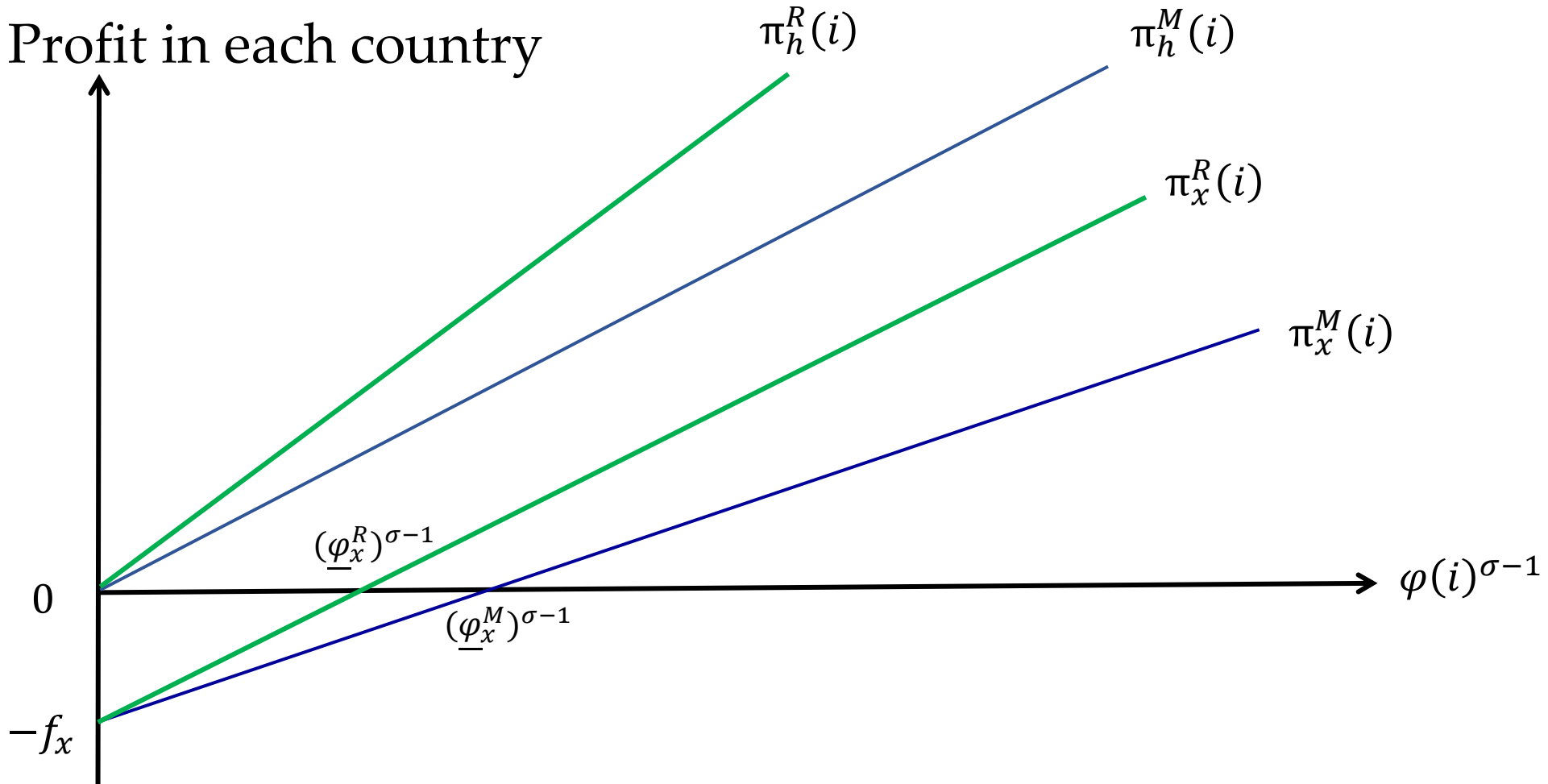


**Figure 1(b): Total Profit before the Formation of RTA**

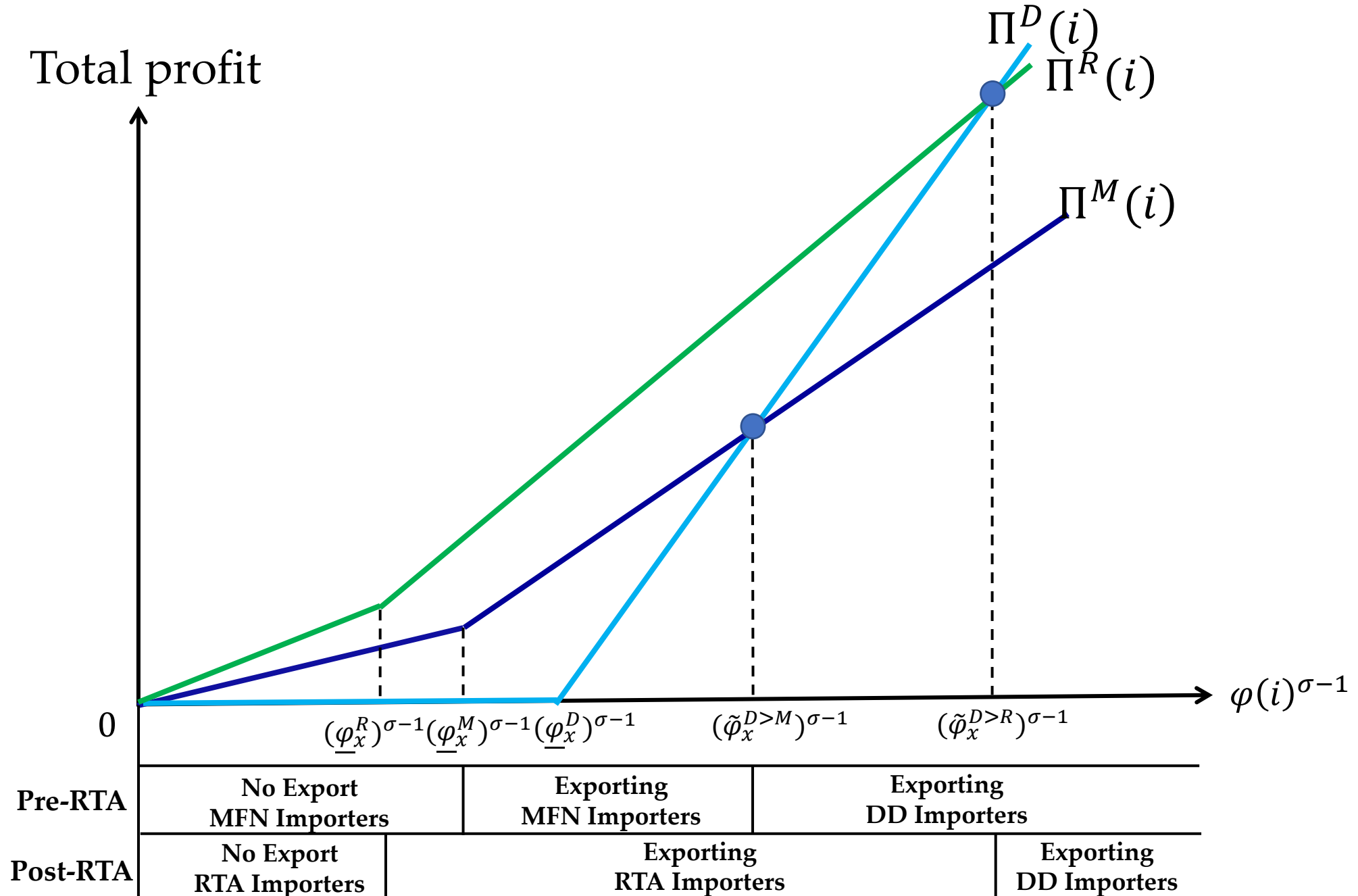




**Figure 2(a): Profit in Each Market in the RTA Regime**



**Figure 2(b): Total Profit after the Formation of RTA**



# Theoretical Analysis: Key Results (1)

## ■ Pre-RTA period

More productive importers choose the **DD** regime rather than the **MFN** regime.

## ■ Post-RTA period

- **High** productivity-importers: DD → DD & **Exports**
- **Medium-high** productivity-importers: DD → RTA & **Exports** + **Domestic**
- **Medium-low** productivity-importers: MFN → RTA & **Exports** + **Domestic**
