The Role of Trade Costs in the Surge of Trade Imbalances

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IEA World Congress 2017
Mexico City, Mexico

June 19, 2017

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Introduction

- Two particular features of the evolution of international trade flows:
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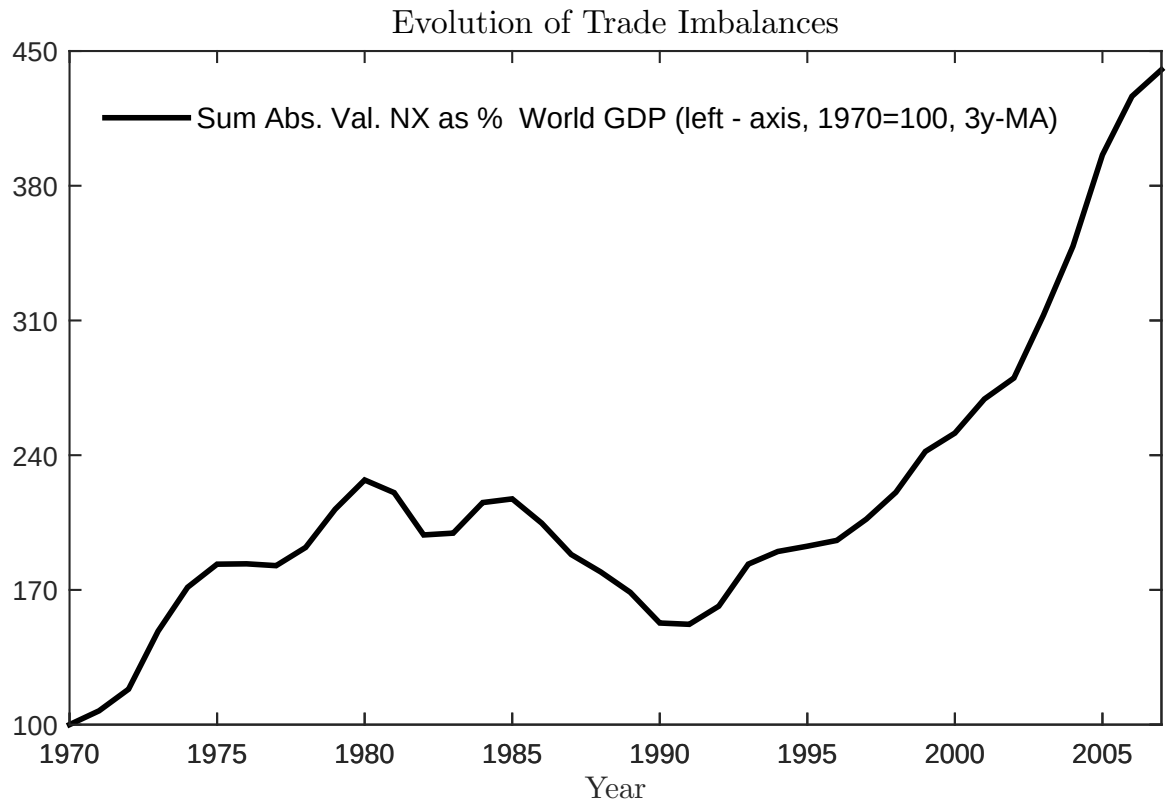

