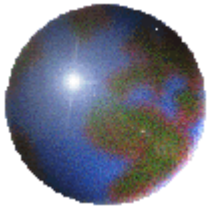

# What goes around comes around:
## Export-enhancing effects of import-tariff reductions

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# *Purpose of this paper*

- ✓Empirical investigation of

  Ishikawa & Tarui (2015) → under revision

  "Backfiring with Backhaul Problems:

  Trade and Industrial Policies with Endogenous Transport Costs"

# *Purpose of Ishikawa & Tarui (2015)*

1st purpose

- To introduce an international transport sector into a standard international trade model
  - To construct the model, characteristics of international shipping are taken into account

# *Purpose of Ishikawa & Tarui (2015)*

## 2nd purpose

- To explore the effects of policies
  - Trade policy: tariffs
  - Industrial policy: taxes in the transport sector
- We study how trade and industrial policies perform differently when transport costs are endogenous and subject to backhaul problems

# *Trade costs in international trade*

- ✓ Anderson and van Wincoop (JEL,2004)
- ➢ Trade costs: All costs incurred in getting a good to a final user other than the MC of producing the good itself
  1. Transport costs (both freight costs and time costs)
  2. Trade barriers: Policy barriers (tariffs and NTBs), Information costs, contract enforcement costs, costs associated with the use of different currencies, legal and regulatory costs
  3. Local distribution costs (wholesale and retail)

# *Trade costs in international trade*

- ✓ Anderson and van Wincoop (JEL,2004)

"The death of distance is exaggerated. Trade costs are large, …"

- ➢ Ad-valorem tax equivalent of trade costs: 170% for industrialized countries

  $1.7 = 1.21(\text{transport costs}) \times 1.44(\text{trade barriers}) \times 1.55(\text{retail \& distribution}) - 1$

  - Ad-valorem tax equivalent of transport costs: 21%
    - Ad-valorem tax equivalent of freight costs: 10.7%
  - Ad-valorem tax equivalent of tariffs and NTBs: 7.7%

# *Transport costs in trade theory*

- Mostly neglected

✓ Deardorf (2014) : "The most obvious cost of trade is transportation, but even this has been surprisingly neglected in trade theory."

- Ad hoc even if not neglected
  - Implicit treatment
    - Exogenous
    - Symmetric

→ Iceberg type (Samuelson, 1952) is often assumed

→ Transport costs should be treated "explicitly" in trade theory

# *Characteristics of international shipping*

1. Market power
2. Asymmetric freight rates
3. Backhaul problem

# *Characteristics of international shipping*

## *(Market power)*

- Operator's share of the world liner fleet in TEU (twenty-foot equivalent unit) terms

| Rank | Operator | Country | Share |
|---|---|---|---|
| 1 | APM-Maersk | Denmark | 14.7% |
| 2 | Mediterranean Shipping Co | Switzerland | 12.9 |
| 3 | CMA CGM Group | France | 8.8 |
| 4 | China Cosco Shipping Group | China | 7.4 |
| 5 | Evergreen Line | Taiwan | 4.5 |

48.3%

# *Characteristics of international shipping*

## *(Market power)*

- The liner trade is organized into cartels, or conferences
  - Empirical evidence for market power
    - ✓Sjostrom (1992)
    - ✓Hummels, Lugovskyy and Skiba (2007)
  - Joint operation
    - ✓April, 2017: CMA CGM + Cosco + Evergreen + OOCL (Hong Kong) → share: 23.5%

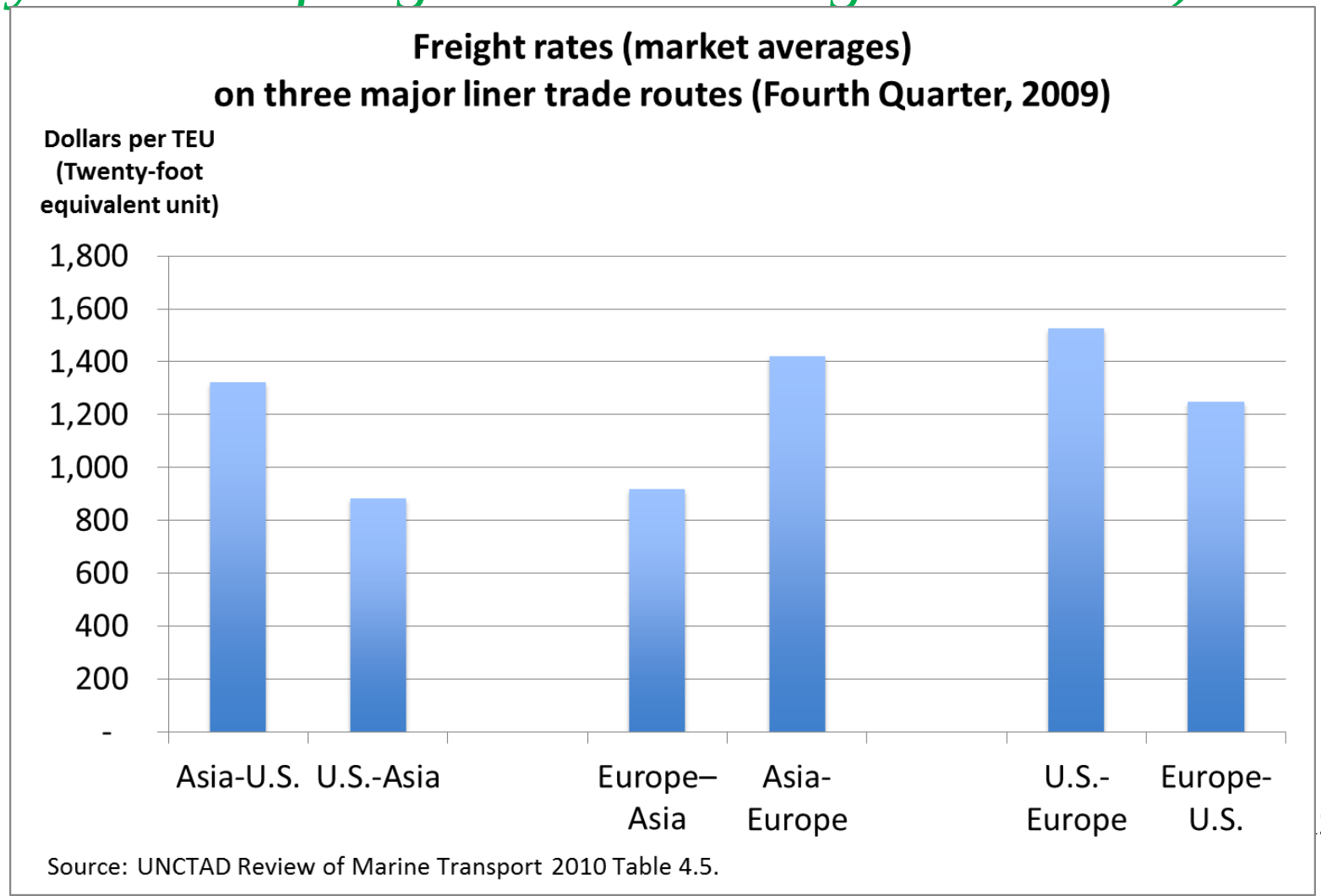
# *Characteristics of international shipping*