- **Low** productivity-importer: MFN → RTA & **Domestic**

## Theoretical Analysis: Key Results (2)

### ■ The effects of RTA formation on input trade (Proposition 1)

◆ DD → RTA importers can either **increase or decrease** their imports.

✓ More likely to **increase** as

- ① the market size of the domestic country ↑
- ② the RTA-tariff rate on input ↓
- ③ the adjustment costs for meeting the RoO ↓
- ④ the tariff on output (or the preference margin on output) ↑

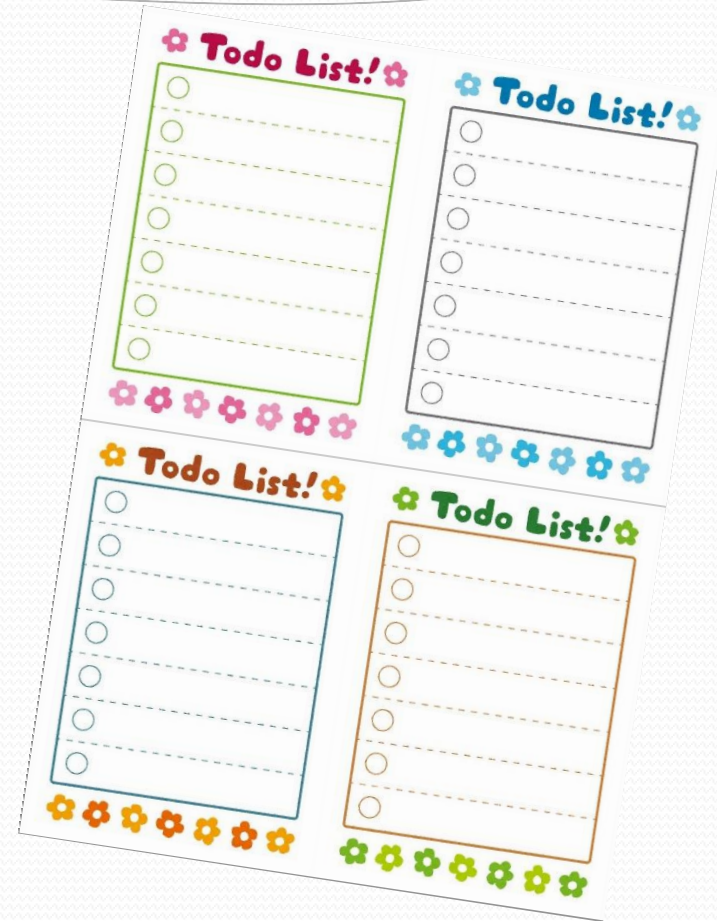
### ■ The effects of RTA formation on output trade (Proposition 2)

◆ DD → RTA importers can either **increase or decrease** their exports of output.

