Emerging Markets and the New Geography of Trade: The Effects of Rising Trade Barriers

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Introduction

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2. International trade models that exploit differences in comparative advantage?

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- EMs' exposure to and role as propagators of shocks

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- EMs' exposure to and role as propagators of shocks

$\rightarrow$ Data on aggregate trade flows and production structures push for a framework closer to **(2)**

Methodology

New Geography of Trade and higher trade barriers

1. Provide set of facts on agg. trade flows and production structure of EMs
   - New Geography of Trade (NGT) $\Rightarrow$ unified and systematic

Trade: Hanson (2012), Timmer et al. (2013), UNCTAD (2014). **Business cycles:** Neumeyer and Perri (2005), Uribe and Yue (2006), Aguiar and Gopinath (2007), Mendoza (2010), García-Cicco et al. (2010)

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2. Propose model guided by facts to quantify effects of rising trade barriers
   - Dynamic multi-country-sector-factor GE trade model with IO linkages

   $\Rightarrow$ Ricardian-HO comp. adv. and consumption vs investment effects

   Static: Eaton and Kortum (2002), Caliendo and Parro (2015), Levchenko and Zhang (2016), Parro (2013), Morrow and Trefler (2019). **Dynamic:** Álvarez (2017), Ravikumar et al. (2019), Reyes-Heroles (2016, 2018).

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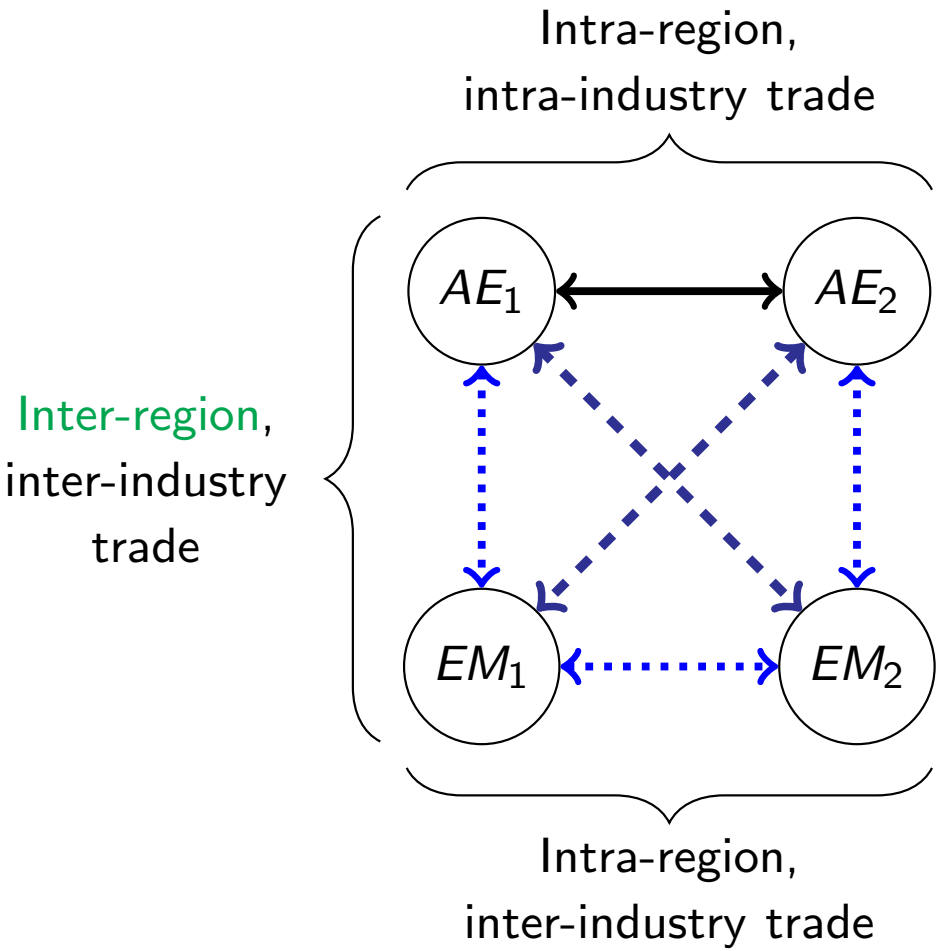
3. Take model to data consistent with NGT and quantify long-run effects of higher trade barriers on EMs
   - Two exercises with focus on EMs
     i. Global increase in trade barriers
     ii. Spillovers from trade war between AEs

   Trade war: Charbonneau and Landry (2018)

Preview of Results

1. Stylized Facts: The New Geography of Trade

→ Stylized facts mostly summarized as follows:



Preview of Results

2. Quantitative Exercises

→ **Global increase in trade barriers:**

- Sizable global negative effects (output and welfare), but EMs disproportionately affected.
- Effects on EMs are more heterogeneous.
- Approximately 1/2 of effects on output (welfare) driven by endogenous responses in investment.
- Redistribution of world exports toward EMs reduces welfare losses.

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- Redistribution of world exports toward EMs reduces welfare losses.

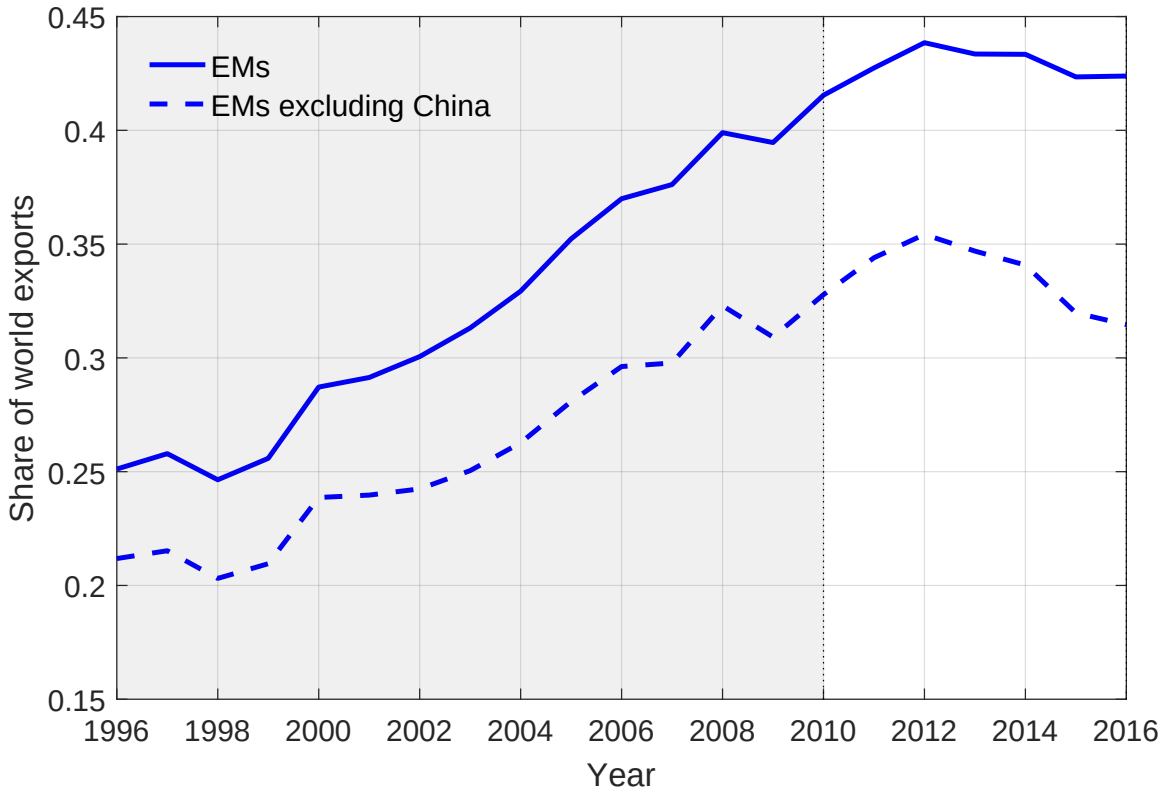
→ **Spillovers - increase in trade barriers between AEs:**

- Sizable spillovers → EMs increase output.
- Lion's share of spillovers from endogenous adjustment in diverted investment.
- Increase in inequality in EMs.
- Welfare effects are very heterogeneous across EMs.

The New Geography of Trade

Fact 1. Trade by EMs represents a significant share of world trade.

Figure: EMs Export Share of World Exports



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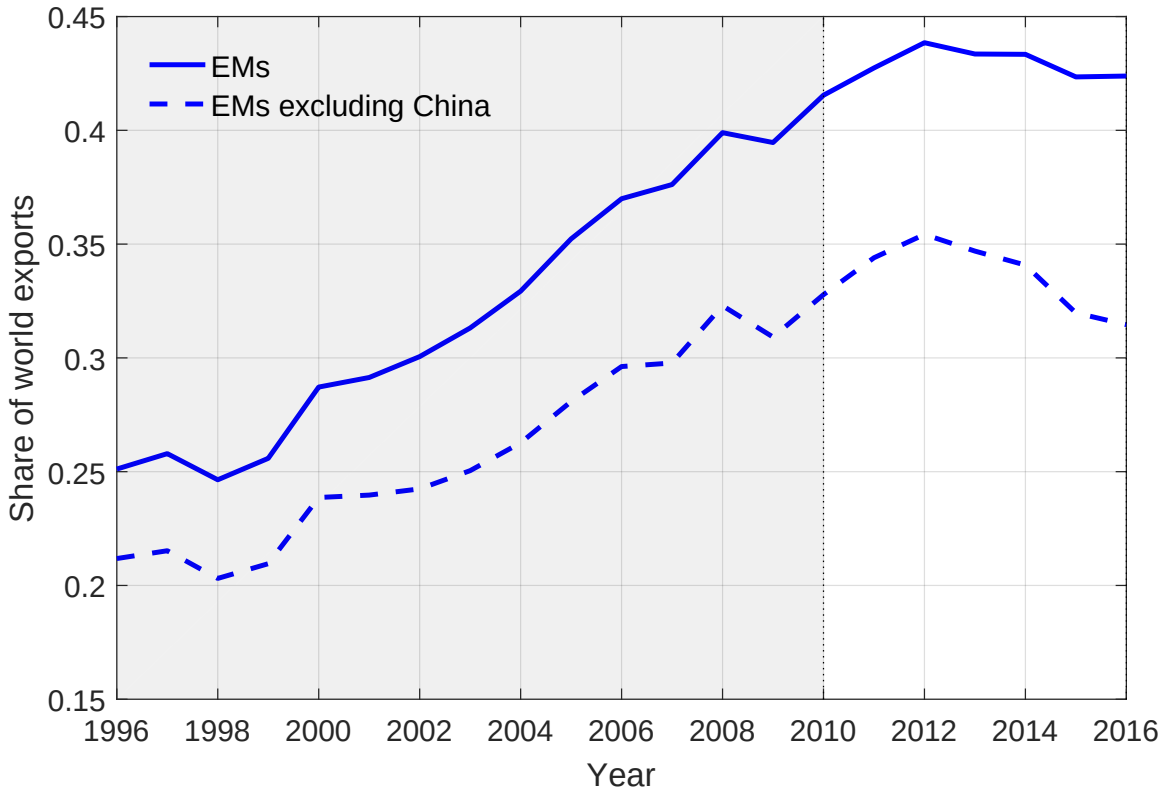
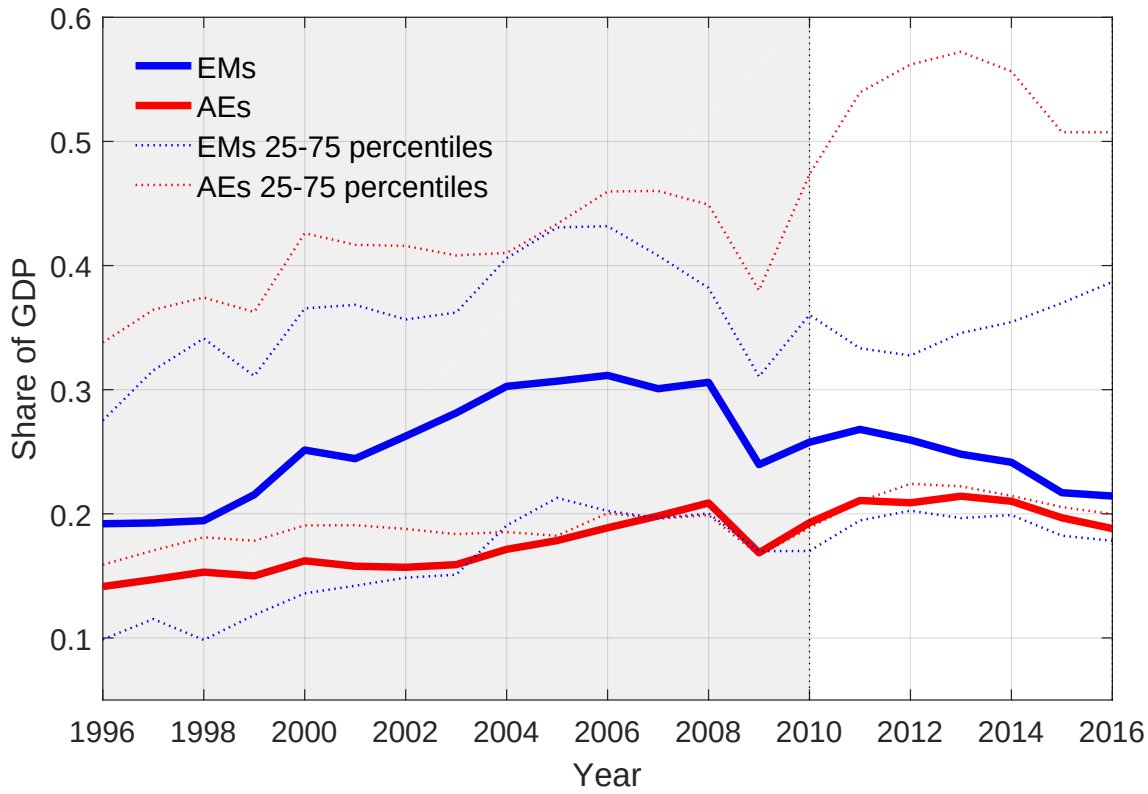


$\Rightarrow$ GE forces with EMs not considered as small open economies (SOEs)

The New Geography of Trade

Fact 2. EMs are on average more open than AEs, but there is substantial heterogeneity across countries.