## *(Market power)*

- Two large air cargo alliances
  - SkyTeam Cargo
    - Members of the SkyTeam airline alliance
  - WOW Alliance
    - SAS Cargo Group & Singapore Airlines Cargo
- Air cargo between Japan and US
  - Alliance between ANA and United → Share: over 30%
- Air cargo between Japan and Europe
  - Alliance between ANA and Lufthansa → Share: over 30%

# *Characteristics of international shipping*

## *(Asymmetric freight rates among directions)*




Source: UNCTAD Review of Marine Transport 2010 Table 4.5.

# *Characteristics of international shipping*

## *(Asymmetric freight rates among directions)*

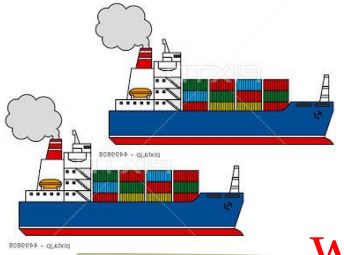
- Why are freight rates asymmetric among directions?
  - Shipping involves a round trip
  - Carriers have to commit to the shipping capacity to meet the maximum shipping volume

→"Backhaul problem" with imbalance in shipping volume in two directions

"There is an opportunity cost associated with returning without a full load"

# *Characteristics of international shipping*

## *(Backhaul problem)*



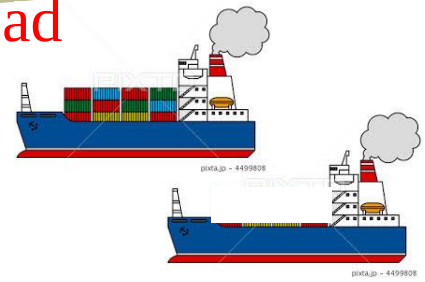
with a full load

Country A

Imbalance in shipping volume in two directions

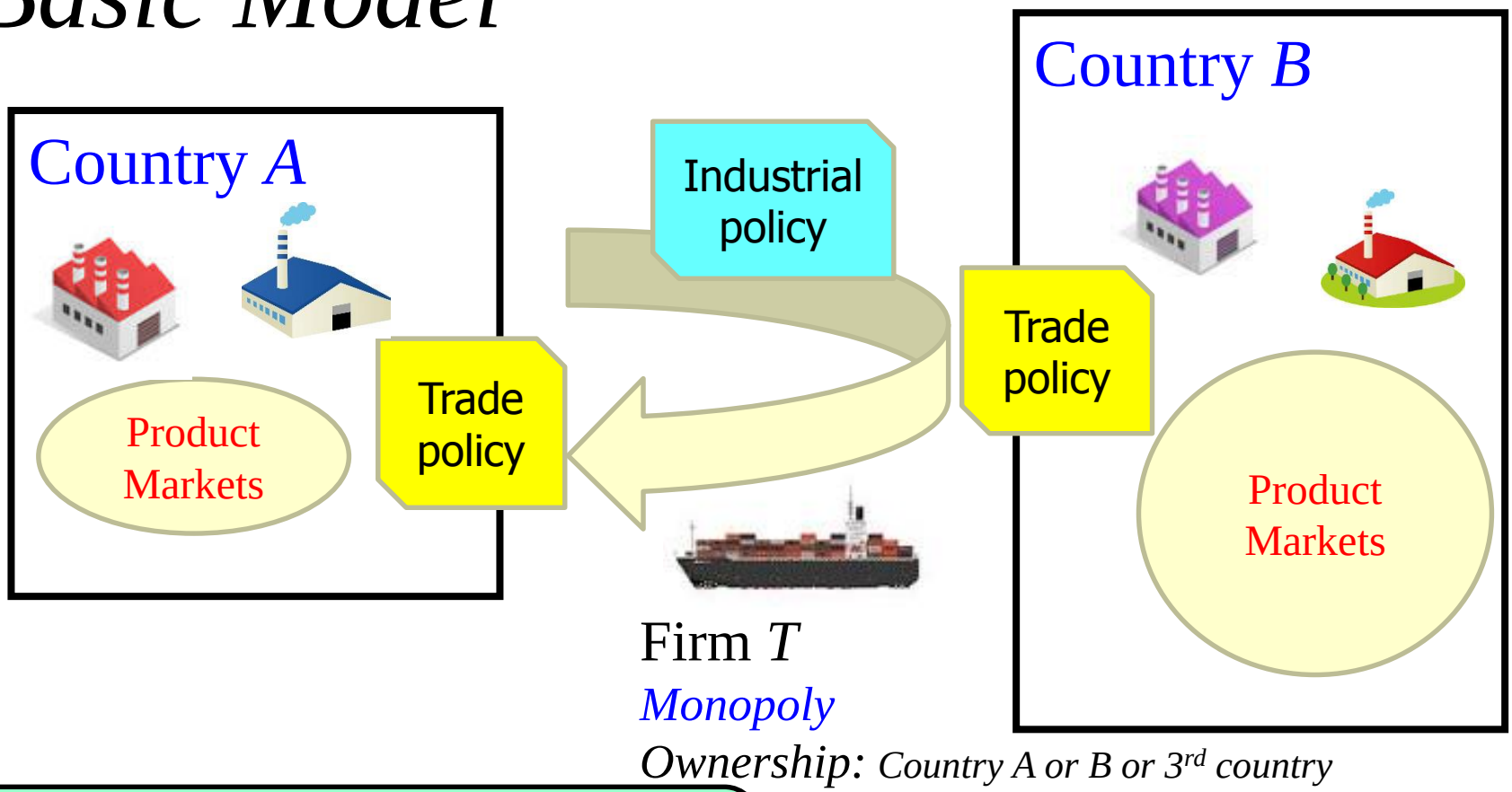
Country B

Without a full load



The backhaul problem makes shipping different from standard intermediate inputs

# *Basic Model*




Firm *T*

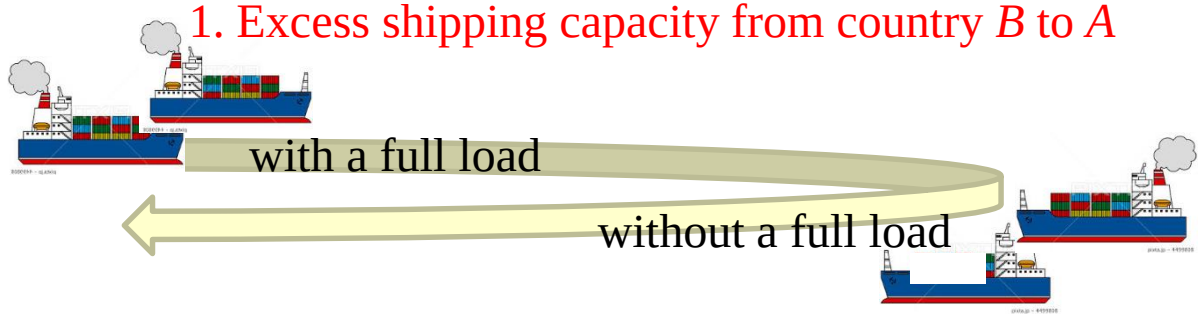
*Monopoly*

*Ownership: Country A or B or 3rd country*

EXTENSIONS
1. Multiple carriers
2. Different product-market structures

# *3 possible cases*

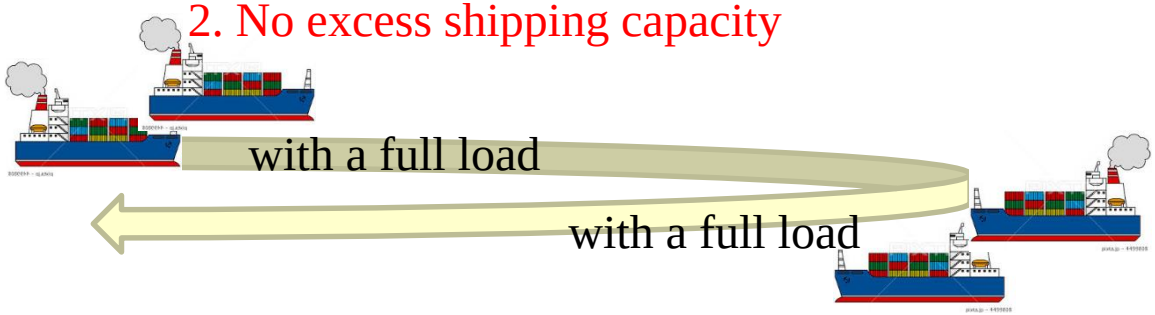
1. Excess shipping capacity from country *B* to *A*