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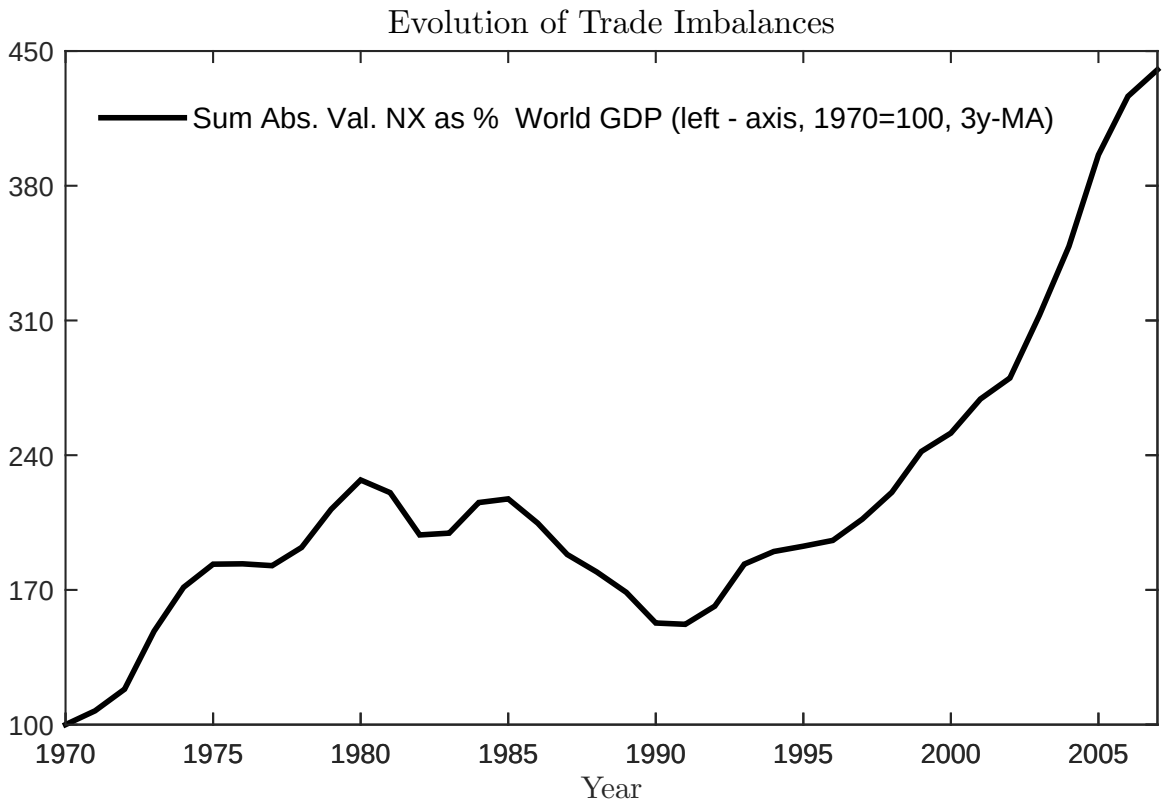
- Two particular features of the evolution of international trade flows:
  1. Large increase in size of net *Trade Imbalances*
     → Ongoing debate on potential causes



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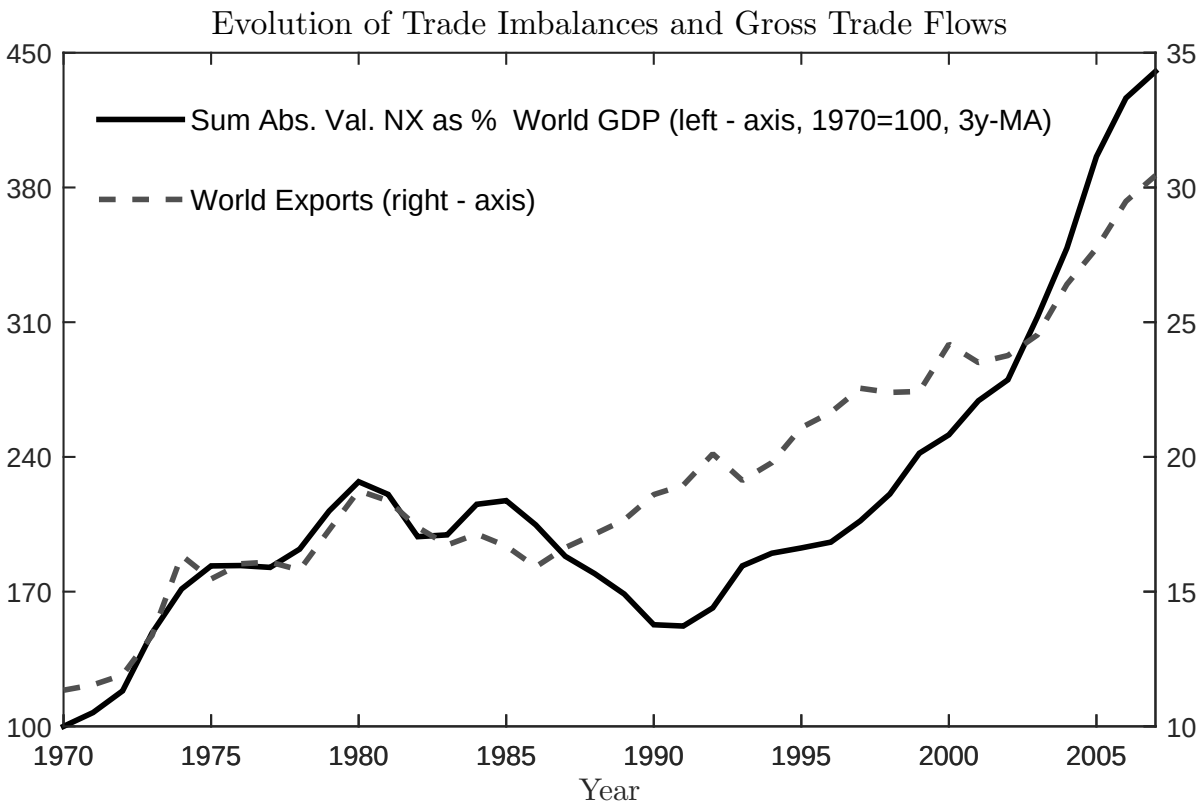