✓ More likely to **increase** as the tariff reduction of the output is sufficiently large.

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# Empirical Analysis

- Empirical questions

- ⇒ What kind of importers switch from the RTA to DD regime?

- ⇒ How do such switching importers change their imports and exports?

- The customs data in Thailand

- Analytical dimension: Firm, HS eight-digit, Country, and Time

- Tariff regimes are not randomly assigned.

- So many selection mechanisms

- ⇒ Use the Propensity Score Matching (PSM) rather than the IV

# PSM-DID

## Logit covariates (as of 2007):

- Log of total exports
- Preference margin (2011)
- Share of exports to RTA partners
- Share of total imports from RTA partners
- Foreign-firm dummy
- Various fixed effects

## Use of total exports as a proxy for productivity

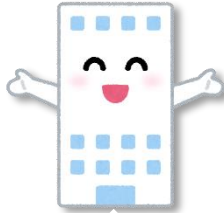
- $\ln \text{Exports} = 0.96 * \ln \text{LP} + \text{FE}_{\text{industry}} + \text{FE}_{\text{province}}$
- Comparison among DD firms (only export sales = total sales)

Imports of product  $p$   
from country  $c$  (RTA partner)

2007  
(pre-RTA)

2011  
(post-RTA)

Switching importers  
(Treatment group)



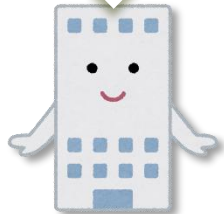
DD  
Outcome\_2007



RTA  
Outcome\_2011



Matched



DD  
Outcome\_2007



DD  
Outcome\_2011

Non-Switching importers  
(Control group)



# Data Issues

## ■ The export and import data from Customs in Thailand

- Cover the whole trade in Thailand
- Firm, HS eight-digit, country, tariff regime (only in import data)
- 2007 and 2011: Few imports under the RTA regime in 2007

## ■ RTA partners in 2011

ASEAN countries, Australia, China, India, Japan, South Korea, and New Zealand

## ■ Sample restrictions

- ✓ The firms with positive exports in both 2007 and 2011
- ✓ The main import regime in 2007 was the **DD** (main = largest value).
- ✓ The main import regime in 2011 was either the **DD** or the **RTA**.
- ✓ The country-product pairs eligible to any RTAs in 2011
- ✓ Manufacturing products

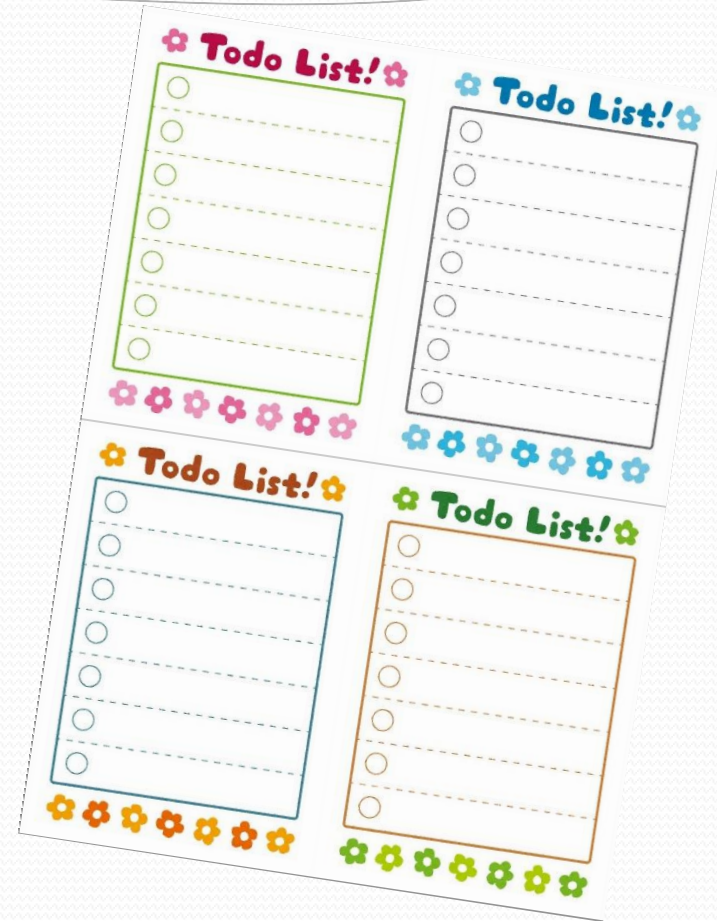
**Table 1. The Share of Imports in Total Imports in 2007 according to the Major Tariff Regimes in 2007 and 2011 (%)**

2007	2011					
	DD	MFN	RTA	Other	Non	
DD	21	3	4	0.4	13	41.4
MFN	1	15	10	4	17	47
RTA	0.0	0.0	0.2	0	0.2	
Other	0.4	2	5	0.2	3	

*Source:* The main tariff regime is defined at a firm-country-product-year-level. We do not include observations not recorded in 2007. “Non” indicates observations that were recorded in 2007 but not in 2011.