Figure: EMs and AEs Trade Openness (exports as a share of GDP)



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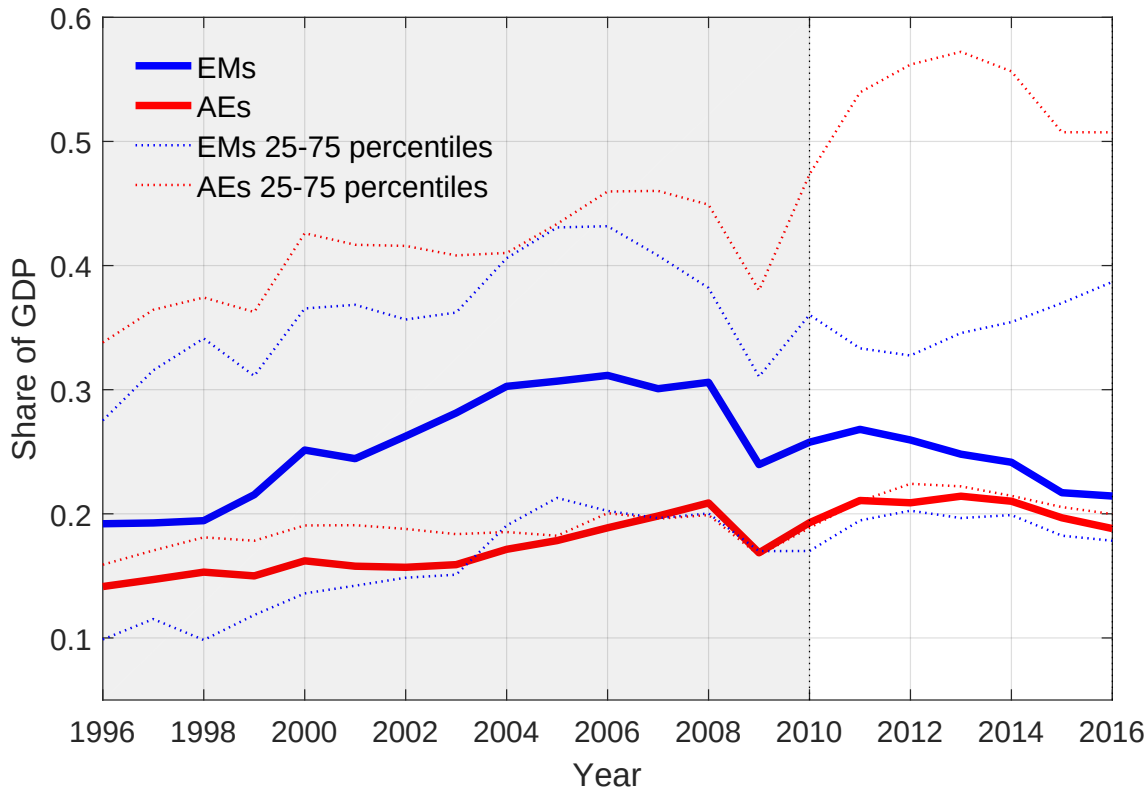
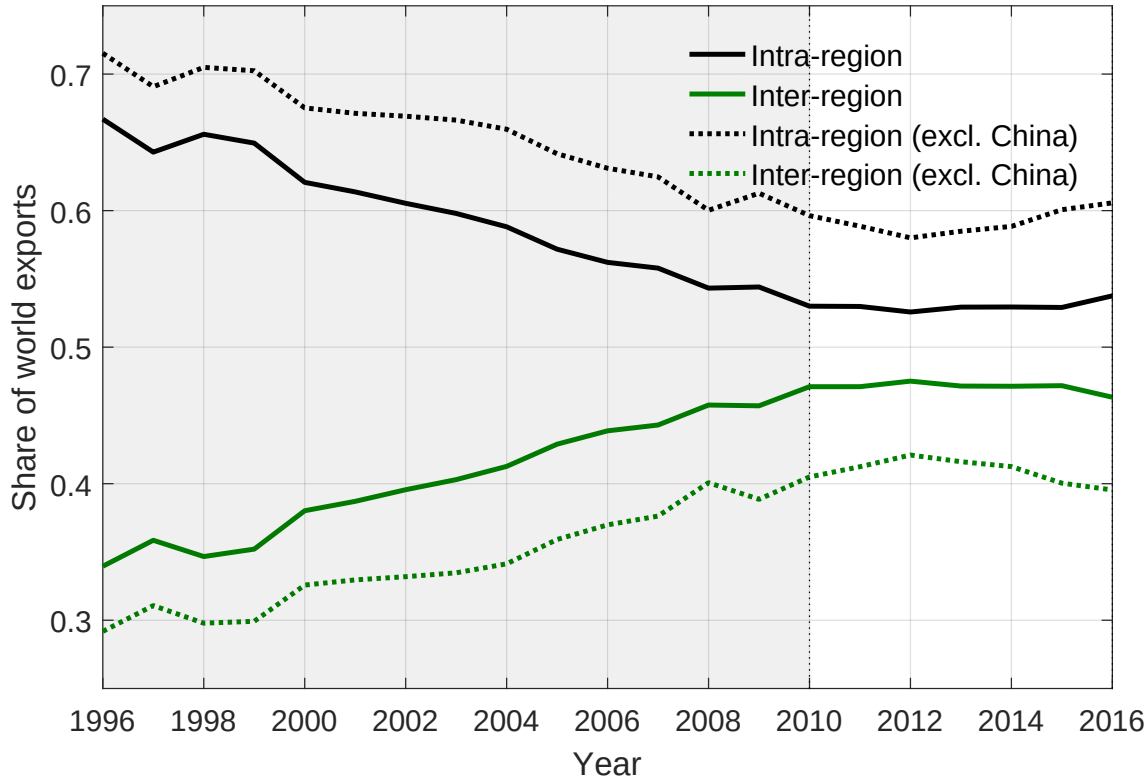


$\Rightarrow$ Heterogeneity in trade costs and openness

The New Geography of Trade

Fact 3. As a share of global trade, inter-regional trade has grown.

Figure: Intra- and Inter-region Trade Linkages (share of world exports)



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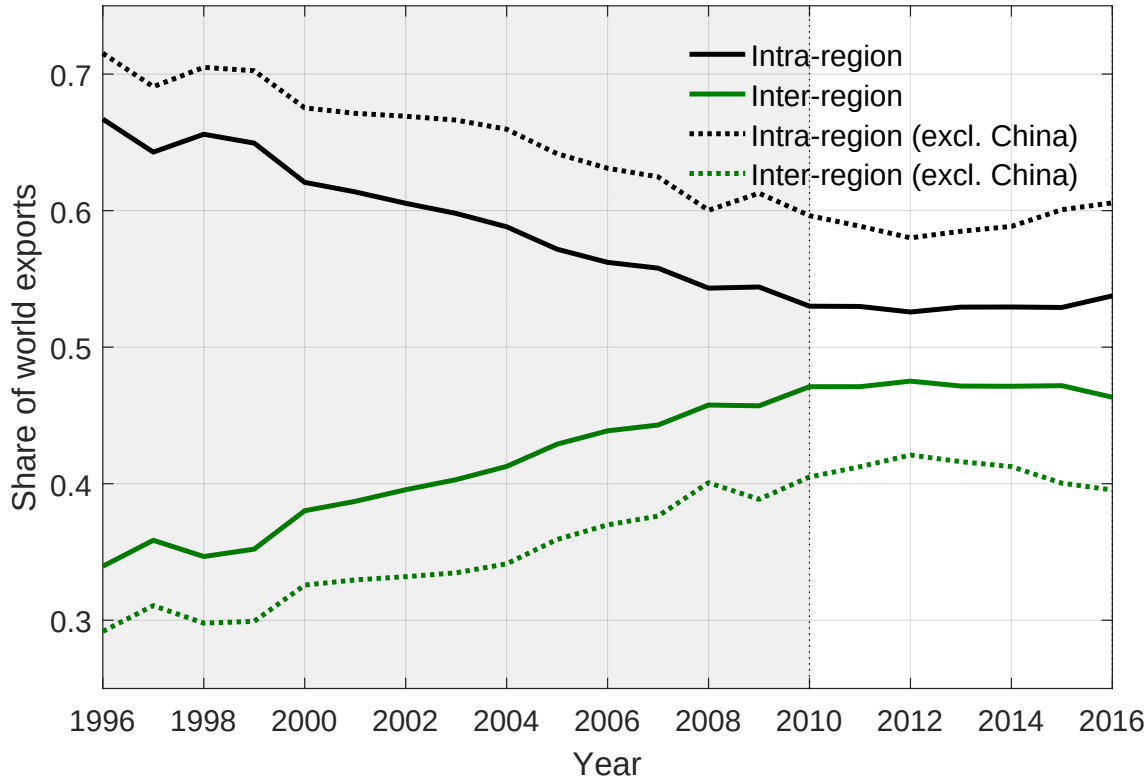
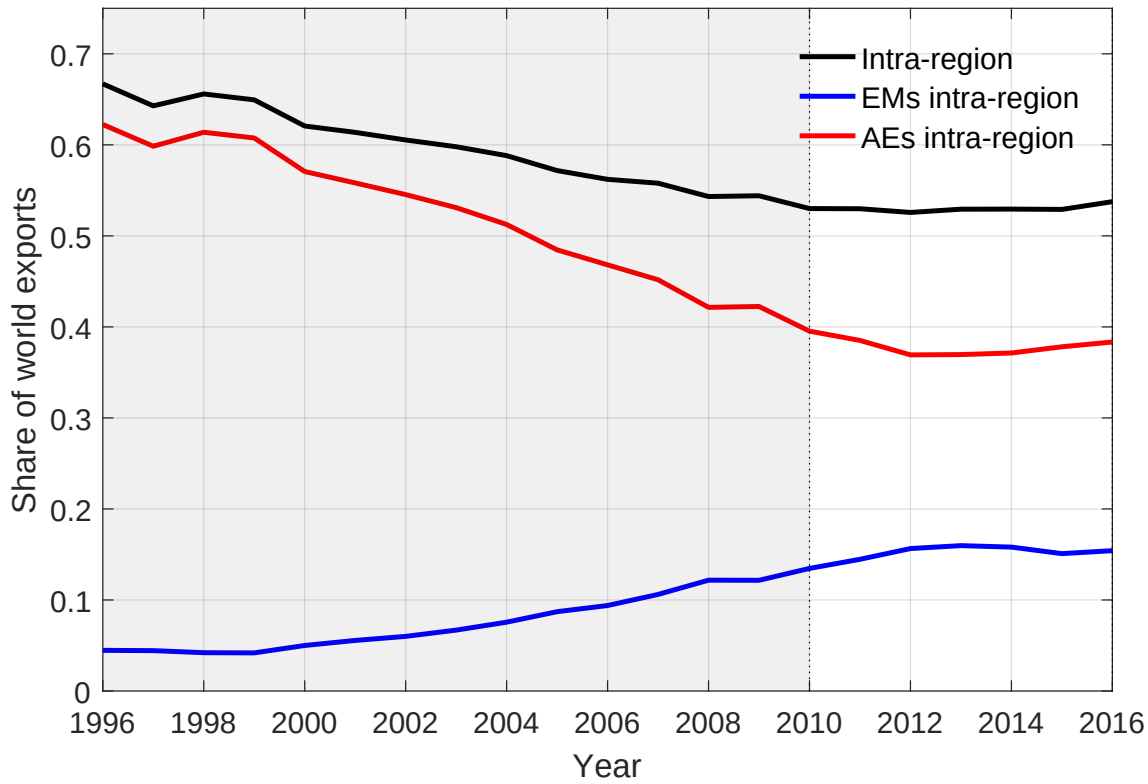


⇒ Differences in comparative advantage and multiple sectors

The New Geography of Trade

Fact 4. As a share of global trade, intra-regional trade has increased between EMs and remains important between AEs, albeit declining.

Figure: Intra-region Trade (share of world exports)



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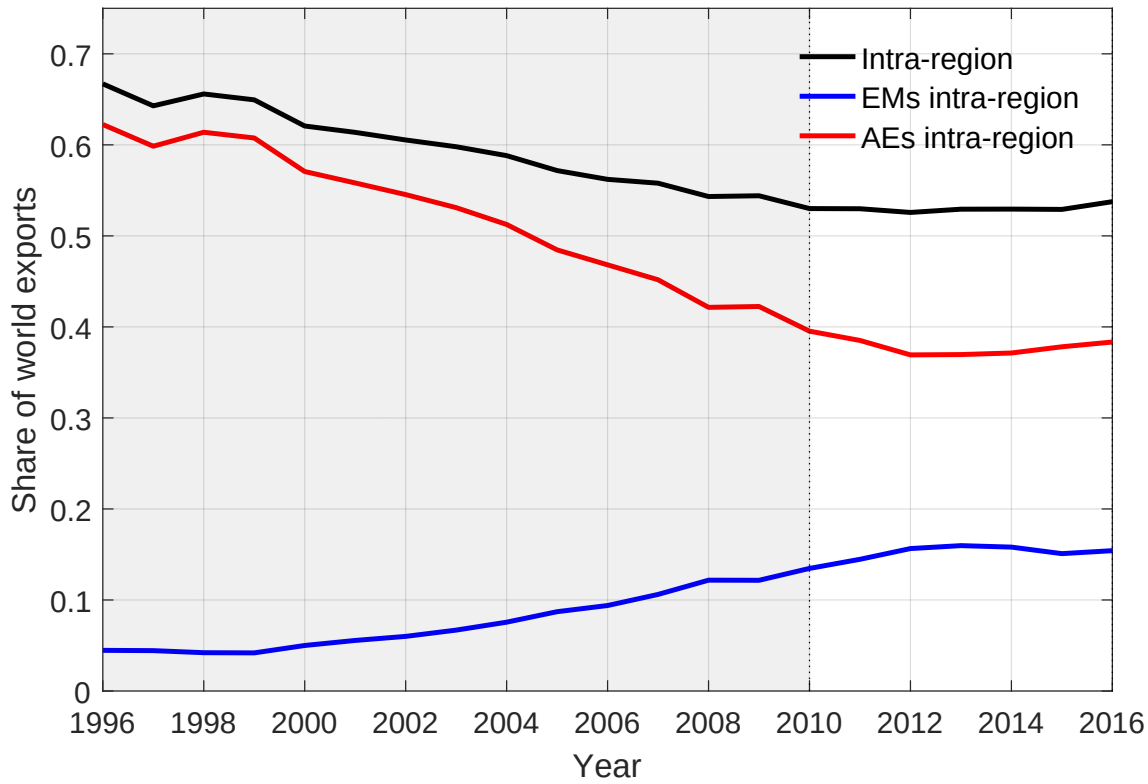


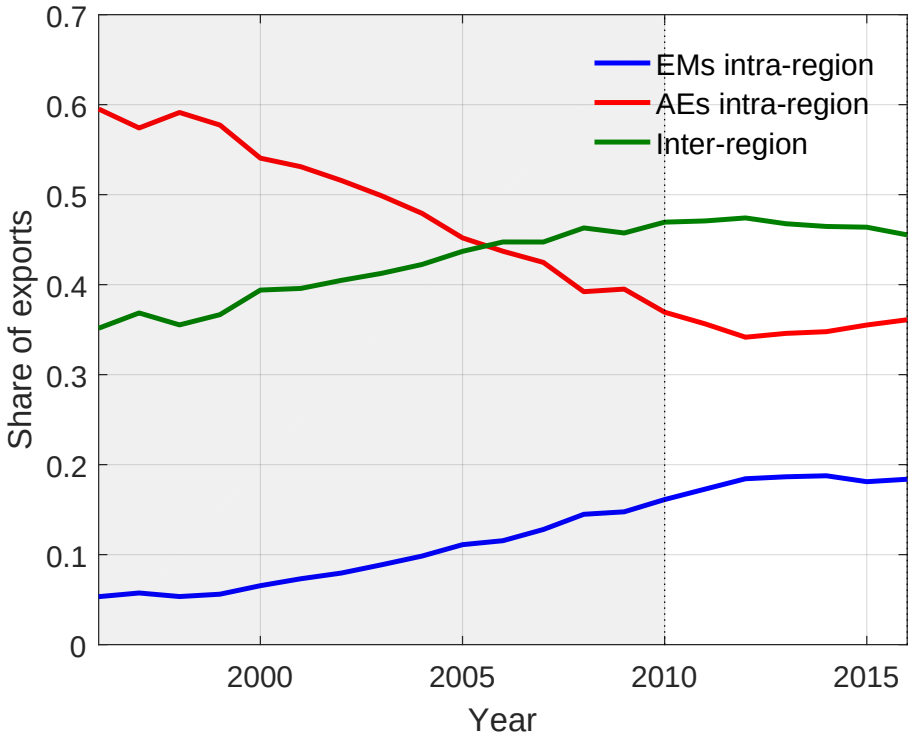
$\Rightarrow$ Incorporate multiple countries