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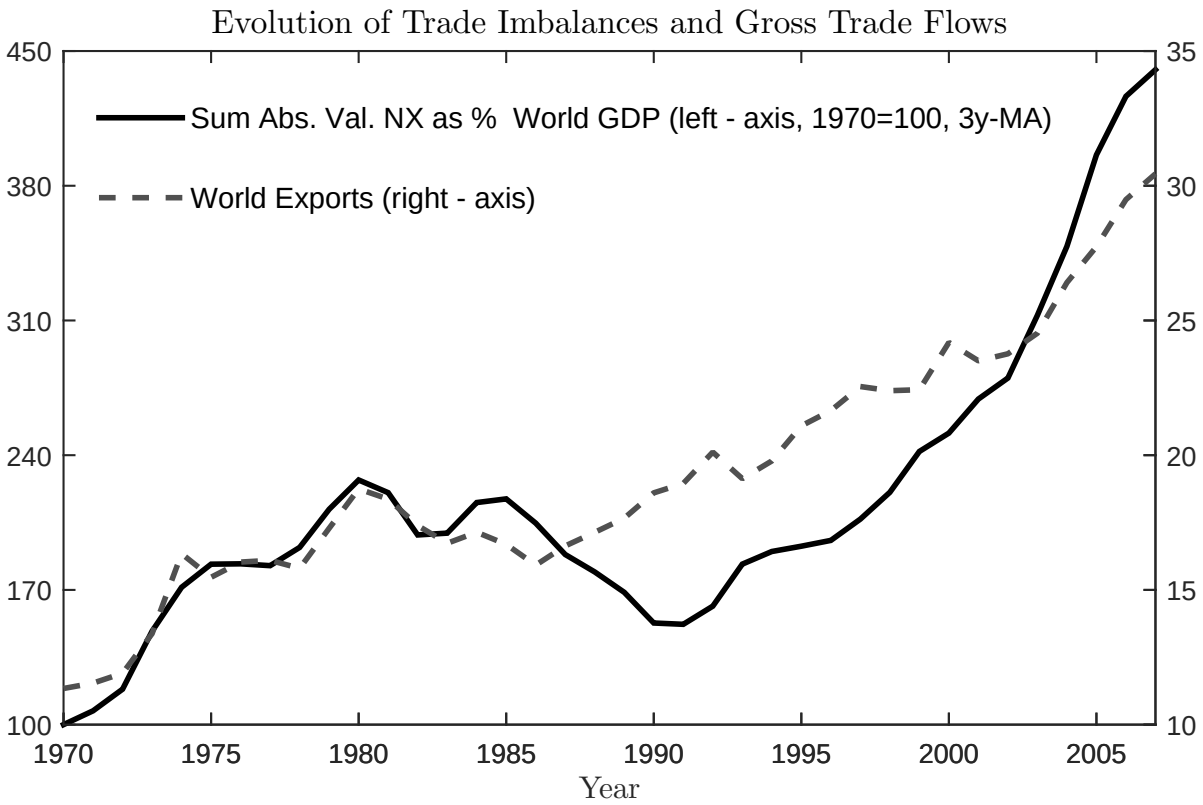

▸ Alternative

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Motivation and Question

- Lower trade costs in goods markets:
  - Important driver of increase in gross trade flows or *intratemporal* trade.
  - Role overlooked in trying to understand the surge in trade imbalances: *intertemporal* trade.

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- However, (i) *costs associated with shipping goods across countries affect all forms of trade*
  - Gross bilateral trade affected by trade costs at a point in time, and
  - Trade imbalances affected by costs at different points in time.