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**Table 2. Effects of Switching on Imports of All Products**

	(I)	(II)	(III)	(IV)
<b>Logit results</b>				
In Total exports	-0.145***	-0.158***	-0.142***	-0.139**
Margin	-0.175	1.738	-0.103	1.669
Foreign dummy		-0.279		-0.370
Share of exports to RTA members			-0.031	0.689**
Share of imports from RTA members			0.452	-0.068
Province FE		X		X
Country-ISIC 2-digit FE	X	X	X	X
Pseudo R2	0.202	0.243	0.203	0.248
<b>Impacts</b>				
In Imports	0.344***	0.401***	0.390***	0.377***
In Quantity	0.222*	0.325**	0.326***	0.385***
In Price	0.122	0.076	0.064	-0.008
Number of obs.	13,834	7,484	13,834	7,484
Treated obs.	1,006	615	1,006	615
Control obs. (Raw)	12,828	6,869	12,828	6,869

Less productive firms switched from **DD** to **RTA**.

The switch increased imports by **30-40%**.

*Notes:* This table reports the results of the PSM. The study observations are restricted to those in which the main regime was the DD in 2007 and either the DD or the RTA in 2011. Then, the treatment variable, Switch, takes the value of one if the main regime in 2011 was the RTA. The upper panel reports the estimation results for the propensity scores. The standard errors are clustered at a firm-level. The results in the outcome variable are reported in the lower panel. The standard errors are the Abadie-Imbens robust ones. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively.

# Table 4. Robustness Checks

	Intermediates		Ineligible		Japan	
	(I)	(II)	(III)	(IV)	(V)	(VI)
<b>Logit results</b>						
In Total exports	-0.144***	-0.111**	-0.139***	-0.103	-0.167***	-0.213***
Margin	0.138	1.996	-2.634	-0.826	-0.104	1.924
Foreign dummy		-0.415*		-0.635**		-0.378
Share of exports to RTA members	0.036	0.764**	0.133	0.916**	-0.045	0.567*
Share of imports from RTA members	0.252	-0.145	0.623*	-0.104	0.689**	-0.05
Province FE		X		X		X
Country-ISIC 2-digit FE	X	X	X	X	X	X
Pseudo R2	0.189	0.233	0.172	0.221	0.186	0.25
<b>Impacts</b>						
In Imports	0.186*	0.283	0.252*	0.076	0.313***	0.480***
In Quantity	0.142	0.29	0.211	0.059	0.208*	0.357**
In Price	0.044	-0.006	0.04	0.017	0.105	0.123
Number of obs.	9,320	5,145	5,832	3,110	7,782	4,090
Treated obs.	835	504	522	293	830	495
Control obs. (Raw)	8,485	4,641	5,310	2,817	6,952	3,595

Not necessarily robust

Notes: This table reports the results of PSM. The observations are restricted to those in which the main regime was the DD in 2007 and either the DD or the RTA in 2011. Subsequently, we set the value of the treatment variable Switch to one if the main regime in 2011 was the RTA. The upper panel reports the estimation results for the propensity scores. The standard errors are clustered at the firm level. The lower panel reports the results for the outcome variable. The standard errors are the Abadie-Imbens robust errors. \*\*\*, \*\*, and \* indicate the significance at the 1%, 5%, and 10% levels, respectively. In column "Parts" we restrict the sample to intermediate products, which are categorized into neither 112, 122, 41, 51, 52, 61, and 62, nor 63 in the BEC classification. Column "Ineligible" reports the results when focusing on import observations ineligible for any RTAs in 2007. Column "Japan" reports the results when excluding import observations from Japan.

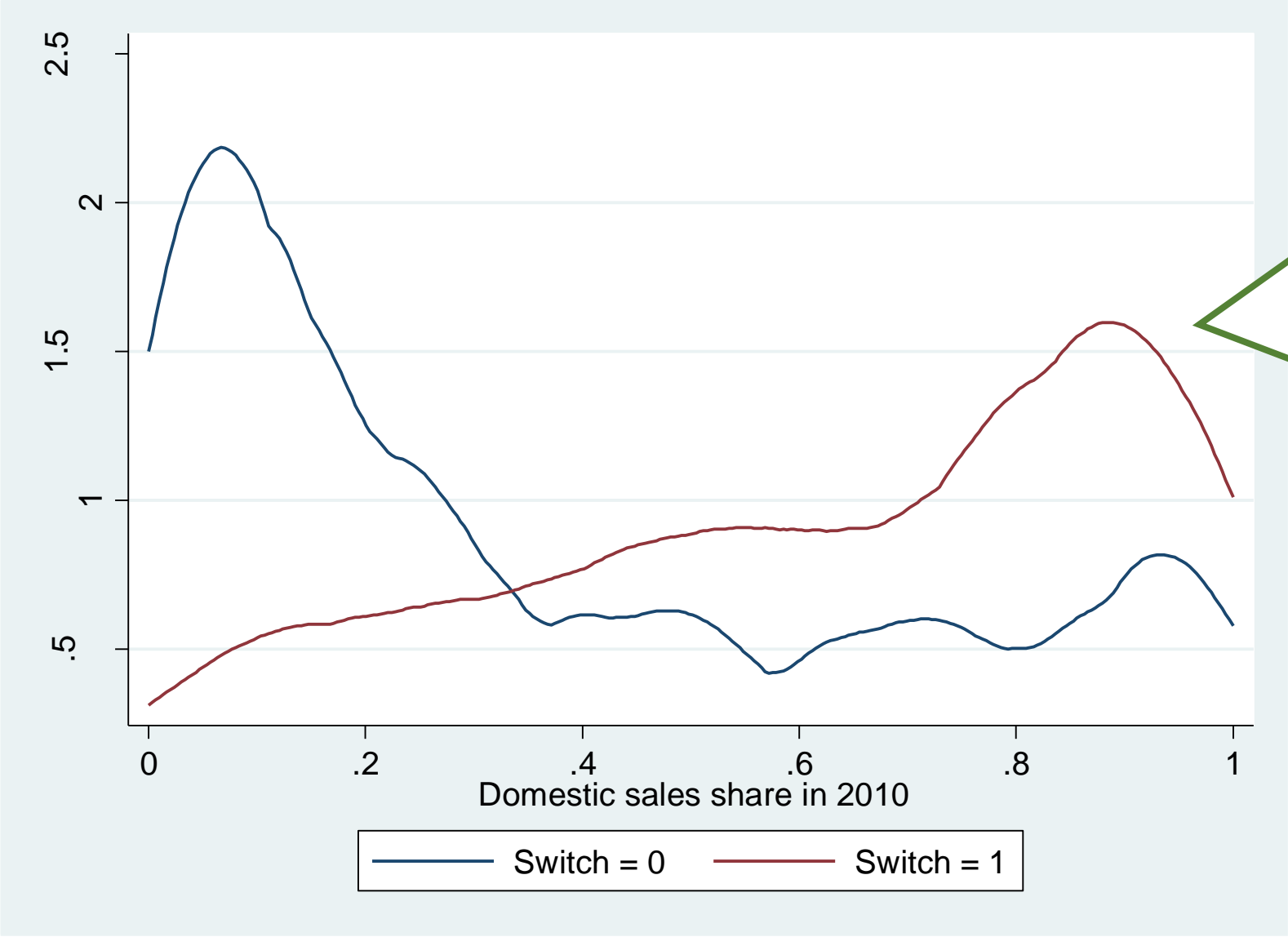
# Table 5. Effects of Switching on Imports and Exports: Firm-level Analyses