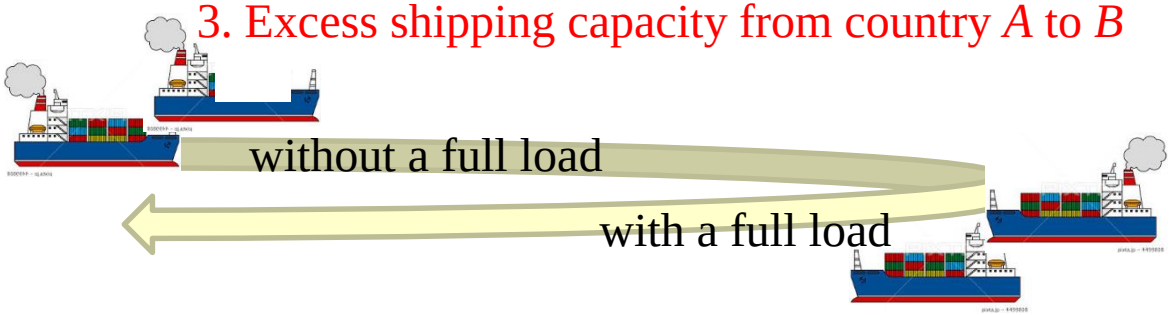

Country A

Country B

2. No excess shipping capacity




3. Excess shipping capacity from country *A* to *B*



# *Main result investigated in this paper*

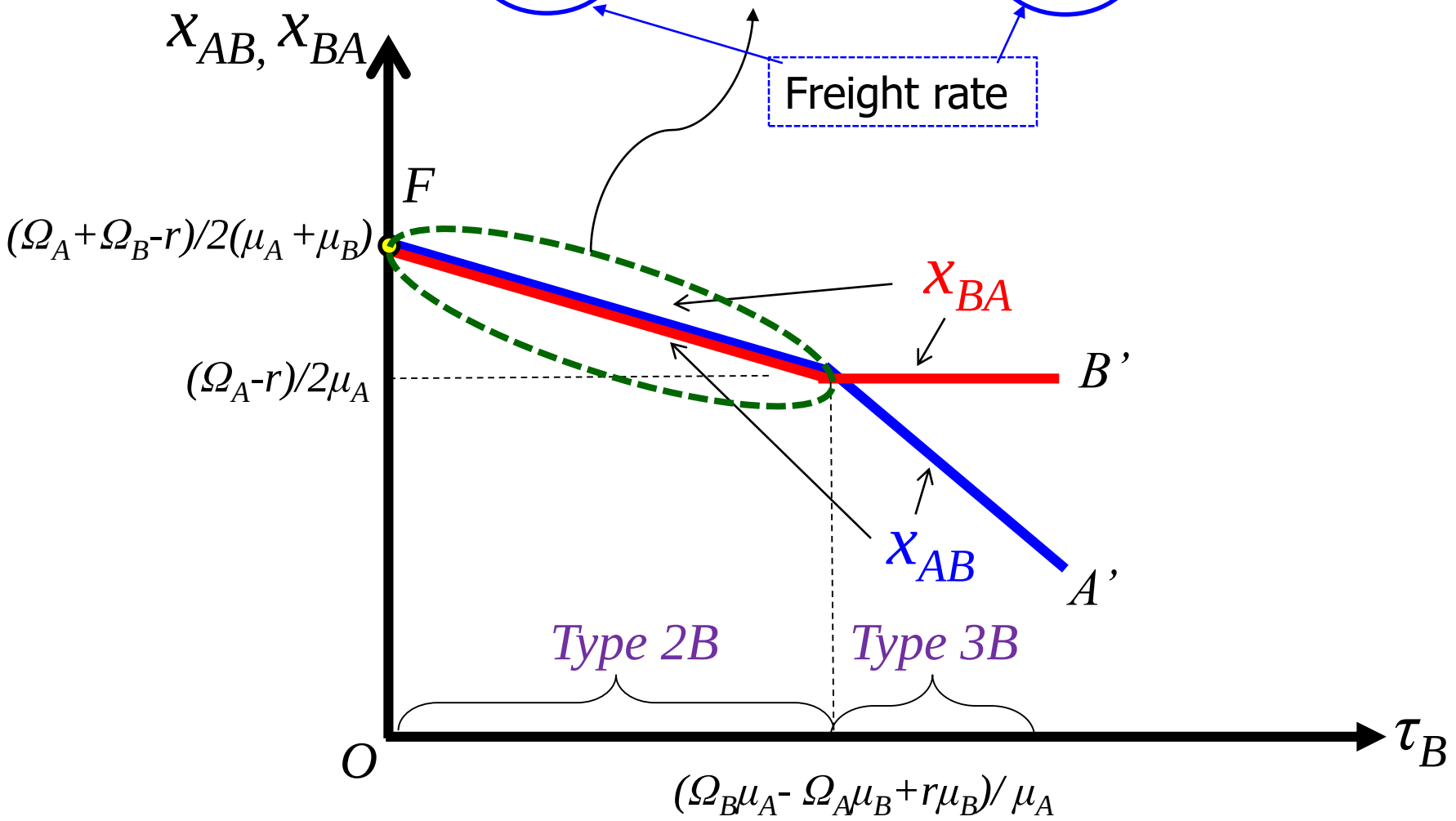
- Country *j*'s import tariffs decrease the freight rate from country *i* to country *j* and could increase the freight rate from country *j* to county *i*

→Country *j*'s import tariffs could affect the exporting sector by decreasing its exports