The New Geography of Trade

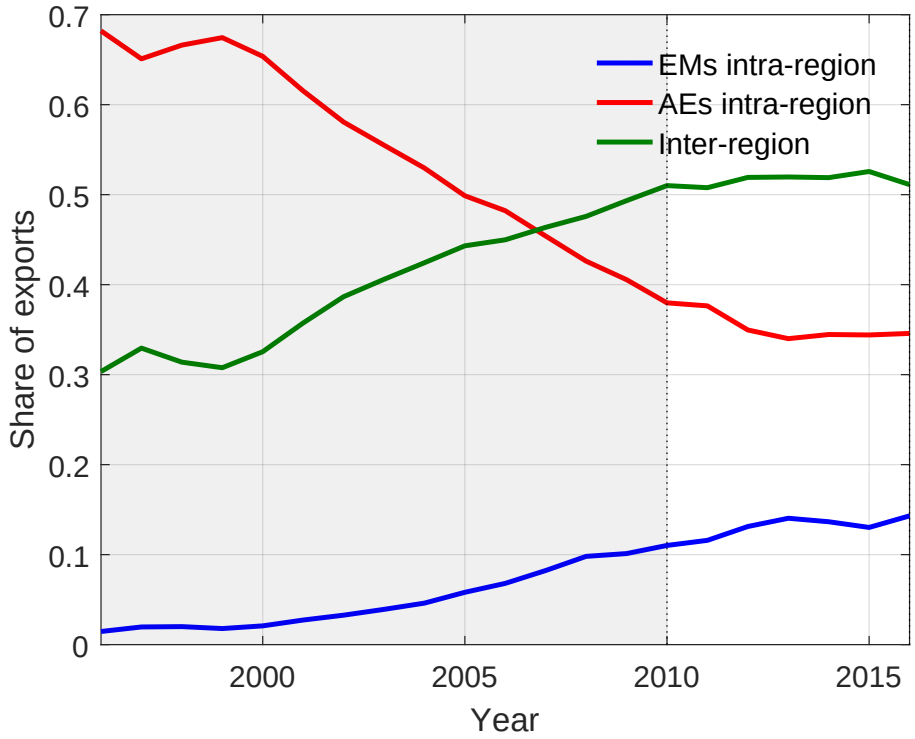
Fact 5. EMs produce and consume both intermediate and capital goods, but heterogeneously. (1/2)

Figure: EMs in Intermediate and Capital Goods Trade (share of category's exports)

(a) Intermediate Goods



(b) Capital Goods



The New Geography of Trade

Fact 5. EMs produce and consume both intermediate and capital goods, but heterogeneously. (2/2)

Figure: Trade among EMs (share of category's exports)

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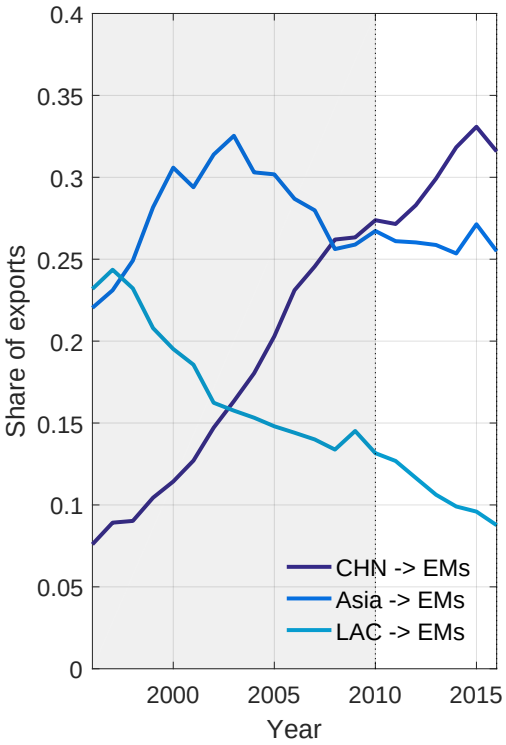
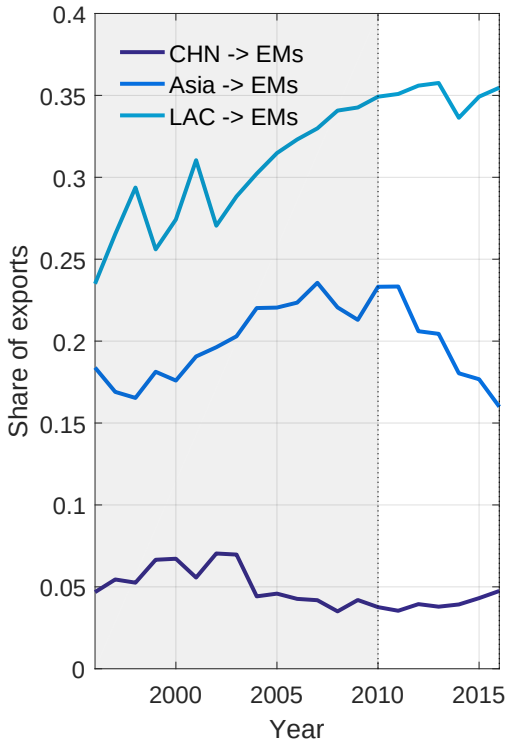
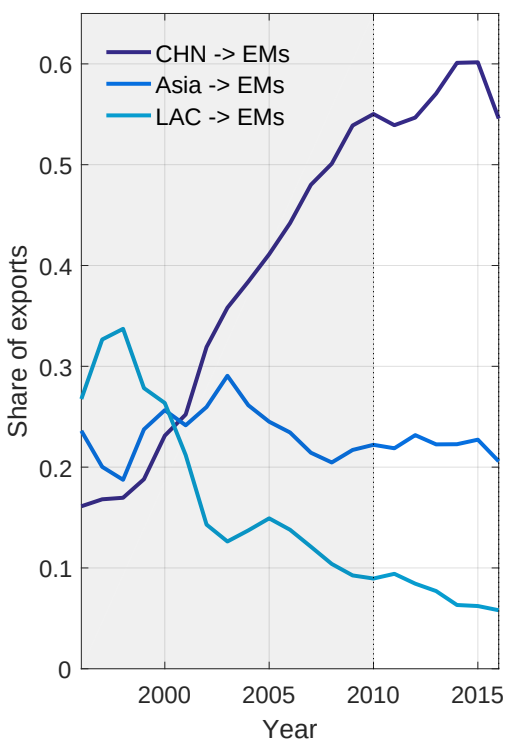


(b) Non-oil Commodities



(c) Capital Goods



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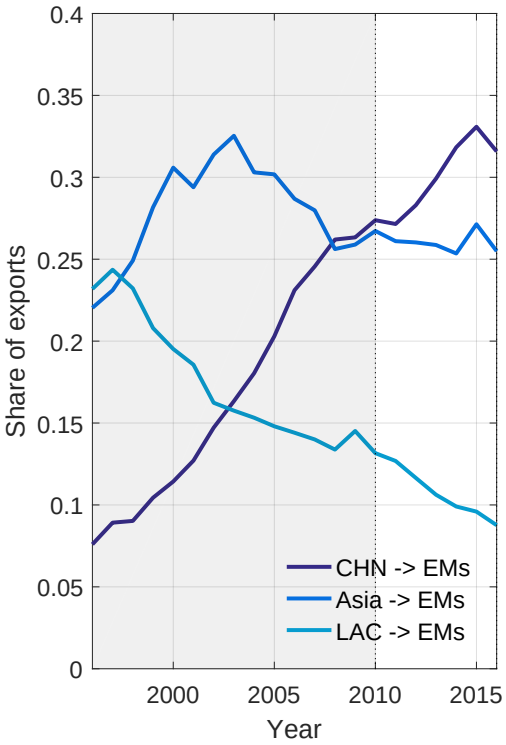

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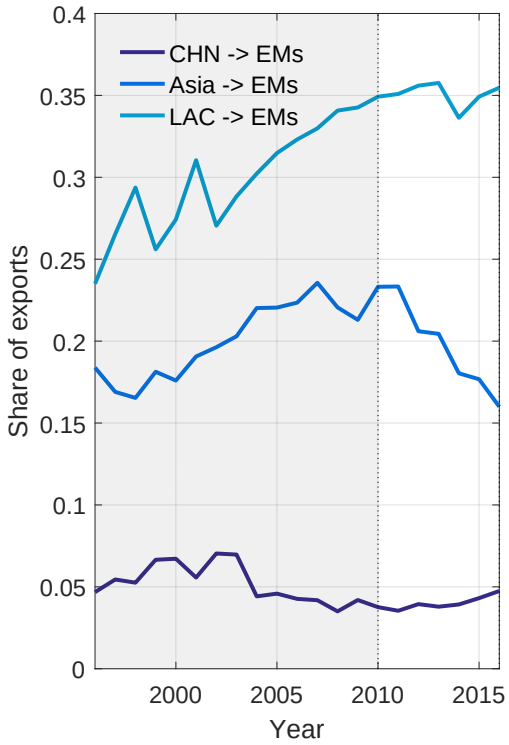

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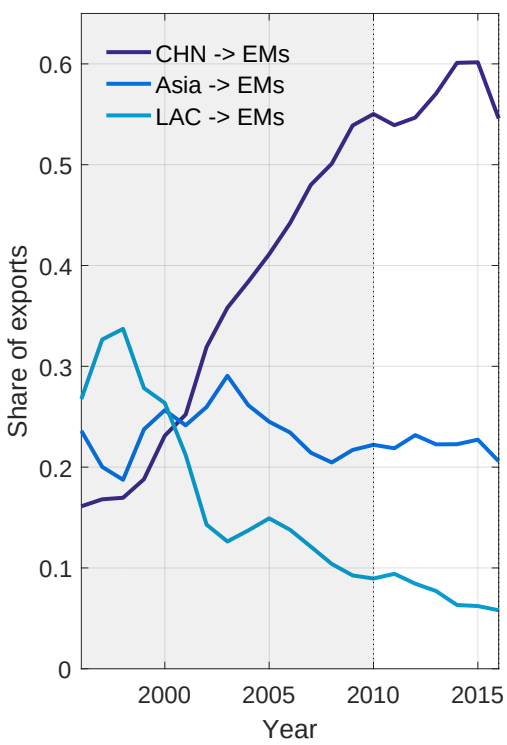


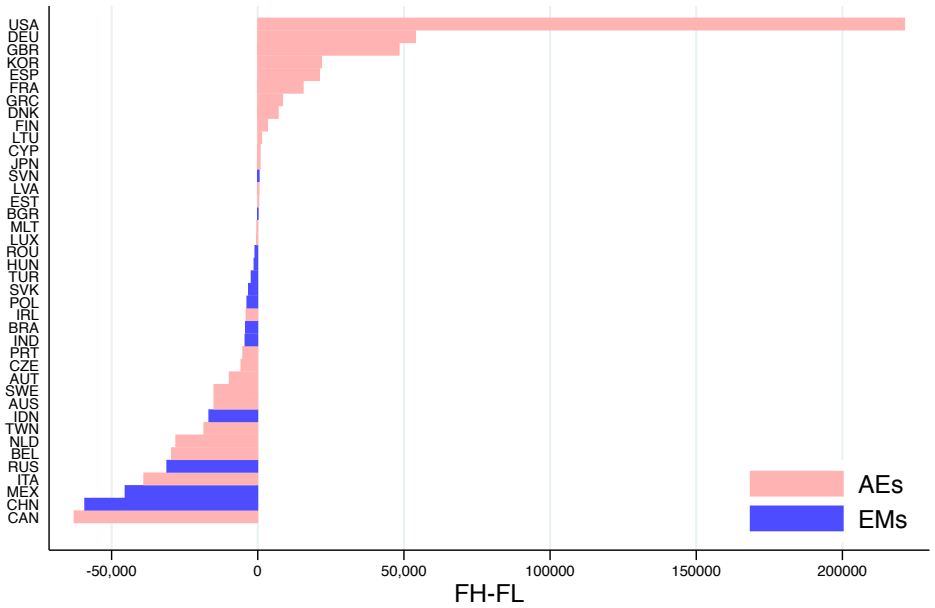
$\Rightarrow$ IO linkages, investment and production heterogeneity across EMs

The New Geography of Trade

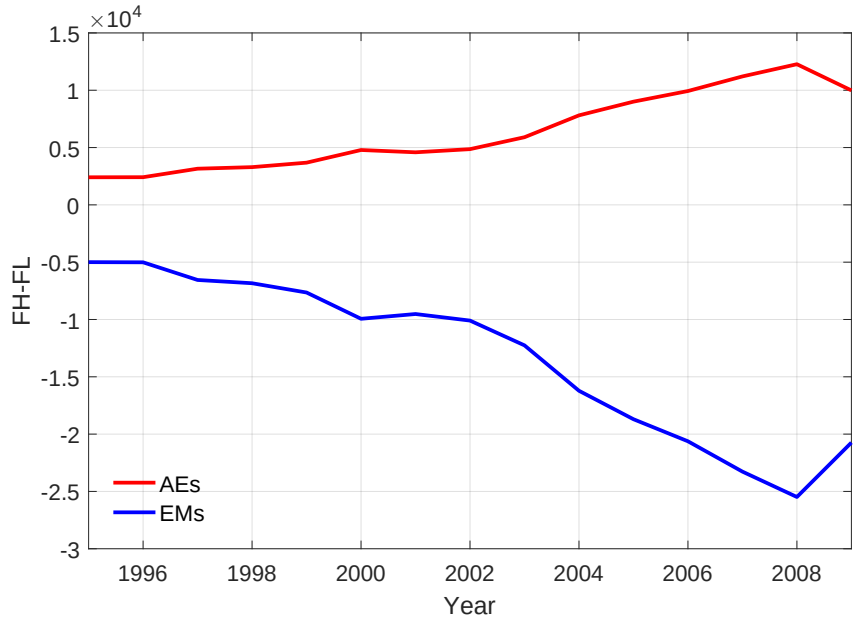
Fact 6. Factor endowments are key to understand AE-EM trade.