	(I)	(II)
Logit results		
In Total exports	-0.024	-0.051*
Foreign dummy		-0.18
Share of exports to RTA members	-0.285**	-0.072
Share of imports from RTA members	0.394**	0.164
Province FE		X
ISIC 2-digit FE	X	X
Pseudo R2	0.072	0.122
Impacts		
In Imports from RTA members	0.382***	0.300**
In Total exports	0.002	-0.011
Number of obs.	2,758	1,354
Treated obs.	808	432
Control obs. (Raw)	1,950	922

The firm-level switches from **DD to RTA** did not change firm's exports.

Notes: This table reports the results of PSM at the firm level. The observations are restricted to those in which imports under the DD regime are larger than those under the RTA regime in 2007. Subsequently, we set the value of the treatment variable Switch to one if firms had larger imports under the RTA regime than those under the DD regime in 2011. The upper panel reports the estimation results for the propensity scores. The standard errors are clustered at the firm level. The results for the outcome variable are reported in the lower panel. The standard errors are the Abadie-Imbens robust errors. \*\*\*, \*\*, and \* indicate the significance at the 1%, 5%, and 10% levels, respectively.

# Figure 3. The Distribution of Domestic Sales Shares in 2010



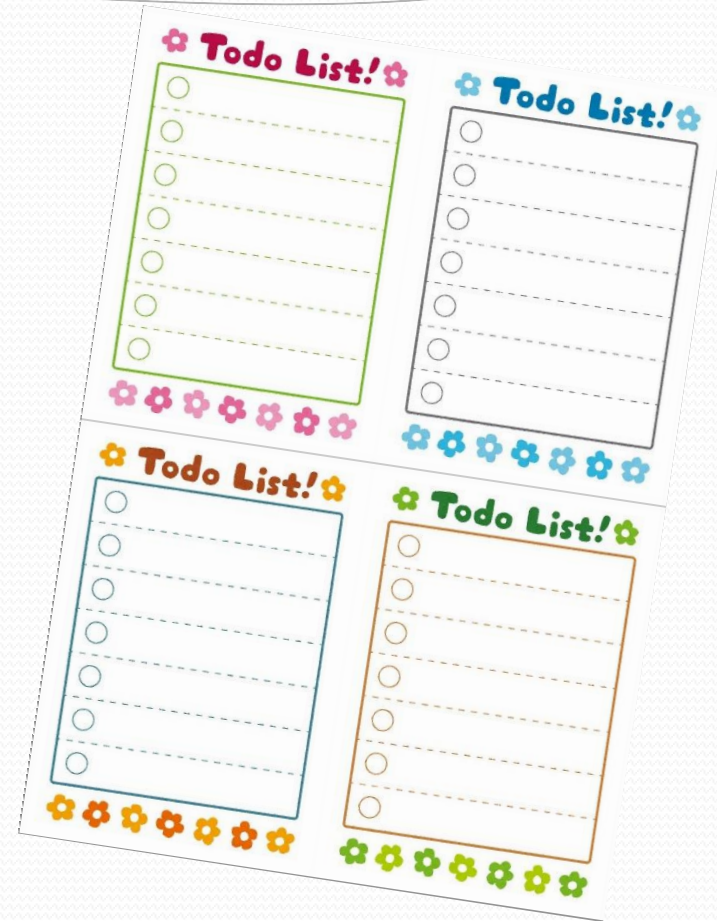
The switching firms increase their imports from RTA partner countries to produce goods for the domestic market, and not to expand exports