# *Figure 3 (b): Tariffs set by country B (with $\tau_A$=0)*

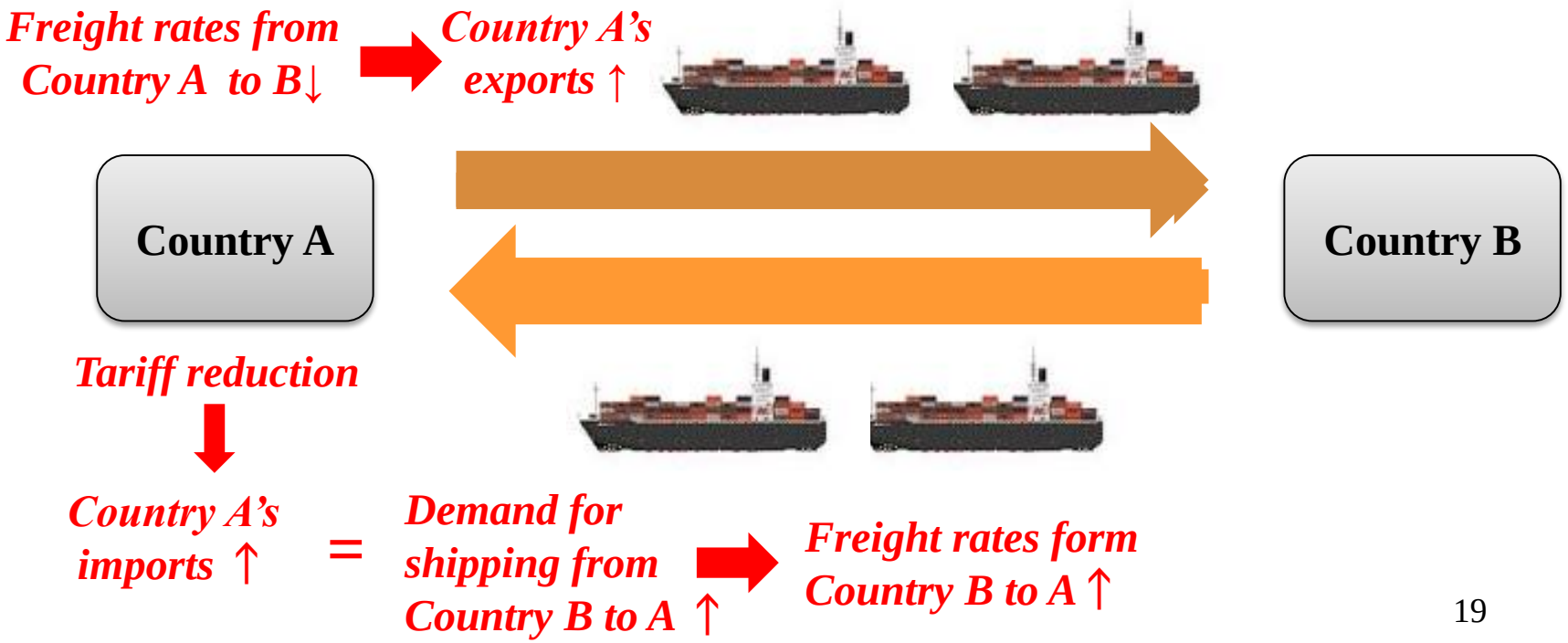
*(Ishikawa and Tarui, 2015)*

$\tau_B \uparrow \rightarrow T_{AB} \downarrow$, $(T_{AB} + \tau_B) \uparrow$, $T_{BA} \uparrow \rightarrow x_{AB}, x_{BA} \downarrow$



# *Empirical Specification*

- Empirically examining two relationships
  - Tariffs → Freight rates of exporting: Positive?
  - Tariffs → Exports: Negative?



# *Empirical Specification*

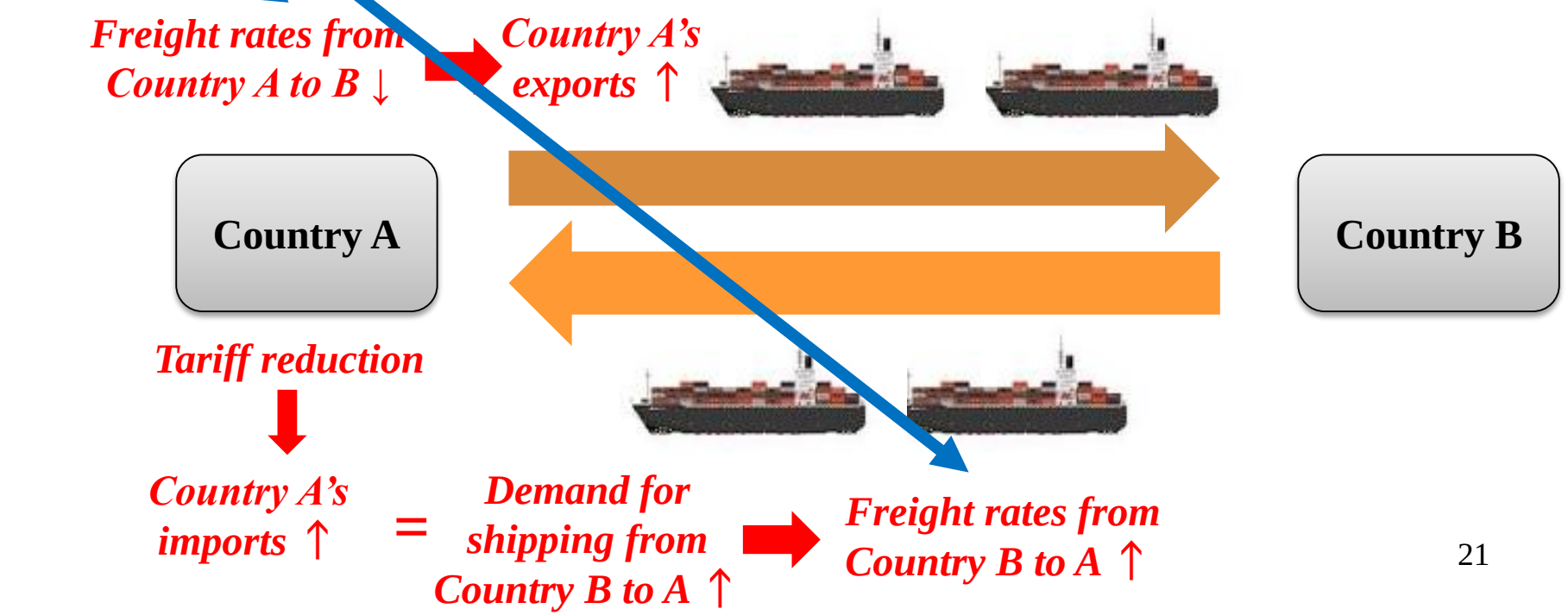
- Freight rates
  - Maritime Transport Costs database in the OECD
    - ✓ 8 destination x 137 origin at an HS 6-digit level during 2003-2007
    - ✓ Australia, New Zealand, the United States, Argentina, Brazil, Chile, Colombia, Ecuador, Peru, and Uruguay
  - Compute ad valorem freight rates in transporting products subject to containerized trade
    - ✓ All products except for HS codes 10, 1201-1207, 1507-1514, 25, 26, 2701-2716, 28, 29, 31, 72, 8701-8705, 8716, 8802, and 89
- Tariff rates
  - Average of applied tariff rates over commodities subject to containerized trade
  - Weighted average in terms of imports at a commodity-level (HS 6-digit)
    - ✓ Not taking the sample selection issue into account