Figure: Skill Bias of Net Factor Content of Trade

(a) Skill Bias of NFCT



(b) Regional Skill Bias of NFCT



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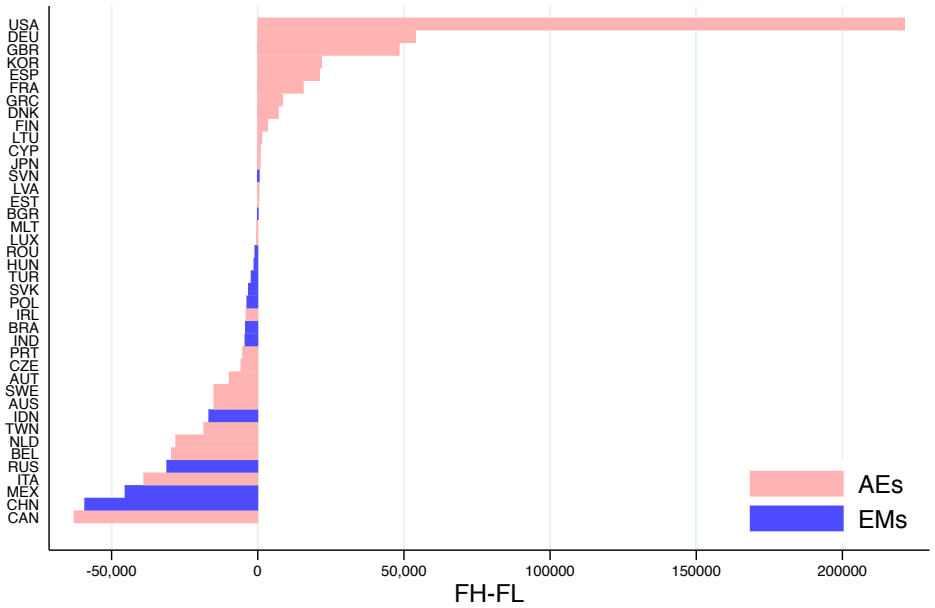

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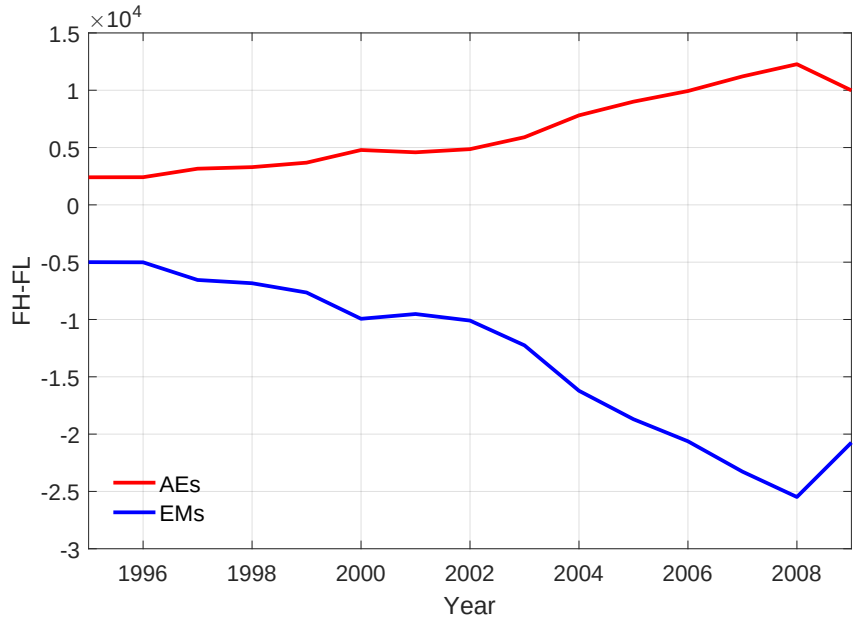


⇒ Multiple factors of production

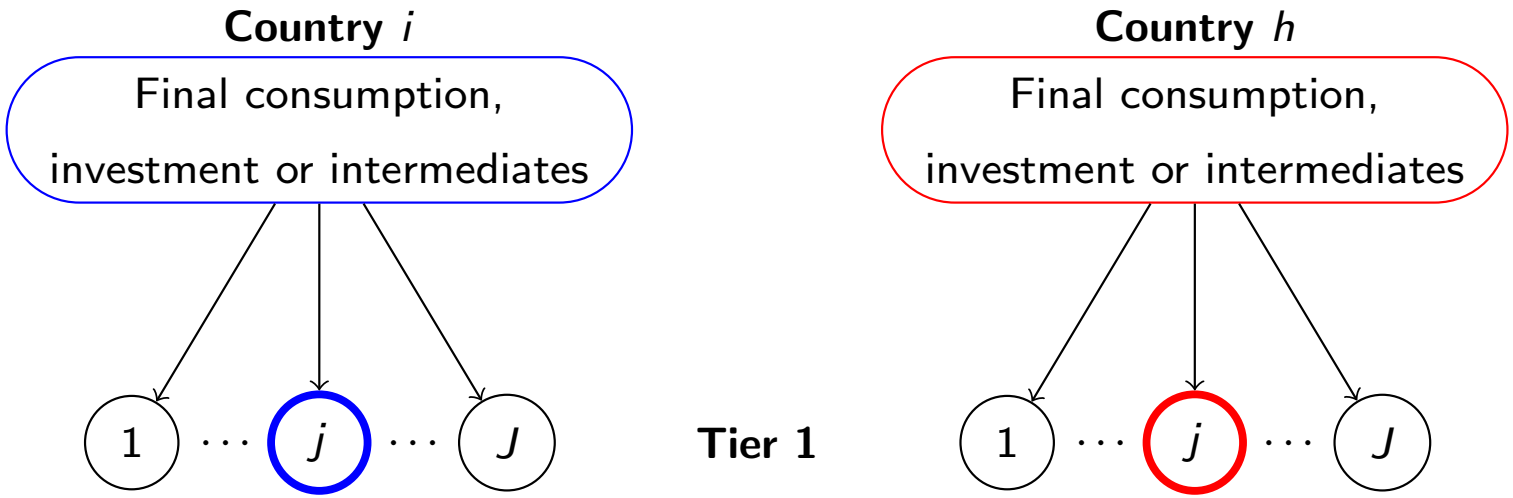
A Quantitative Model of The New Geography of Trade

Setup and Endowments

- Time is discrete: $t = 0, 1, \ldots$
- All economic agents have perfect foresight
- I countries indexed by i, J sectors indexed by j
- Country i endowed with $U_{i,t}$ units of *low-skill* workers and $S_{i,t}$ units of *high-skill* workers in every t, and $K_{i,0}$ units of *physical capital*.
  - Immobile across countries
- Representative household in each country:
  - Access to international financial markets: One-period bonds in zero net-supply
  - Own physical capital and initial NFA position

A Quantitative Model of The New Geography of Trade

Technologies and Trade



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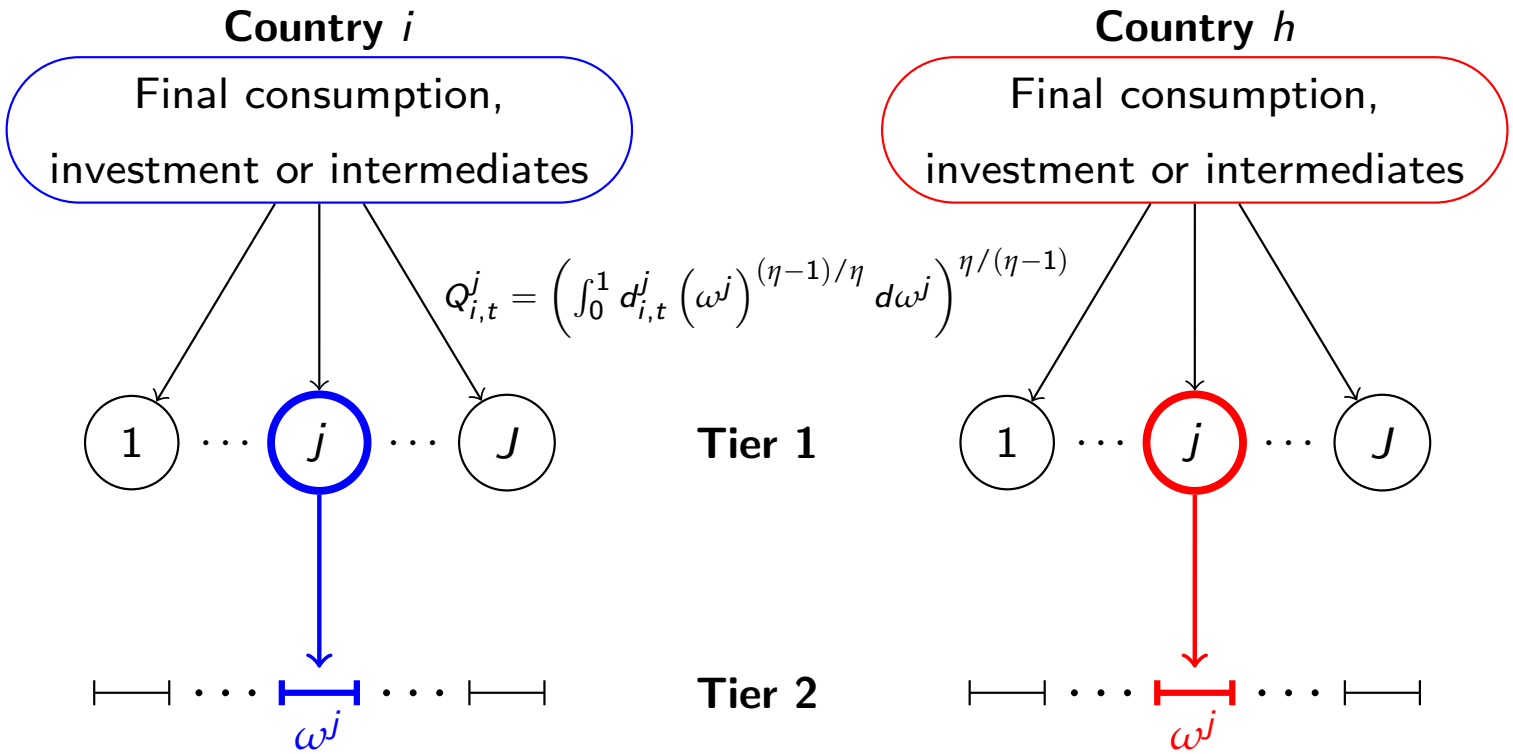

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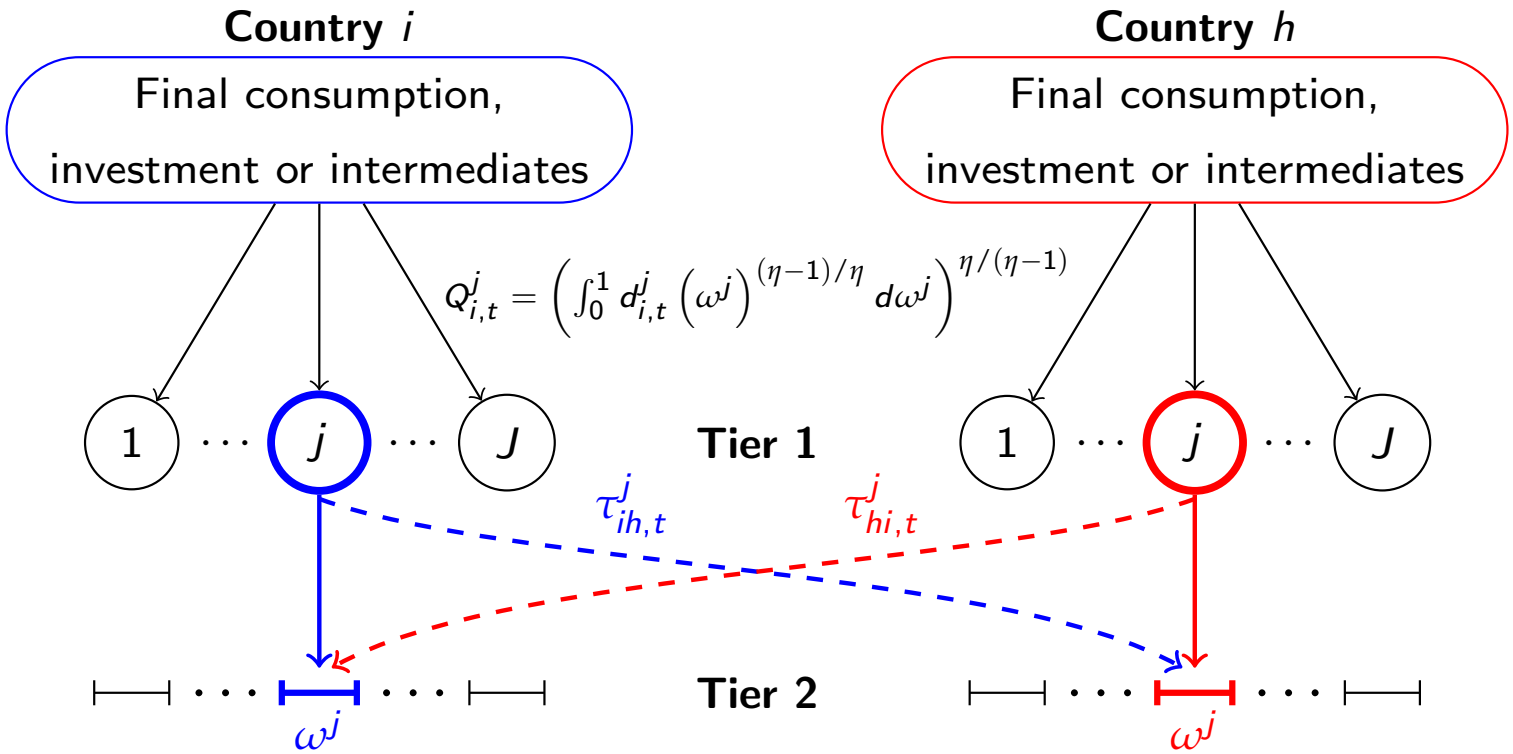

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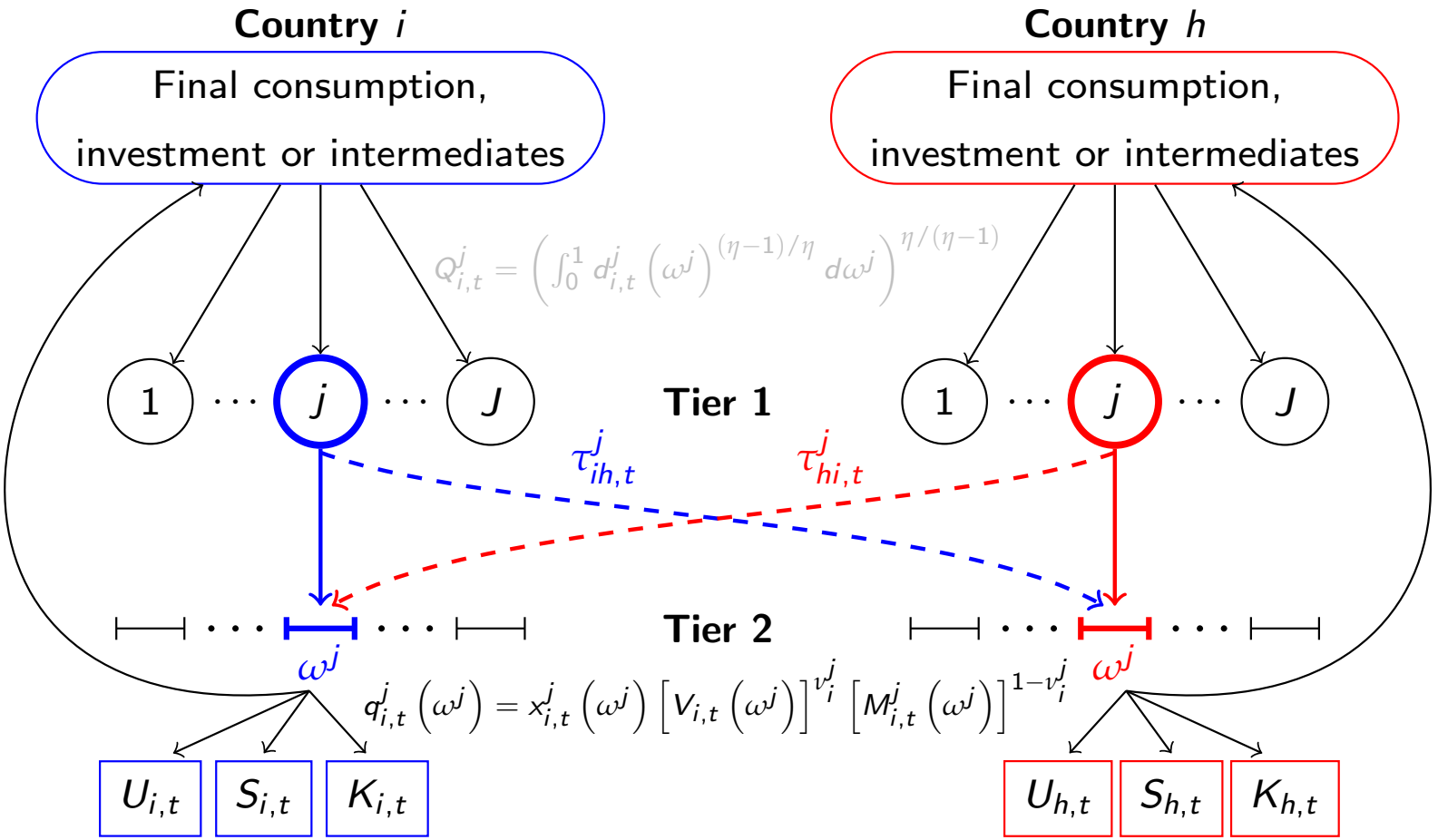