Source: Authors' compilation



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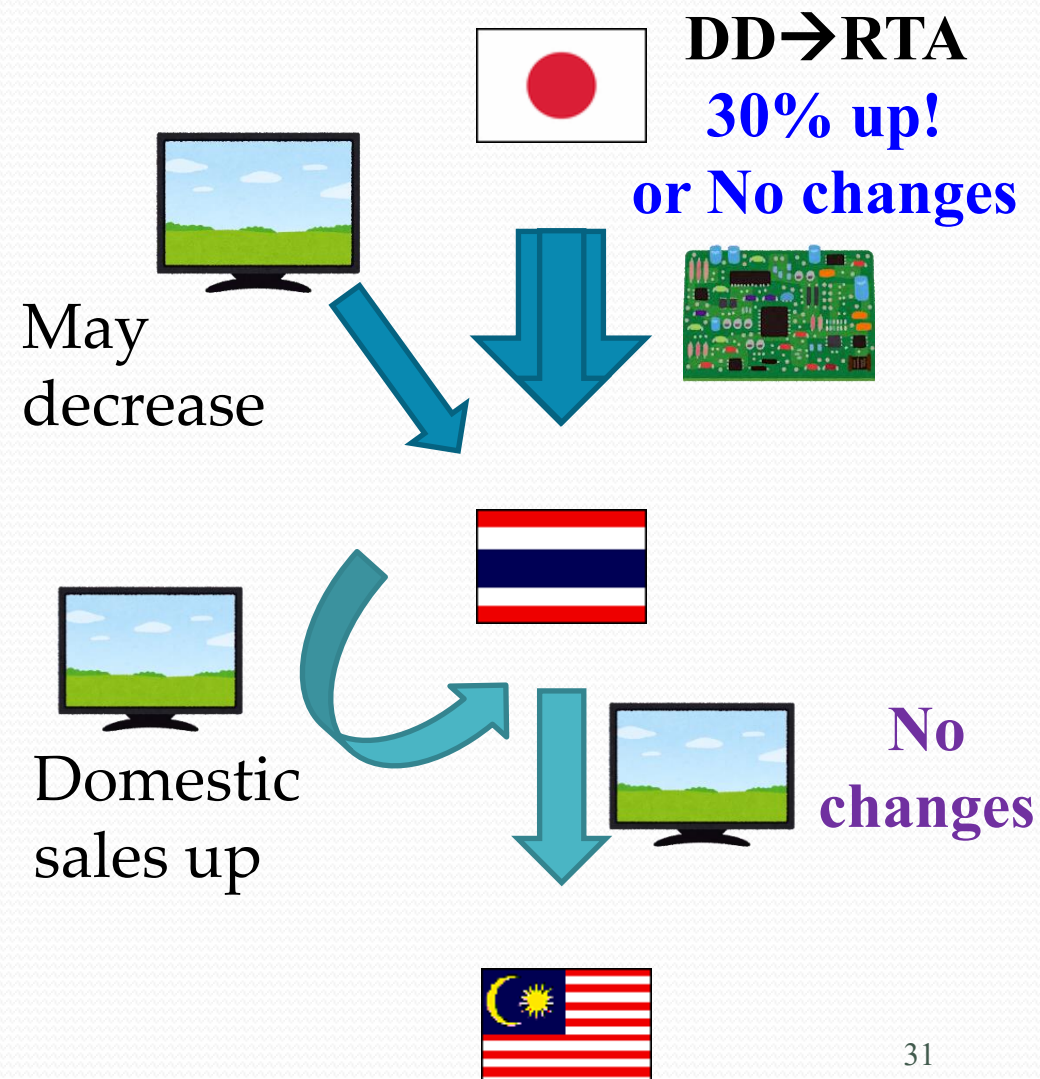
# Concluding Remarks

- Smaller-sized importers switch from the DD to the RTA.
- Switching firms **increase or do not change** their imports.