# *Empirical Specification*

$$\ln Freight_{ijt} = \gamma_1 \ln(1 + Tariff_{ijt}) + \gamma_2 \ln(1 + Tariff_{jit}) + \gamma_3 \ln Distance_{ij} + \gamma_3 Border_{ij} + \gamma_4 Colony_{ij} + \gamma_5 Language_{ij} + u_{it} + u_{jt} + \epsilon_{ijt}.$$

Positive in Exporter's tariffs

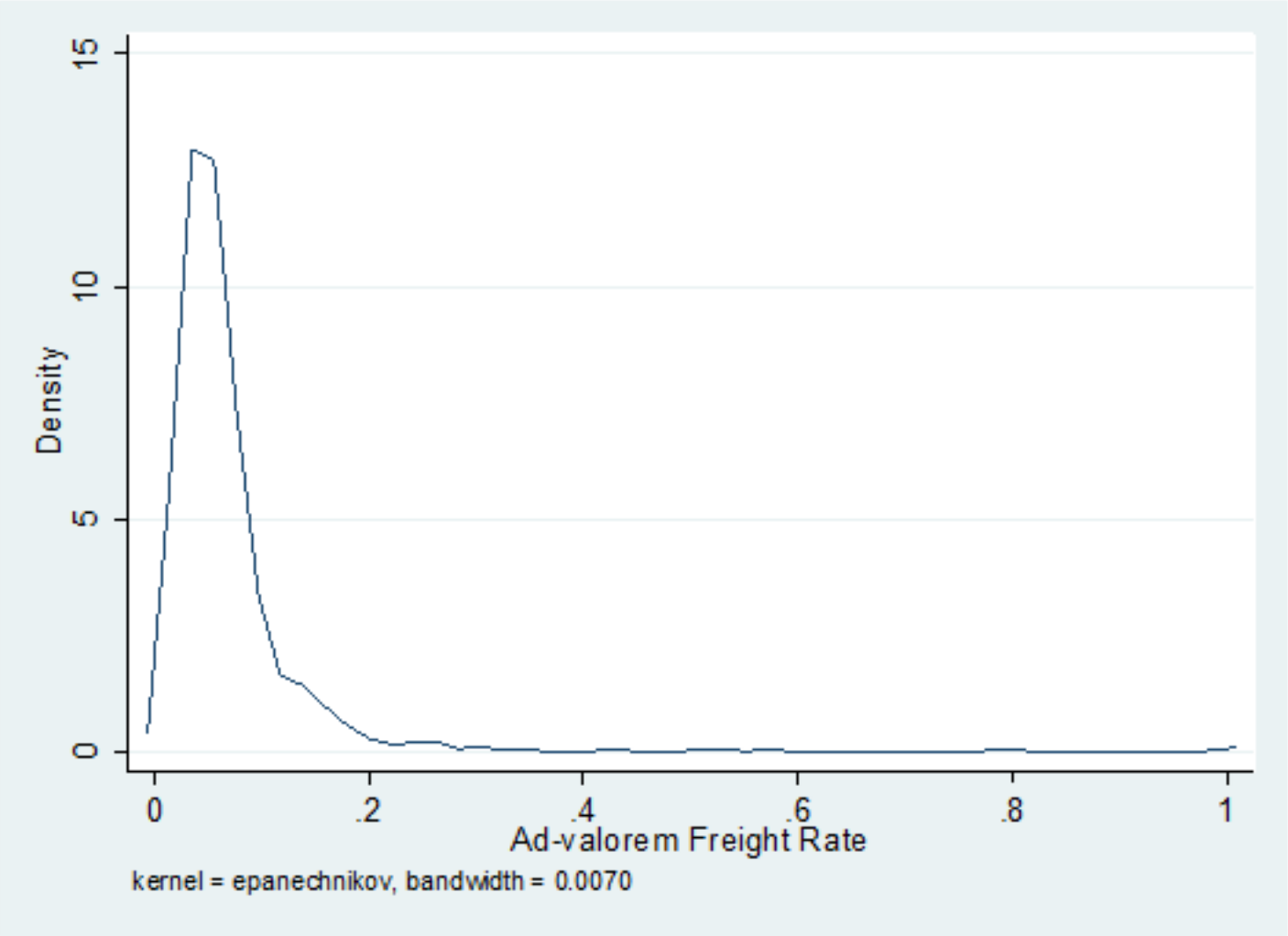
Negative in Importer's tariffs



# *Data Sources*

- Imports
  - Used for a weight in tariff variables (imports at a fob basis)
  - BACI database in CEPII
- Distance, Border, Colony, and Language
  - CEPII website
- Tariffs
  - Obtaining raw data from the WITS database
  - Identifying the lowest tariff rates among all schemes available for each country pair at a tariff-line level
  - Converting to tariff rates at HS 6-digit level (simple average)
  - Computing the weighted average of tariff rates by using the average of HS six-digit level imports during 2003-2007 as a weight.