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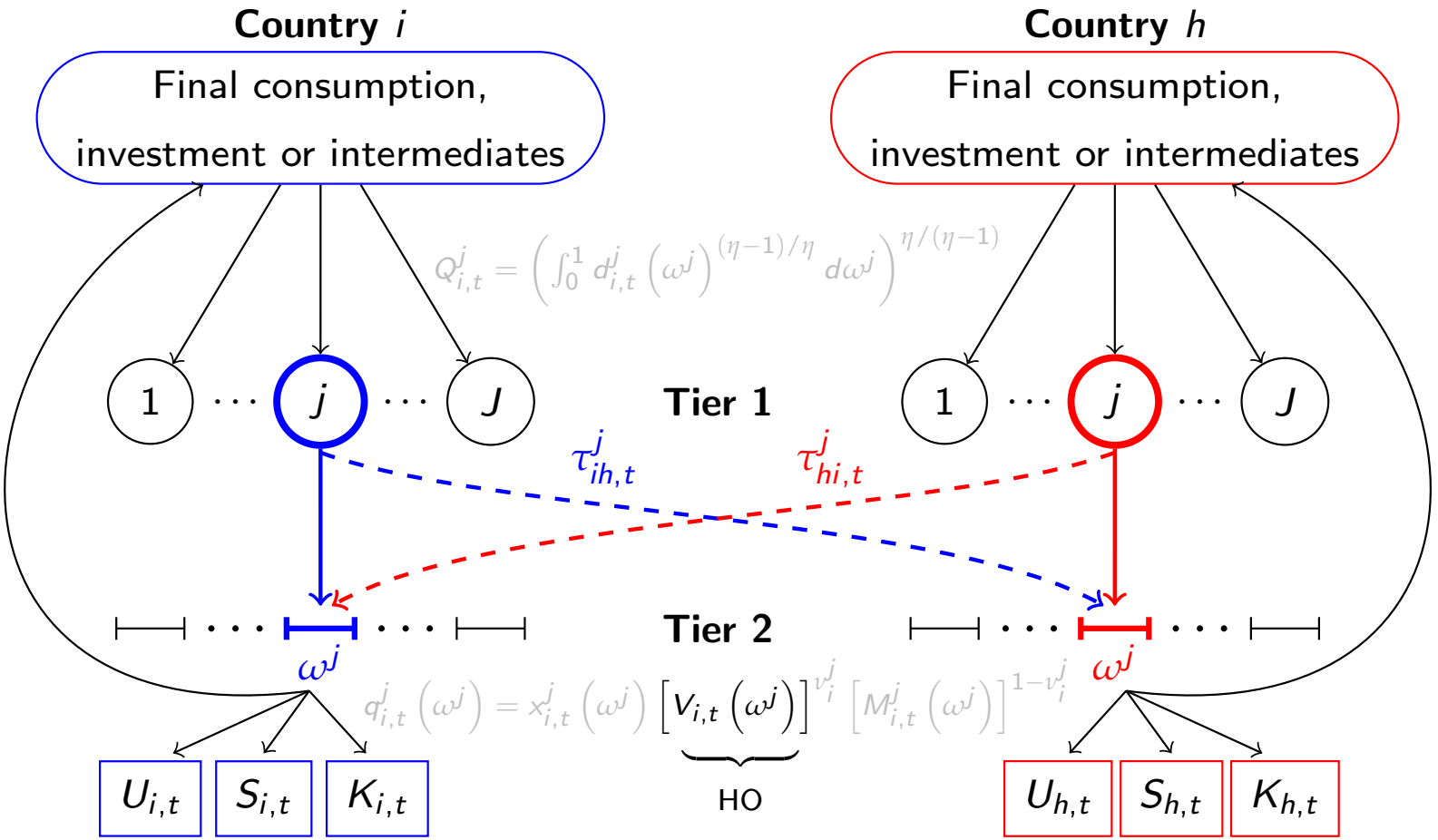

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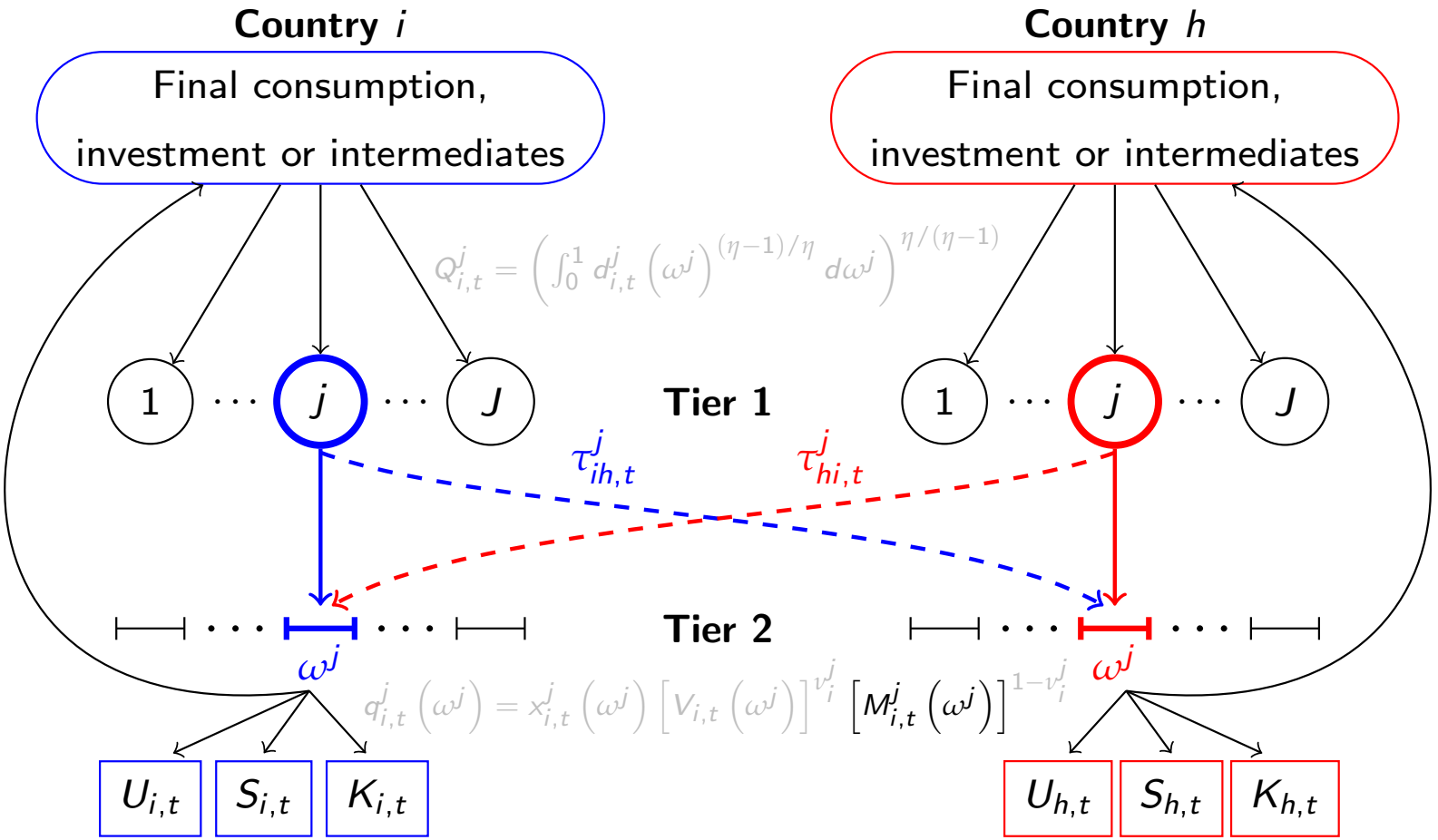

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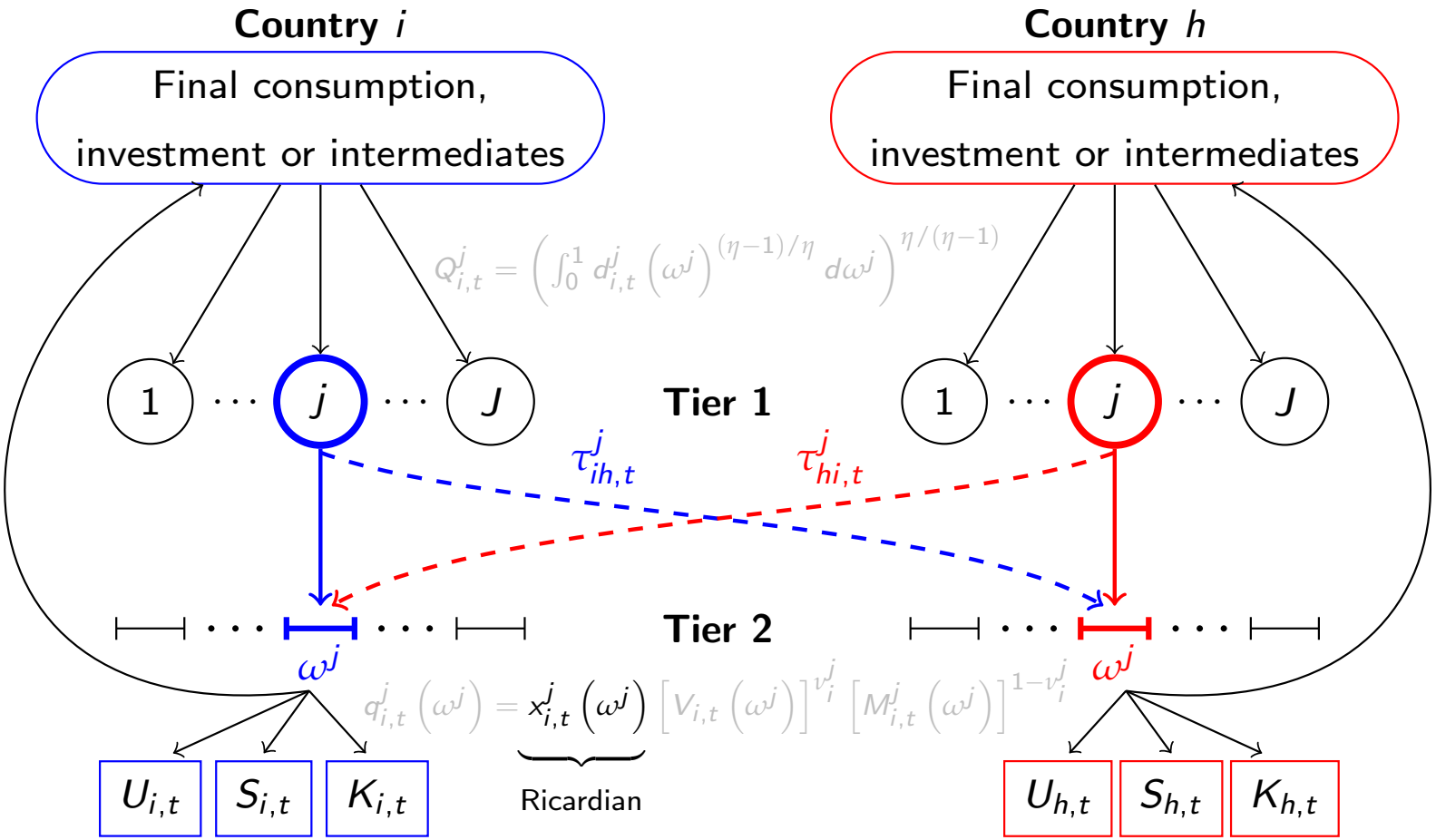
A Quantitative Model of The New Geography of Trade

Technologies and Trade



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$$F^j_{i,t}(x|t) = \Pr\left[x^j_{i,t} \leq x\right] = e^{-T^j_{i,t} x^{-\theta^j}}$$

A Quantitative Model of The New Geography of Trade

Households

- Household in i chooses $\left\{K_{i,t+1}, B_{i,t+1}, \left\{C_{i,t}^j\right\}_j, \left\{X_{i,t}^j\right\}_j\right\}_{t=0,1,...}$ to maximize

$$\sum_{t=0}^{\infty} \beta^t \ln\left(\prod_{j=1}^{J}\left(C_{i,t}^j\right)^{\mu_i^j}\right) \quad \text{s.t.}$$

subject to

$$\sum_{j=1}^{J} P_{i,t}^j (C_{i,t}^j + X_{i,t}^j) + B_{i,t+1} + \frac{\psi}{2}\left(B_{i,t+1} - \bar{B}_i\right)^2 = w_{i,t}^U U_{i,t} + w_{i,t}^S S_{i,t} + r_{i,t} K_{i,t} + R_t B_{i,t},$$

$$K_{i,t+1} = \xi_{i,t} \prod_{j=1}^{J}\left(X_{i,t}^j\right)^{\chi_i^j} + (1-\delta) K_{i,t},$$

where $K_{i,0}$, $W_{i,0} = R_0 B_{i,0}$ are given and $\mu_i^j, \chi_i^j > 0$ and $\sum_{j=1}^J \mu_i^j = \sum_{j=1}^J \chi_i^j = 1$.

▸ Market Clearing Conditions ▸ Equilibrium and Steady State Conditions

Taking the Model to the Data

- Calibrate model to steady state in 2016
  - If data not available for period, use most recent available.
- I=31, 30 core countries and ROW
  - **AEs:** AUS, AUT, DEU, CAN, DNK, ESP, FIN, FRA, ITA, GRC, IRL, JPN, KOR, NLD, NZL, NOR, PRT, SWE, GBR, USA.
  - **EMs:** ARG, BRA, CHL, CHN, HUN, IDN, IND, MEX, TUR, ZAF, ROW.
- 40 sectors: 20 tradable and 20 non-tradable. Sectors
- Data sources include UNCOMTRADE, WIOD, UN National Accounts, etc.