👉 **Small impacts of RTAs on national trade**

- Exports **do not change**.
  - The rise of the domestic sales share

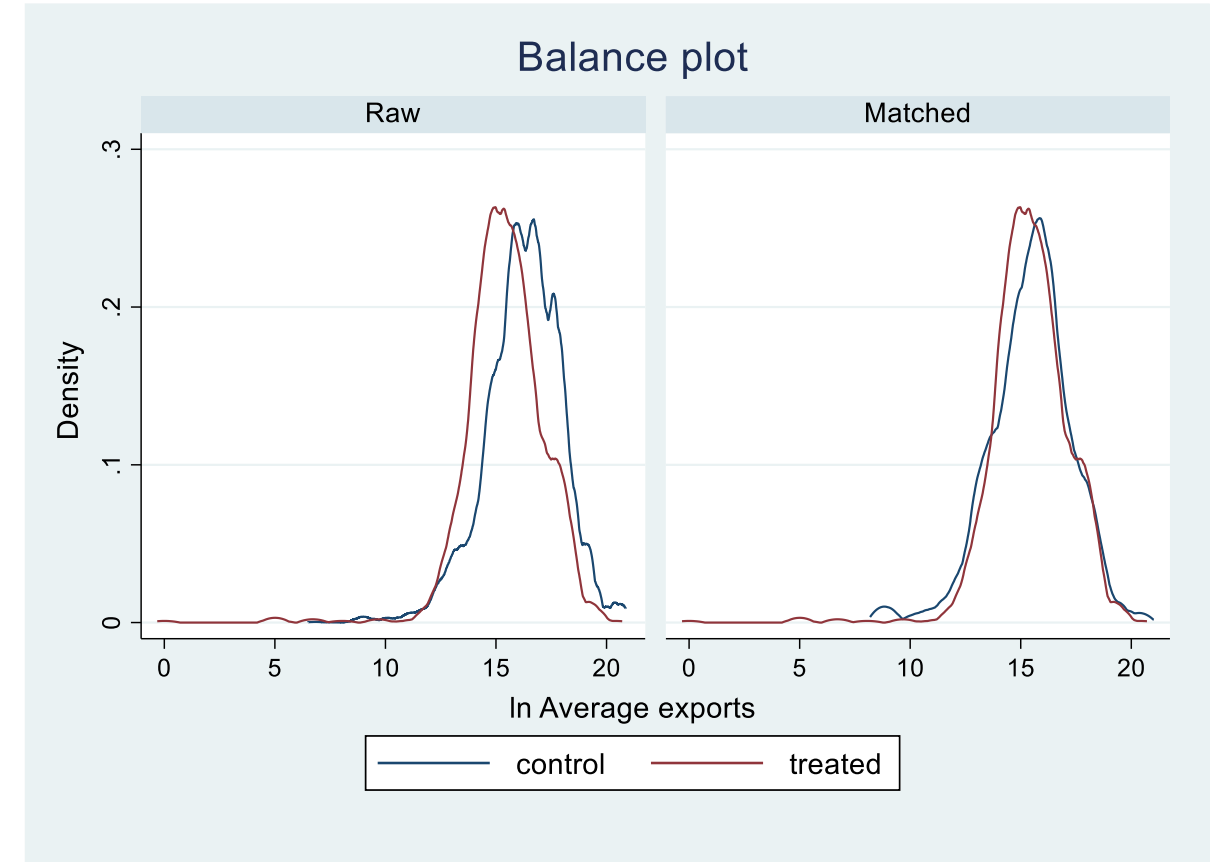
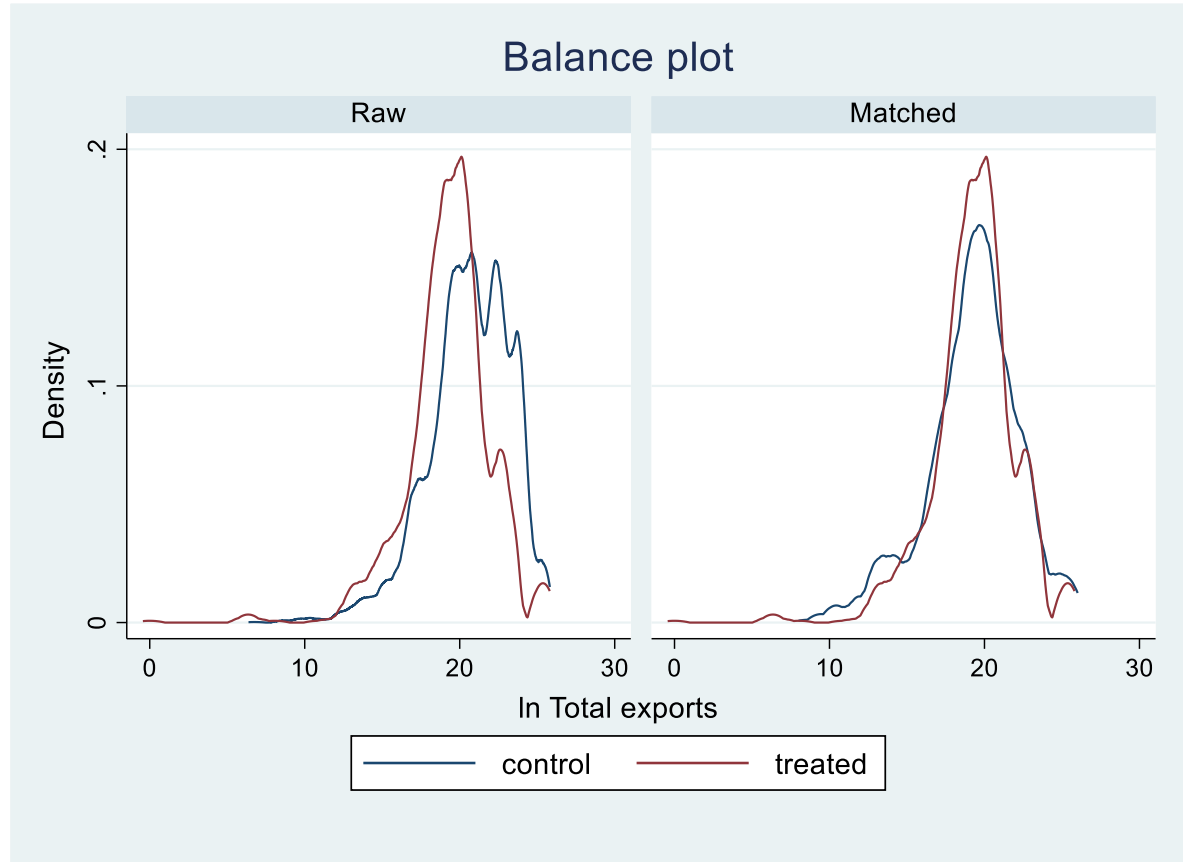
👉 **May crowd out the final-good imports**