# Figure 2. Distribution of Ad-valorem Freight Rates in 2007






*Source*: Authors computation using the Maritime Transport Costs database

# Figure 3. Change of Tariff Rates from 2003 to 2007




*Source*: Authors computation using the WITS database

# Table 1. Basic Statistics

| | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Analysis for Freight Costs | | | | | |
| ln Freight | 4,391 | -2.890 | 0.711 | -7.3627 | -0.001 |
| ln (1+Importer's tariffs) | 4,391 | 0.071 | 0.053 | 0.000 | 0.343 |
| ln (1+Exporter's tariffs) | 4,391 | 0.082 | 0.084 | 0 | 0.836 |
| ln Distance | 4,391 | 9.128 | 0.661 | 5.371 | 9.894 |
| Border | 4,391 | 0.031 | 0.172 | 0.000 | 1.000 |
| Colony | 4,391 | 0.003 | 0.050 | 0 | 1 |
| Language | 4,391 | 0.242 | 0.429 | 0 | 1 |
| Gravity Analysis | | | | | |
| ln Value | 77,468 | 8.312 | 3.482 | 0 | 19.451 |
| ln Quantity | 77,468 | 7.112 | 3.919 | -6.908 | 19.074 |
| ln (1+Importer's tariffs) | 77,468 | 0.073 | 0.078 | 0.000 | 1.859 |
| ln (1+Exporter's tariffs) | 77,468 | 0.073 | 0.078 | 0 | 1.859 |
| ln Distance | 77,468 | 8.595 | 0.854 | 4.107 | 9.894 |
| Border | 77,468 | 0.025 | 0.157 | 0 | 1.000 |
| Colony | 77,468 | 0.019 | 0.137 | 0.000 | 1.000 |
| Language | 77,468 | 0.162 | 0.369 | 0.000 | 1.000 |
| ln Value of Materials | 67,786 | 7.166 | 3.335 | 0.000 | 17.762 |
| ln Quantity of Materials | 67,786 | 5.706 | 3.879 | -7.794 | 16.906 |

# Table 2. Baseline Estimation Results

| | (I) | (II) | (III) |
|---|---|---|---|
| ln (1+Importer's tariffs) | -0.694** | | -0.731** |
| ln (1+Exporter's tariffs) | | 0.364** | 0.387** |
| ln Distance | 0.070** | 0.060** | 0.066** |
| Border | -0.371*** | -0.354*** | -0.364*** |
| Colony | -0.370*** | -0.384*** | -0.371*** |
| Language | 0.042 | 0.052 | 0.046 |
| Number of observations | 4,391 | 4,391 | 4,391 |
| Adjusted R-squared | 0.2516 | 0.2514 | 0.2524 |

*Notes*: The dependent variable is a log of ad-valorem freight rates. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. In the parenthesis is the heteroscedasticity-consistent standard error. In all specifications, we control for exporter-year and importer-year fixed effects.