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→ **Steps:**

1. Calibrate *time-invariant parameters* (μ_i^j, χ_i^j *among others*) *and exogenous observable endowments* ($U_{i,t}, S_{i,t}$). ▸ TIP ▸ μ_i^j, χ_i^j
2. Invert model to recover *exogenous unobservable shifters*:
   - *bilateral trade barriers*: $\tau_{ih,t}^j$
   - *sectoral productivities*: $T_{i,t}^j$ ▸ Productivities
   - *investment efficiencies*: $\xi_{i,t}$

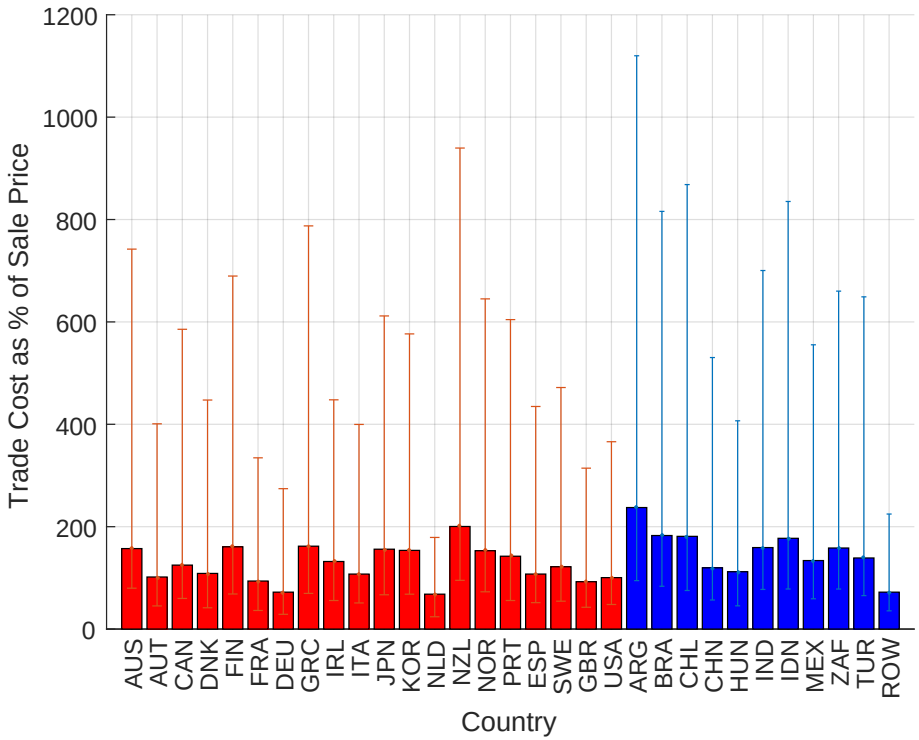
Taking the Model to the Data

Exogenous Shifters: Trade Barriers Across Countries

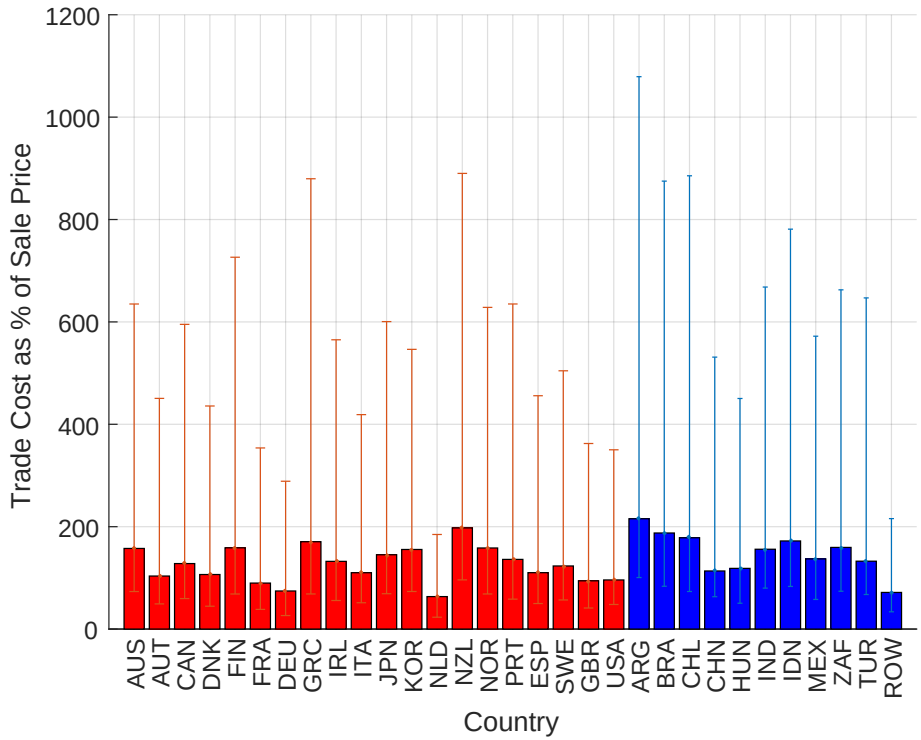
$$\tau^j_{ih,t} = \frac{P^j_{i,t}}{P^j_{h,t}} \left(\frac{\pi^j_{hh,t}}{\pi^j_{ih,t}} \right)^{1/\theta^j} \quad \rightarrow \pi^j_{ih,t}\text{: share of exp. by } i \text{ on sector } j \text{ goods produced in } h$$

Figure: Trade Costs Across Countries: Median and 25th-75th percentile ranges

(a) Exporting Costs



(b) Importing Costs

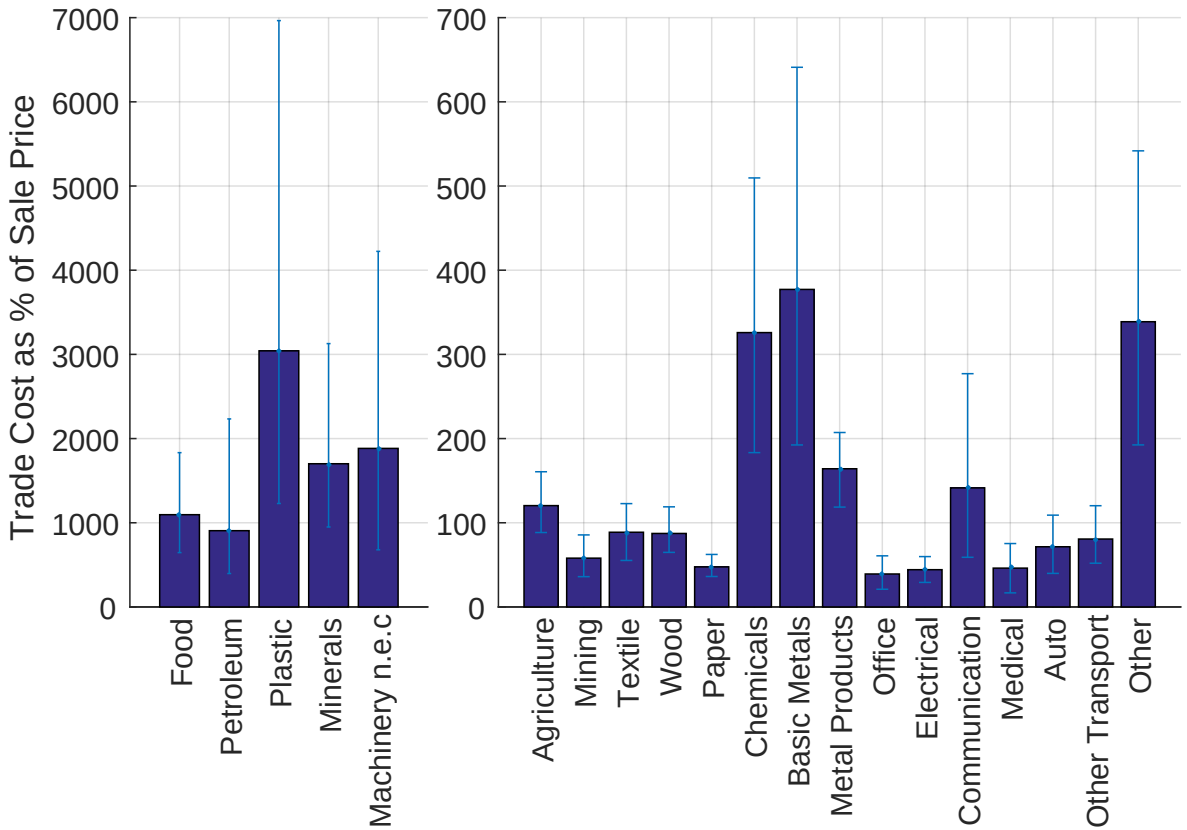


Taking the Model to the Dara

Exogenous Shifters: Trade Barriers Across Sectors

$$\tau^j_{ih,t} = \frac{P^j_{i,t}}{P^j_{h,t}} \left(\frac{\pi^j_{hh,t}}{\pi^j_{ih,t}} \right)^{1/\theta^j} \quad \rightarrow \pi^j_{ih,t}\text{: share of exp. by } i \text{ on sector } j \text{ goods produced in } h$$

Figure: Sectoral Trade Costs: Median and 25th-75th percentile ranges



Counterfactual Exercises

- Two main counterfactual exercises:
  1. Global increase in bilateral trade barriers
  2. Spillovers: Increase in bilateral bariers between AEs
- Exogenous changes in trade barriers in isolation

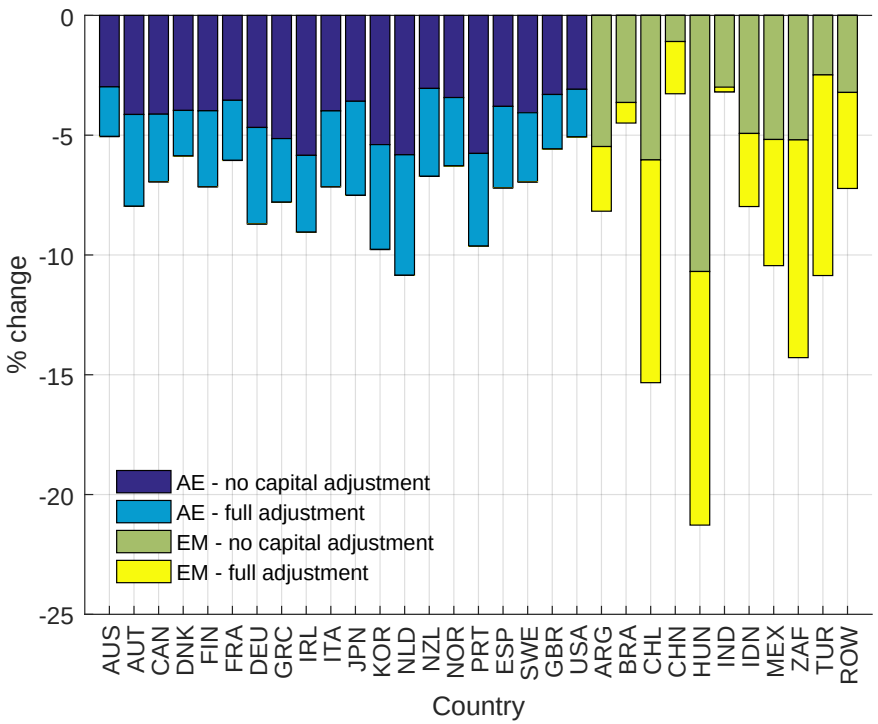
  $\rightarrow$ Baseline $T_{i,t}^{j}$, $\xi_{i,t}$, $U_{i,t}$ and $S_{i,t}$ unchanged.
- Solve for new steady state equilibrium $w_{i,t}^{U}$, $w_{i,t}^{S}$ and $r_{i,t}$ such that the labor market and capital markets clear.
- Outcomes of interest: focus on macroeconomic outcomes including GDP, welfare, relative factor prices and aggregate trade flows.

Counterfactual Exercises

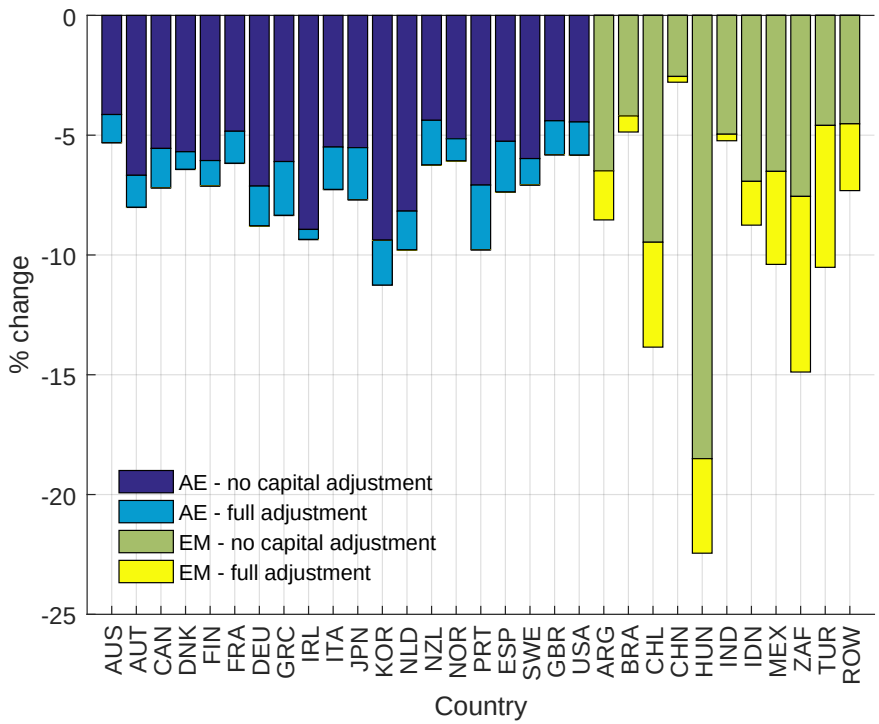
Global Increase in Trade Barriers (1/3)

Figure: Global Trade War: Macroeconomic Effects

(a) Gross Domestic Product



(b) Consumption

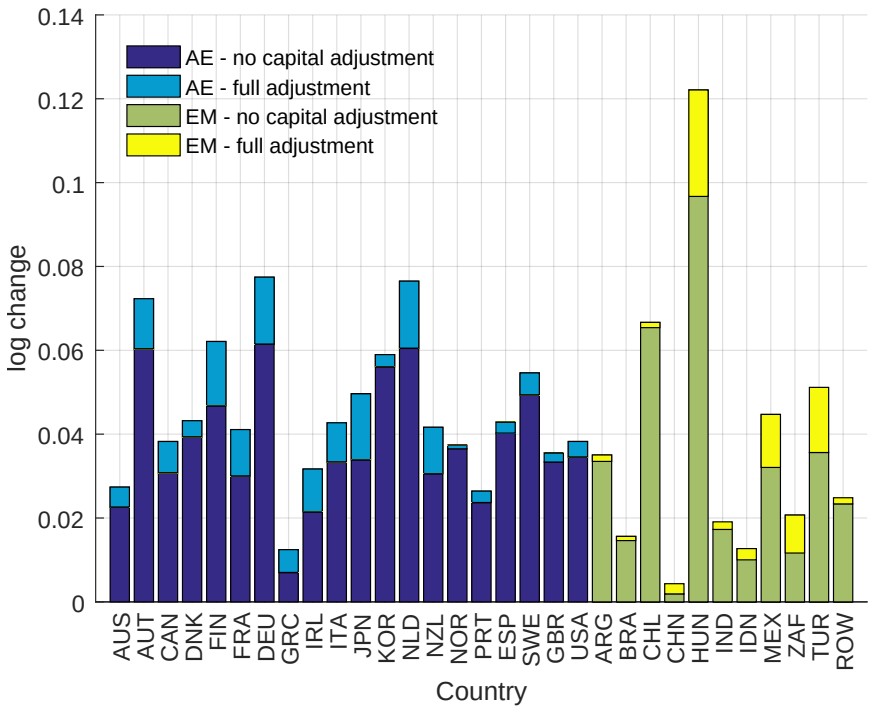


Counterfactual Exercises

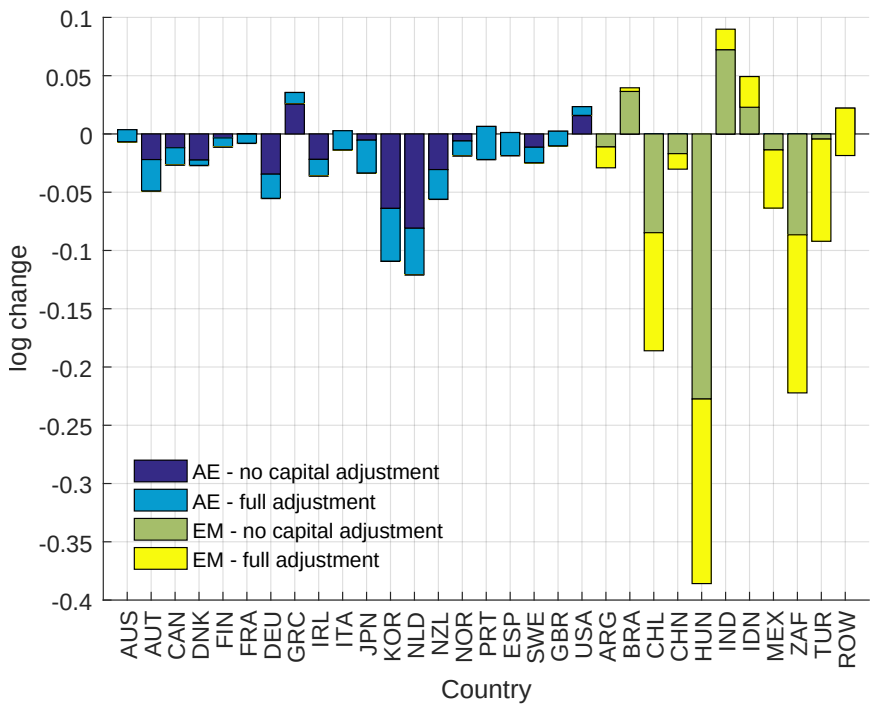
Global Increase in Trade Barriers (2/3)