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- **How much of the increase in trade imbalances from 1970 to 2007 can be attributed to the decline in trade costs underlying the increase in gross bilateral trade flows?**
  - Quantitative assessment of declining trade costs to trend in size
  - Trade costs disciplined by gross bilateral trade flows

Introduction

Approach

1. Propose a **model suitable for quantitative analysis** that incorporates the main mechanisms driving intra and intertemporal trade:
   - *Static*: quantitative multi-country and sector general equilibrium Ricardian model of international trade.
   - *Dynamic*: imbalances from optimal consumption-saving decisions by agents with perfect foresight exchanging bonds in international financial markets.

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2. **Map model to observed data** and recover time series of structural residuals of the model:
   - Exploit data on bilateral trade flows, and sectoral and aggregate production and prices for 26 countries and 3 sectors over the period 1970-2007.
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   - Accounting procedure $\rightarrow$ recover wedges: *trade costs*, sectoral productivities and preference shifters that rationalize the data .
3. **Counterfactual exercises** $\rightarrow$ shut down changes in bilateral trade costs:
   - Main: fix trade costs at their 1970's levels and consider counterfactual *competitive equilibrium*.

Preview of Results

1. Changes in trade costs since 1970 account for *69%* of the increase in trade imbalances from 1970 to 2007.
2. The *contribution* is a result of a decrease of *41%* in 2007 and an increase of *28%* in 1970.

   ▸ Level effect: intertemporal trade less costly in every period.
   ▸ Tilting effect: intertemporal trade less costly in future periods.

3. The effect of lower trade costs on trade imbalances is heterogeneous across countries.
   - Lower trade costs *account for increase in US trade deficit and China's trade surplus after 1995*.
4. Welfare gains from more efficient intertemporal trade.
   - Decomposition into measures in existing literature on static trade models.

Related Literature

- Trade costs and international macroeconomics
  - *Obstfeld & Rogoff (2000)* and *Fitzgerald (2012).*
  - Backus et al. (1992); Kose & Yi (2006); Fitzgerald (2008); Barattieri (2014).
- Quantitative GE models of international trade
  - Balanced trade: Eaton & Kortum (2002).
  - Exogenous trade imbalances: Dekle et al. (2007, 2008); Costinot & Rodriguez-Clare (2014); Ossa (2014); Caliendo & Parro (2015); Caliendo et al. (2014).
  - Endogenous imbalances: *Eaton et al. (2015, 2016)*.
- International Macroeconomics Models
  - Imbalances: Obstfeld & Rogoff (1995, 2005); Engel and Rogers (2006) Caballero et al. (2008); Mendoza et al. (2009); Antràs & Caballero (2010); Jin (2012); Gourinchas & Rey (2014); Alessandria and Choi (2016); Kehoe et al. (2016); Steinberg (2016).
  - Dispersion: Faruqee and Lee (2009); *Chang et al. (2013)*.
- Counterfactuals:
  - Chari, Kehoe and McGrattan (2005, 2007); Eaton et al. (2011); Kehoe et al. (2016).

The Model

- Time is discrete, $t = 0, 1, ...$
- All economic agents have perfect foresight.
- I countries indexed by i; J sectors indexed by j.
- Each country $i \in \{1, ..., I\}$ endowed with $L_{i,t}$ units of homogeneous labor and $K_{i,t}$ units of homogeneous capital in each period.
- Representative household in each country:
  - Access to international financial markets by means of buying and selling bonds.
  - Financial markets are frictionless.

The Model

Technologies conditional on t [EK (2002)]

- Final **nontradable output in each sector** j is an aggregation over *tradable* goods indexed by $\omega^j \in [0,1]$ (ES: $\eta > 0$):
  - $Q^j_{i,t}$: output and $P^j_{i,t}$: ideal price index of final good in sector j.
  - Purchase good ω^j from lowest cost suppliers across countries.
- Tradable goods subject to **icebergs**: $\tau^j_{ih,t} \geq 1$ and $\tau^j_{ii,t} = 1$ for all $i = 1, \ldots, I$.
- Production technology for **tradable** $\omega^j \in [0,1]$: Cobb-Douglas aggregate of capital, labor and nontradable intermediate inputs (input-output linkages).

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

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

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

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- **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.