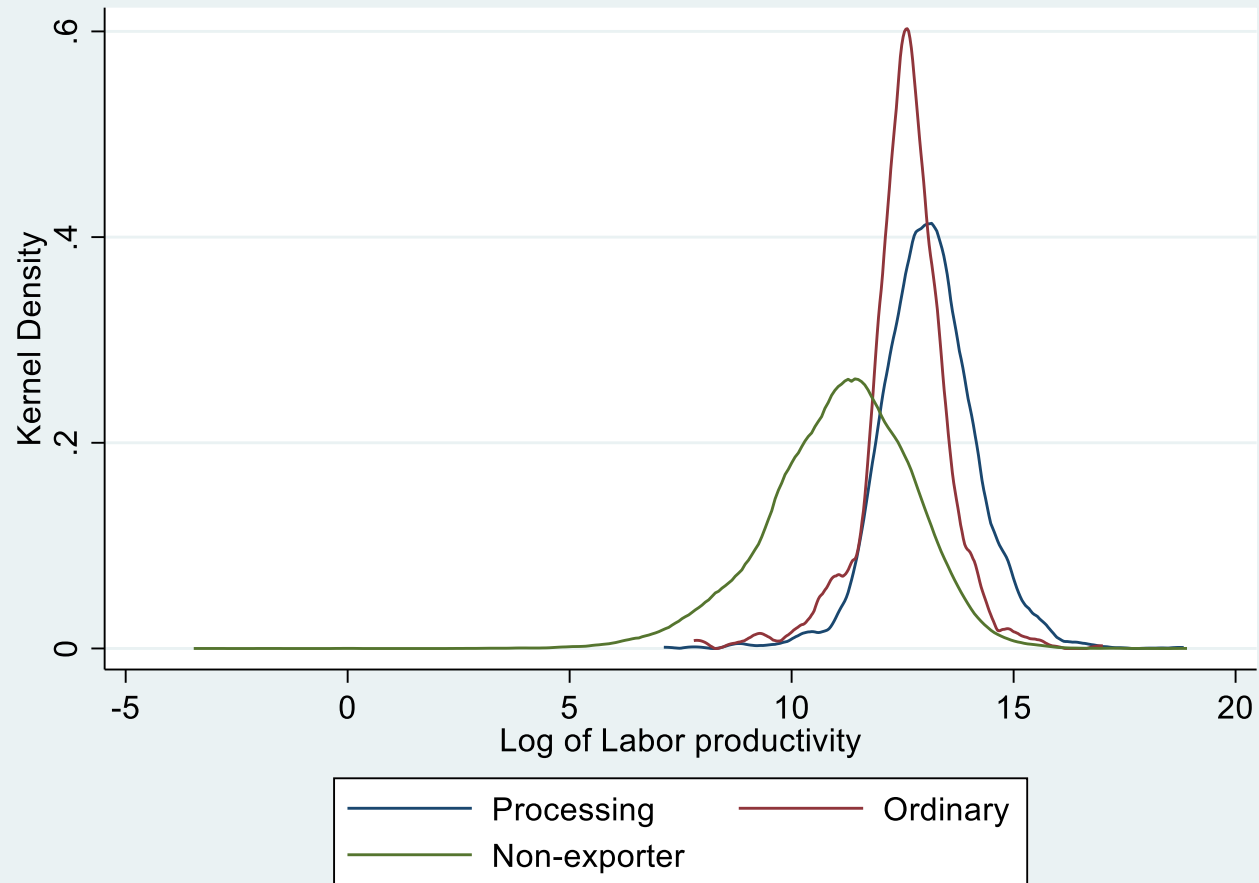


# Appendix

# Figure C2. Balance Plots



# Figure B1. Labor Productivity Distribution



Source: Authors' compilation using the industrial census in 2007.

Notes: Labor productivity is computed by value-added (i.e., sales minus material costs) divided by the number of employees. "Processing" refers to establishments that receive investment promotion privileges from the BOI and have positive exports. "Ordinary" includes establishments that do not receive investment promotion privileges from the BOI but have positive exports. "Non-exporter" includes the establishments that do not have a positive value of exports.

	Value-added	Employment	Wage	Productivity
Exporter	1.933*** [0.101]	1.405*** [0.085]	0.191*** [0.018]	0.578*** [0.047]
Exporter * Processing	1.112*** [0.110]	0.669*** [0.076]	0.088*** [0.026]	0.417*** [0.059]
Foreign	1.188*** [0.082]	0.724*** [0.057]	0.057*** [0.019]	0.476*** [0.055]
Number of observations	69,634	73,931	51,672	69,634
Adjusted R-squared	0.5605	0.4376	0.3919	0.4932

Notes: The standard errors clustered at the ISIC four-digit level are reported in the parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. In all specifications, we control for the ISIC four-digit level fixed effects and province fixed effects.

# Table C7. Gravity Results by the Pseudo-Poisson Maximum Likelihood

	(I)	(II)	(III)	(IV)
	Material	Finish	Material	Finish
RTA	0.081** [0.038]	-0.011 [0.049]		
CU			0.150*** [0.051]	0.024 [0.059]
FTA			0.065* [0.036]	-0.049 [0.045]
PSA			0.025 [0.070]	0.271*** [0.060]
Number of observations	551,547	556,189	551,547	556,189
Log pseudolikelihood	-4.E+09	-2.E+09	-4.E+09	-2.E+09
Pseudo R-squared	0.9903	0.9928	0.9903	0.9928

RTAs increased imports of **materials** but not those of **finished goods**.

*Notes:* This table reports the estimation results of the gravity equations for the trade among 222 countries during 1995-2017. The standard errors are clustered by country pairs. \*\*\*, \*\*, and \* indicate 1%, 5%, and 10% significance, respectively. We employ the BACI database available in the CEPII. The RTA dummy variable is drawn from Egger and Larch (2008) and its 2020 update by using RTA information available on the World Trade Organization website (Egger, Peter and Larch, Mario, 2008, Interdependent Preferential Trade Agreement Memberships: An Empirical Analysis, Journal of International Economics, 76(2): 384-399). CU, FTA, and PSA take a value of one for trade among the members of Customs Union, Free Trade Agreement, and Partial Scope Agreement, respectively. RTA takes a value of one if any of these dummy variables takes a value of one. Finished products (Finish) are defined as items categorized into 112, 122, 41, 51, 52, 61, 62, or 63 in the Broad Economic Categories (BEC) classification while the rest are intermediate products (Material). We also control for exporter-year fixed effects, importer-year fixed effects, and country pair fixed effects.