Figure: Global Trade War: Macroeconomic Effects

(a) Relative Price of X: P_i^X / P_i^C



(b) Skill Premium: w_i^S / w_i^U

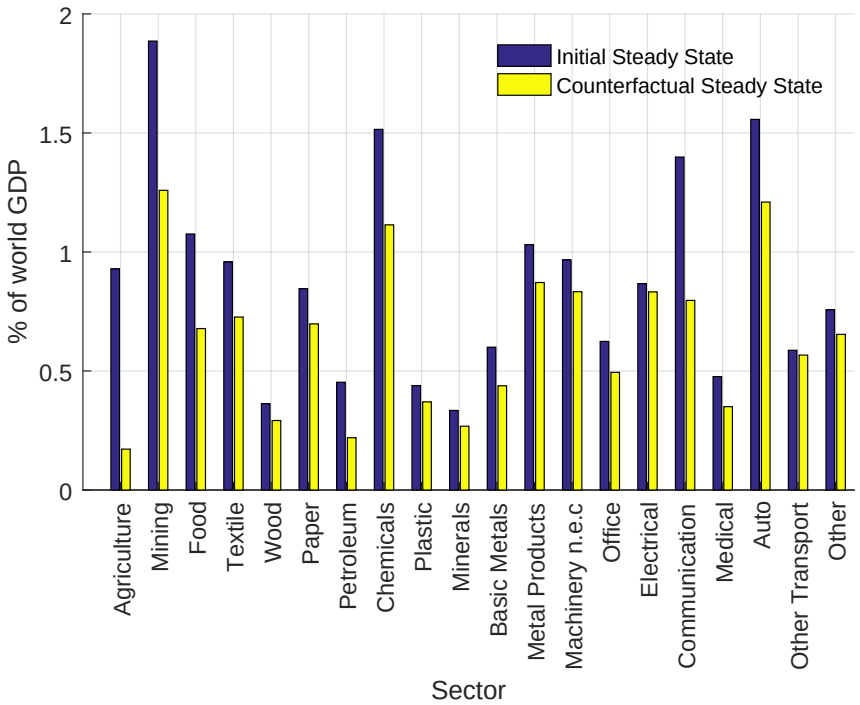


Counterfactual Exercises

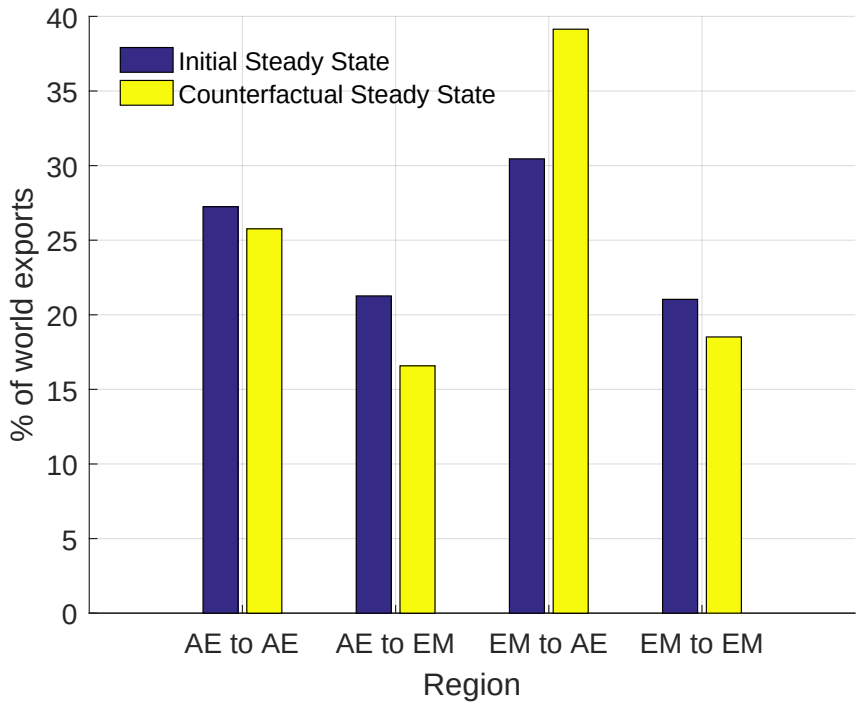
Global Increase in Trade Barriers (3/3)

Figure: Global Trade War: Macroeconomic Effects

(a) World Exports by Sector



(b) Regional Exports

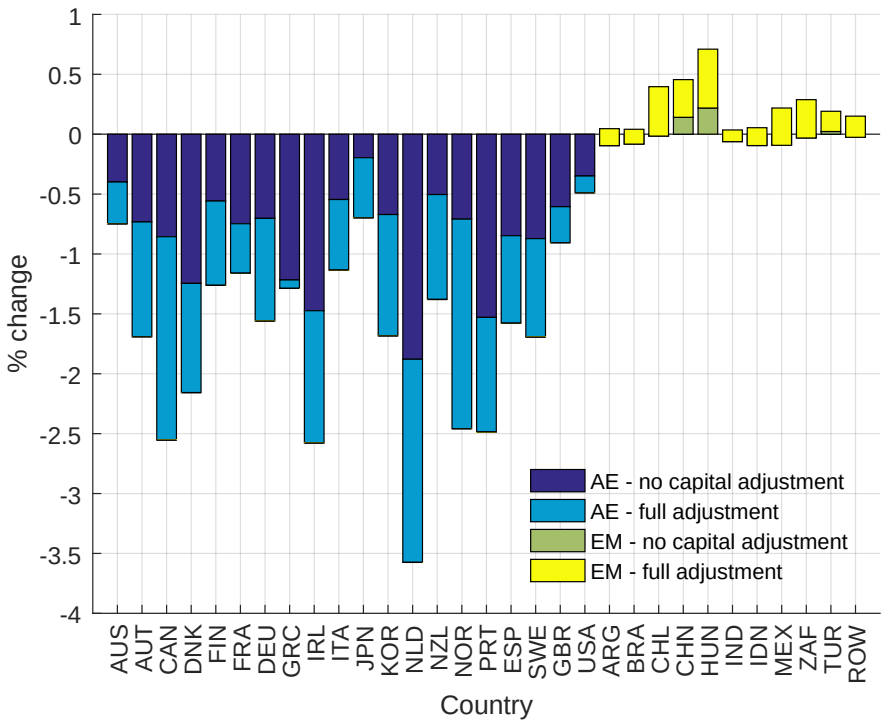


Counterfactual Exercises

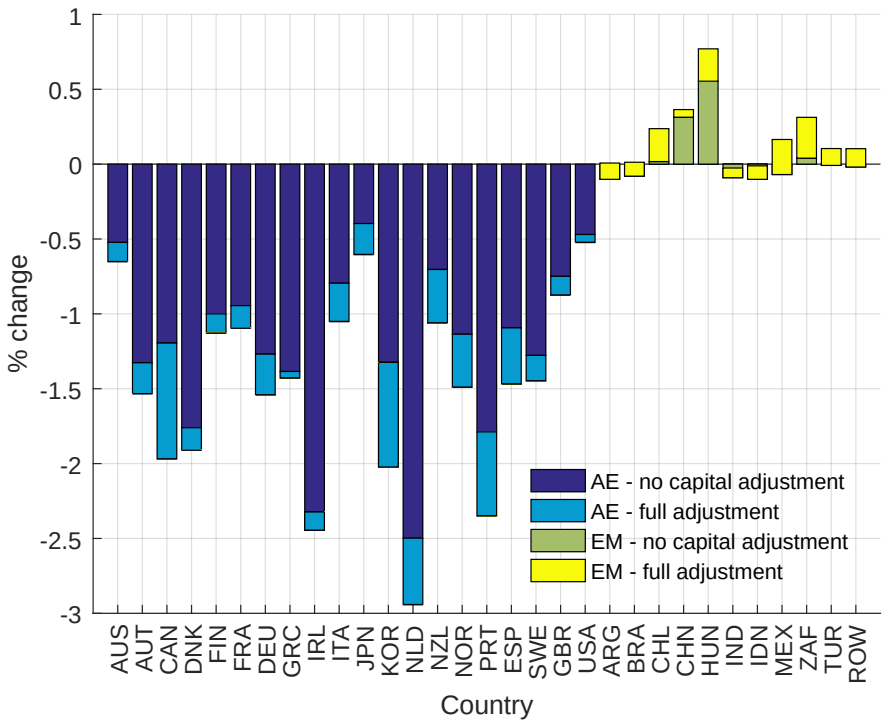
Spillovers: Increase in Trade Barriers between AEs (1/3)

Figure: Trade War between Advanced Economies: Macroeconomic Effects

(a) Gross Domestic Product



(b) Consumption

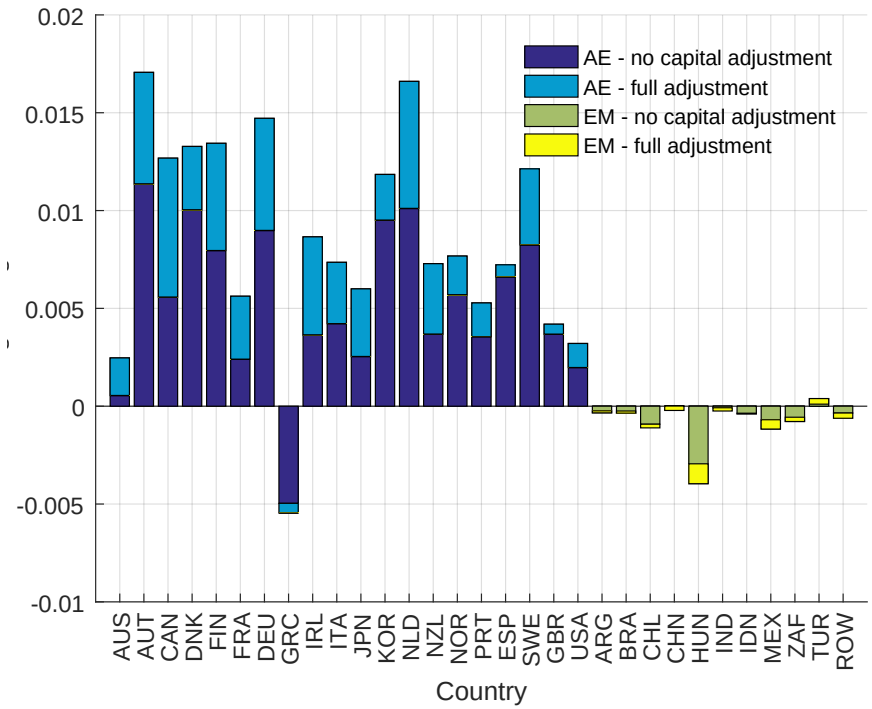


Counterfactual Exercises

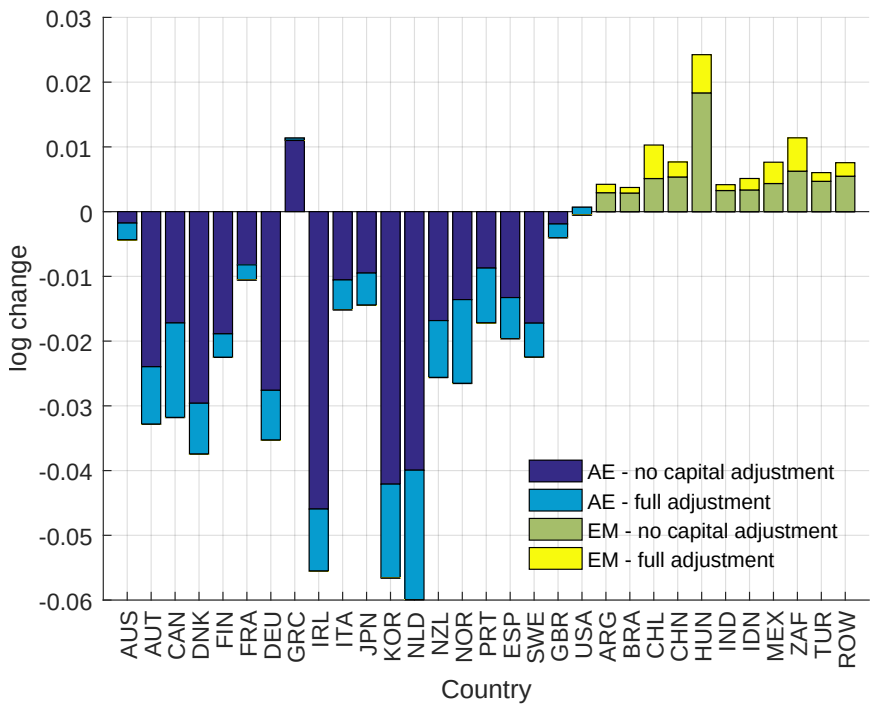
Spillovers: Increase in Trade Barriers between AEs (2/3)