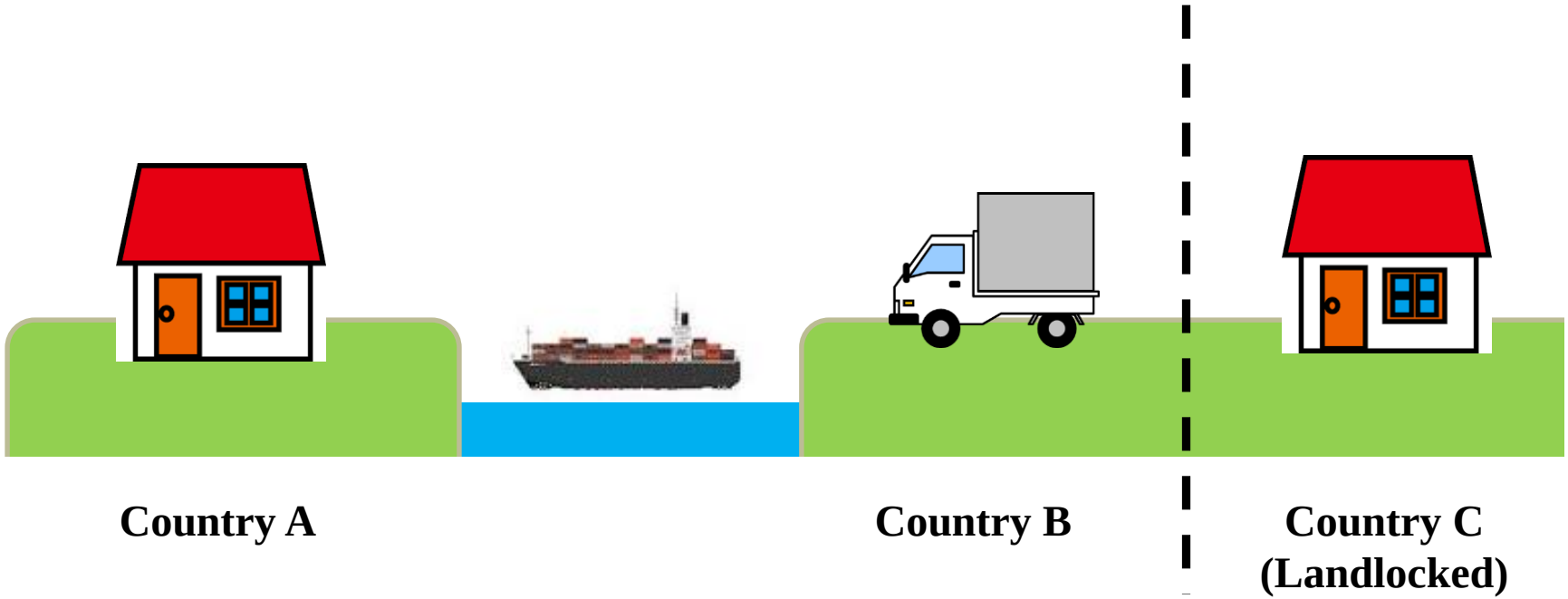
# Table 3. Robustness Checks

| | Distance | Coastal |
|---|---|---|
| ln (1+Importer's tariffs) | -0.727** | -0.677** |
| ln (1+Exporter's tariffs) | 0.388** | 0.370** |
| ln Distance | 0.237 | 0.071** |
| (ln Distance)^2 | -0.010 | |
| Border | -0.343*** | -0.364*** |
| Colony | -0.373*** | -0.362*** |
| Language | 0.047 | 0.022 |
| Number of observations | 4,391 | 3,865 |
| Adjusted R-squared | 0.2523 | 0.2248 |

*Notes*: The dependent variable is a log of ad-valorem freight rates. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. In the parenthesis is the heteroscedasticity-consistent standard error. In all specifications, we control for exporter-year and importer-year fixed effects. In column "Coastal", we exclude landlocked importers/exporters.

# Excluding Landlocked Importers/Exporters

**Freight rates from C to A = Freight rates from C to B + Freight rates from B to A**



# *First-differenced Specification*

$$\Delta \ln Freight_{ijt} = \gamma_1 \Delta \ln\left(1 + Tariff_{ijt}\right) + \gamma_2 \Delta \ln\left(1 + Tariff_{jit}\right) + u_{it} + u_{jt} + \epsilon_{ijt}$$

- Eliminating not only time-invariant country pair effects but also all effects that are unchanged between two consecutive years
- More efficient than the specification with country pair fixed effects if the error terms are serially correlated and/or follow a random walk

# Table 4. First Differenced Specification

| | Baseline | Coastal |
|---|---|---|
| ln (1+Importer's tariffs) | -1.769*** | -1.723** |
| ln (1+Exporter's tariffs) | 1.112 | 1.397* |
| Number of observations | 3,097 | 2,765 |
| Adjusted R-squared | 0.097 | 0.0801 |

*Notes*: The dependent variable is the first difference of a log of ad-valorem freight rates. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. In the parenthesis is the heteroscedasticity-consistent standard error. In all specifications, we control for exporter-year and importer-year fixed effects. In column "Coastal", we exclude landlocked importers/exporters.

# *Empirical Specification for Trade*

$$\ln Export_{ijt} = \gamma_1 \ln(1 + Tariff_{ijt}) + \gamma_2 \ln(1 + Tariff_{jit}) + \gamma_3 \ln Distance_{ij} + \gamma_3 Border_{ij} + \gamma_4 Colony_{ij} + \gamma_5 Language_{ij} + u_{it} + u_{jt} + \epsilon_{ijt}$$

Negative in Exporter's tariffs

Negative in Importer's tariffs

***Freight rates from Country A to B ↓*** ➡ ***Country A's exports ↑***

**Country A**

**Country B**

***Tariff reduction*** ⬇

***Country A's imports ↑*** = ***Demand for shipping from Country B to A ↑*** ➡ ***Freight rates from Country B to A ↑***

# *Empirical Issues for Analysis on Trade*

- Estimating this gravity equation for not only trade values but also trade volume
- Obtained from the BACI database in CEPII
  - Using trade values at a fob basis
  - Trade quantity measured in ton
- Focusing on and aggregate trade over products subject to containerized trade
- Not taking into account the sample selection issue because of the use of weighted-average of tariff rates
- Estimating for trade among 157 countries in 2003-2007

# Table 5. Estimation Results for Import Value and Quantity

| | All | | Materials | |
|---|---|---|---|---|
| | Value | Quantity | Value | Quantity |
| ln (1+Importer's tariffs) | -1.476*** | -0.875*** | -1.988*** | -1.253*** |
| ln (1+Exporter's tariffs) | -0.508*** | -0.447*** | -0.677*** | -0.507*** |
| ln Distance | -1.495*** | -1.837*** | -1.269*** | -1.658*** |
| Border | 0.646*** | 0.807*** | 0.824*** | 1.210*** |
| Colony | 0.909*** | 1.093*** | 1.043*** | 1.231*** |
| Language | 0.805*** | 0.873*** | 0.653*** | 0.747*** |
| Number of observations | 77,468 | 77,468 | 67,786 | 67,786 |
| Adjusted R-squared | 0.7901 | 0.7078 | 0.7451 | 0.6429 |

*Notes*: The dependent variable is a log of exports or export quantity. ***, **, and * represent significance at the 1%, 5%, and 10% statistical levels, respectively. In the parenthesis is the heteroscedasticity-consistent standard error. In all specifications, we control for exporter-year and importer-year fixed effects. In column "Material", we focus only on trade in material products.

# *Focusing on Trade in Intermediate Goods*

- Other paths to yield the significant relationship between the exporter's tariffs and exports?
- Excluding trade in finished products and focusing instead on trade in materials alone
  - 111, 112, 21, 31, 42, and 53 in the BEC

# *Discussion*

- Empirical support on theoretical predictions
  - Lower tariffs by a country induce the transport firms to lower their freight rates on the country's export
  - Tariff reductions expand not only the country's imports but its exports.
- So… What goes around "really" comes around with an explicit transport sector under trade-policy
  - Point to another potential gains from freer trade (cf. welfare analysis in Ishikawa and Tarui 2015)

Mahalo!

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