Figure: Trade War between Advanced Economies: Macroeconomic Effects

(a) Relative Price of X: P_i^X / P_i^C



(b) Skill Premium: w_i^S / w_i^U

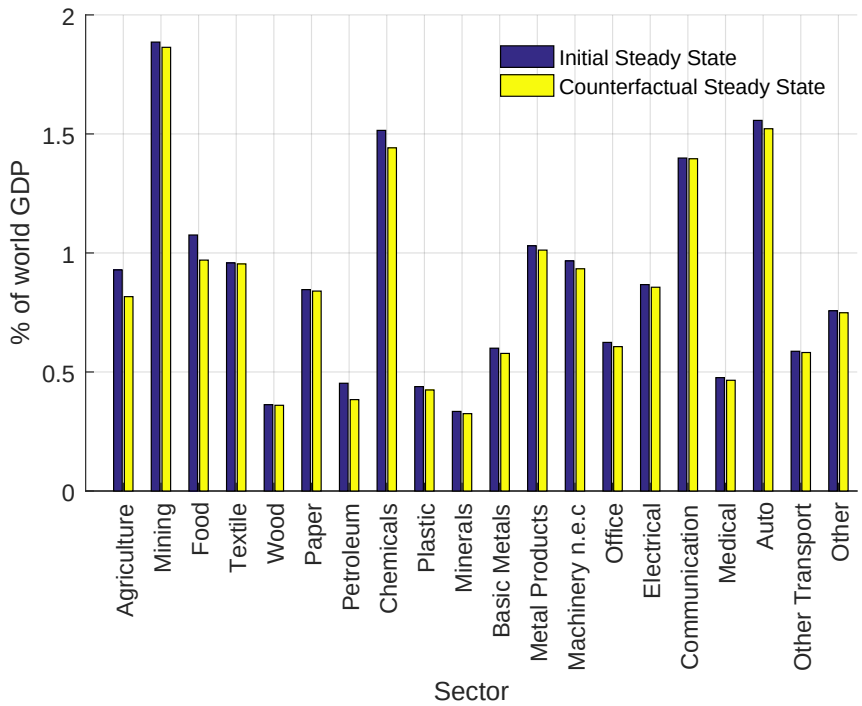


Counterfactual Exercises

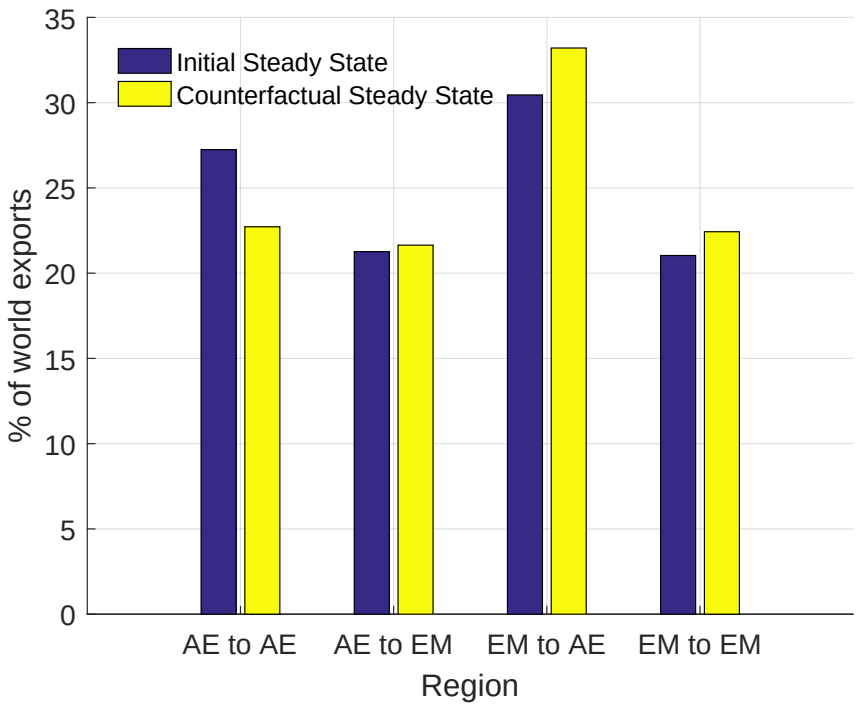
Spillovers: Increase in Trade Barriers between AEs (3/3)

Figure: Trade War between Advanced Economies: Macroeconomic Effects

(a) World Exports by Sector



(b) Regional Exports



Conclusions

1. Key role of EMs in New Geography of Trade
2. Role $\Rightarrow$ sizable effects of increases in trade barriers for EMs even when symmetric and EMs not modeled fundamentally different (mechanisms) from AEs
3. Relevance of investment channel
4. Spillover effects can be sizable

Conclusions

1. Key role of EMs in New Geography of Trade
2. Role $\Rightarrow$ sizable effects of increases in trade barriers for EMs even when symmetric and EMs not modeled fundamentally different (mechanisms) from AEs
3. Relevance of investment channel
4. Spillover effects can be sizable

Thank You!

A Quantitative Model of The New Geography of Trade

Market Clearing Conditions

- Nontradable goods and factor markets clearing:

$$C_{i,t}^{j} + X_{i,t}^{j} + \sum_{k=1}^{J} D_{i,t}^{k,j} = Q_{i,t}^{j} \text{ for all } j,$$

$$\sum_{j=1}^{J} U_{i,t}^{j} = U_{i,t}, \ \sum_{j=1}^{J} S_{i,t}^{j} = S_{i,t} \text{ and } \sum_{j=1}^{J} K_{i,t}^{j} = K_{i,t}.$$

- Let $Y_{i,t}^{j}$ denote the value of production, then:

$$Y_{i,t}^{j} = \sum_{h=1}^{I} \pi_{hi,t}^{j} E_{h,t}^{j} \text{ for all } j.$$

- Country-specific resource constraint:

$$B_{i,t+1} - R_t B_{i,t} = \sum_{j=1}^{J} \left(Y_{i,t}^{j} - E_{i,t}^{j} \right).$$

- International financial markets clear: $\sum_{i=1}^{I} B_{i,t+1} = 0$ for all t.

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A Quantitative Model of The New Geography of Trade

Steady State and Key Equilibrium Conditions

Let t be such that the world economy is in steady state. Then:

- **Sectoral prices** in each j ($c^j_{i,t}$: cost input bundle):

$$P^j_{i,t} = \Gamma \left[\Phi^j_{i,t}\right]^{-\frac{1}{\theta}}, \text{ where } \Phi^j_{i,t} = \sum_{h=1}^{I} T^j_{h,t} \left[c^j_{h,t}\tau^j_{ih,t}\right]^{-\theta}.$$

- **Share of total expenditure in j on goods produced in h**: $(E^j_{i,t} \equiv P^j_{i,t}Q^j_{i,t})$

$$\pi^j_{ih,t} \equiv E^j_{ih,t}/E^j_{i,t} = T^j_{h,t}\left(c^j_{h,t}\tau^j_{ih,t}\right)^{-\theta}/\Phi^j_{i,t}.$$

  $\rightarrow$ Multisector version of gravity equation.

- **Final consumption and investment prices** in i:

$$P^C_{i,t} = \varkappa^C_i \prod_{j=1}^{J}\left(P^j_{i,t}\right)^{\mu^j_{i,t}} \text{ and } P^X_{i,t} = \frac{\varkappa^X_i}{\xi_{i,t}}\prod_{j=1}^{J}\left(P^j_{i,t}\right)^{\chi^j_{i,t}}.$$

- **Steady state** $K_{i,t}$ in each i:

$$\frac{r_{i,t}}{P^X_{i,t}} = \frac{1}{\beta} - (1-\delta) \text{ and } \delta K_{i,t} = X_{i,t}.$$

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Taking the Model to the Data

Sectors

Table: Sectors

Tradable				Non-Tradable			
1	Agriculture	11	Basic metals	21	Electricity	31	Real estate
2	Mining	12	Metal products	22	Construction	32	Renting machinery
3	Food	13	Machinery nec	23	Retail	33	Computer
4	Textile	14	Office	24	Hotels	34	R&D
5	Wood	15	Electrical	25	Land transport	35	Other business
6	Paper	16	Communication	26	Water transport	36	Public
7	Petroleum	17	Medical	27	Air transport	37	Education
8	Chemicals	18	Auto	28	Aux transport	38	Health
9	Plastic	19	Other transport	29	Post	39	Other services
10	Minerals	20	Other	30	Finance	40	Private

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Taking the Model to the Data

Time-invariant parameters and observable endowments

Table: Time-invariant Parameters

Parameter	Value	Variable	Source
ν_i^j	–	Value added to gross output ratio	Data: OECD Stan, WIOD (SEA), UNs' INDSTAT2 and the NAs
$\alpha_i^{j,k}$	–	Input-output coefficients	Data: WIOD 2016 release and OECD
γ_i^j, φ_i^j	–	Factor shares in value added	Data: WIOD 2016 release and model
θ^j	–	Trade elasticities	Caliendo and Parro (2015)
σ, ρ	1.67, 0.67	Elasticities of substitution acros factors	Parro (2013)
η	2	Elasticity of substitution in tradable goods	Standard in literature
β	0.95	Discount factor	In line with annual data
δ	0.05	Depreciation rate	In line with annual data
μ_i^j	–	Sectoral consumption expenditure shares	Data: WIOD 2016 release
χ_i^j	–	Sectoral investment expenditure shares	Data: WIOD 2016 release

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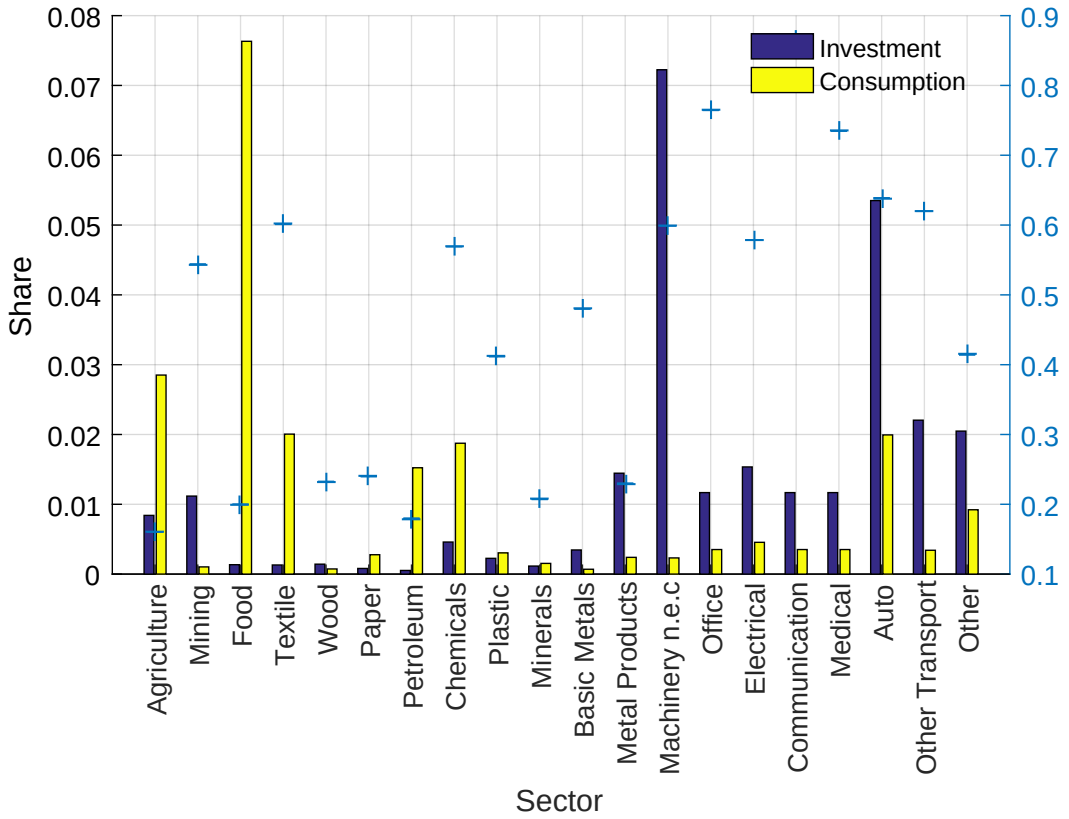
Taking the Model to the Data

Time-invariant Parameters: Consumption and Investment Shares

Figure: Investment (χ_i^j) and Consumption (μ_i^j) Sectoral Shares in Tradable Sectors and Foreign Trade Share



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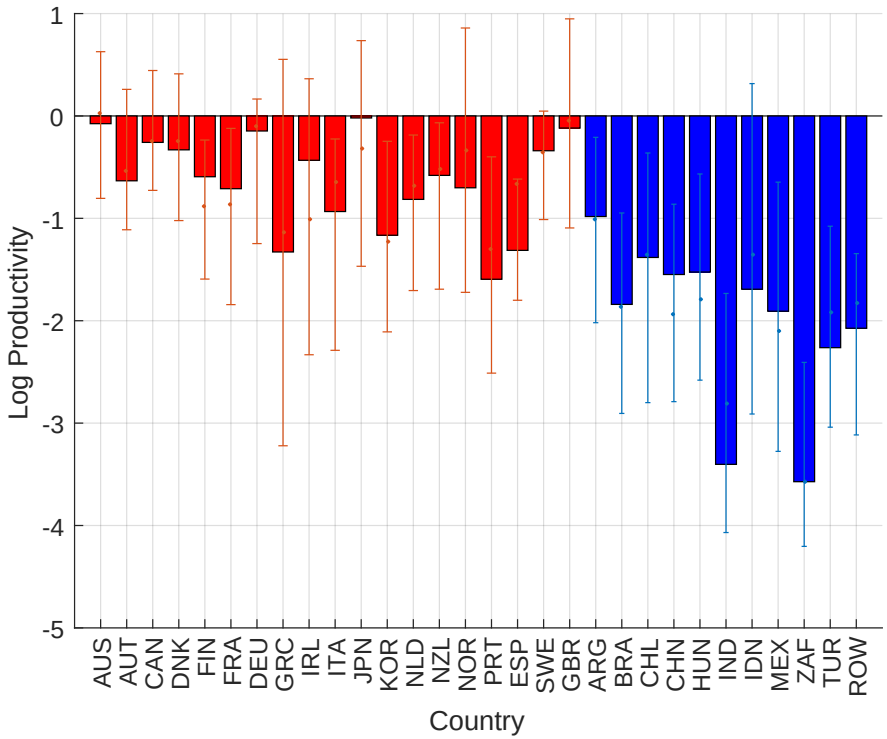
Taking the Model to the Data

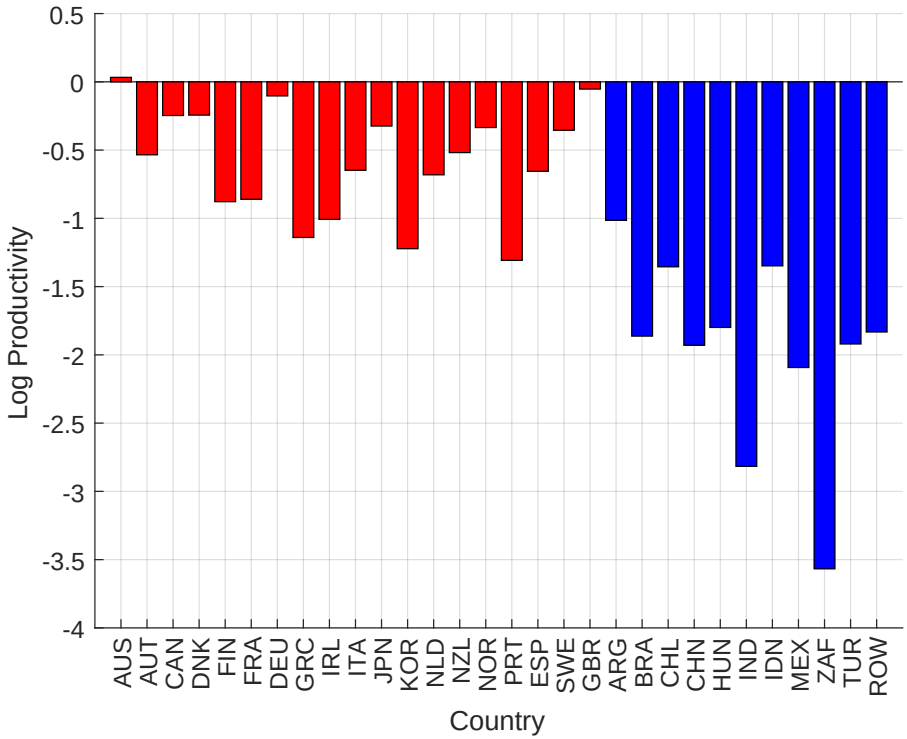
Sectoral Productivities Across Countries

Figure: Sectoral Productivities: Median and 25th-75th percentile ranges, relative to the U.S.

(a) Tradable Sectors



(b) Non-tradable Sectors



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