The Model

Households and dynamic decisions

- Household in country i chooses $\left\{B_{i,t+1}, \left\{C_{i,t}^{j}\right\}_{j=1}^{J}\right\}_{t=0}^{\infty}$ to maximize

$$U_i = \sum_{t=0}^{\infty} \delta^t \phi_{i,t} u\left(C_{i,t}\right) \text{ s.t. } \sum_{n=1}^{J} P_{i,t}^{j} C_{i,t}^{j} + B_{i,t+1} = w_{i,t} L_{i,t} + r_{i,t} K_{i,t} + R_t B_{i,t}$$

for all t, where $C_{i,t} = \left(\sum_{j=1}^{J} (\mu_{i,t}^{j})^{\frac{1}{\psi}} \left(C_{i,t}^{j}\right)^{\frac{\psi-1}{\psi}}\right)^{\frac{\psi}{\psi-1}}$, $\mu_{i,t}^{j} > 0$, $\sum_{j=1}^{J} \mu_{i,t}^{j} = 1$.

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- Conditional on $C_{i,t}$, $P_{i,t}^{j} C_{i,t}^{j} = \mu_{i,t}^{j} \left(P_{i,t}^{j} / P_{i,t}\right)^{1-\psi} P_{i,t} C_{i,t}$, where $P_{i,t}$ is the ideal aggregate price index. These + No-Ponzi imply (IBC)

$$\sum_{s=t}^{\infty} P_{i,s} C_{i,s} \left(\prod_{l=t+1}^{s} R_l\right)^{-1} = \sum_{s=t}^{\infty} GDP_{i,s} \left(\prod_{l=t+1}^{s} R_l\right)^{-1} + R_t B_{i,t} \text{ for all } t.$$

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- Optimal $C_{i,t}$ determined by Euler equation

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- Remark: Same nominal interest rate across countries, but different real interest rates as different baskets of goods.

The Model

Market clearing conditions

- Nontradable goods and factor markets clearing:

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

- 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.

The Model

How do trade costs affect dynamic decisions?

$\rightarrow$ Three equations summarize the interaction between trade costs and trade imbalances:

- Euler equation: $u'\left(C_{i,t}\right) = \delta \hat{\phi}_{i,t+1} \frac{R_{t+1} P_{i,t}}{P_{i,t+1}} u'\left(C_{i,t+1}\right).$
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1. **Level effect** $\rightarrow$ Uniformly lower trade costs increase trade imbalances. ▸ LE
   - Low trade costs $\rightarrow$ intertemporal trade is less costly.
   - Differences in real interest rates due to differences in prices such that optimal intra and intertemporal trade are consistent. [Obstfeld & Rogoff (2000)]

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2. **Tilting effect** $\rightarrow$ Difference between constant and declining trade costs. ▸ TE
   - Lower trade costs in the future lead to increase in world real interest rate.
   - Substitution effect in same direction, income effects in opposite directions.
   - Equilibrium imbalances in initial periods dampened.

Taking the Model to the Data

- Time period: 1970-2007.
- $I = 26$, 25 core countries and ROW.
  - Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Greece, India, Italy, Japan, Korea, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK, US, Venezuela, and ROW.
- $J = 3$; AM: agriculture and mining, M: manufacturing, S: services (nontradable); define $\mathcal{J} \equiv \{AM, MN, S\}$.
- Households: $u(\cdot) = \ln(\cdot)$.
- Data sources:
  - Aggregate data: EU-KLEMS, UNStat and countries' statistical agencies.
  - Bilateral trade flows: NBER-UN (1970-2000) and CEPII-BACI (2001-2007).
  - IO-Tables: OECD Stan Database, WIOD countries' statistical agencies.
  - Population, capital stocks and prices: PWT 7.1.

Taking the Model to the Data

The model's parameters and wedges

- Given values for parameters β_i^j, $\nu_i^{j,k}$, φ_i, θ, η, ψ and δ for all i and j,k and series for exogenous variables observed in the data (endowments), calibrate wedges
  - Trade costs: $\tau_{ih,t}^j$; ▸ Trade Costs
  - Sectoral productivities: $T_{i,t}^j$; ▸ Productivities
  - Sectoral demand: $\mu_{i,t}^j$; and
  - Intertemporal preference: $\phi_{i,t}$. ▸ Intertemporal Shifters

  so that model's outcomes match data on
  - Bilateral trade shares, $\pi_{ih,t}^j$, in tradable sectors $j = AM, MN$;
  - Sectoral prices in tradable sectors, $P_{i,t}^j$ for $j = AM, MN$, and GDP prices, $P_{i,t}$;
  - Sectoral expenditures, $E_{i,t}^j$; and
  - Net exports, $NX_{i,t}$.

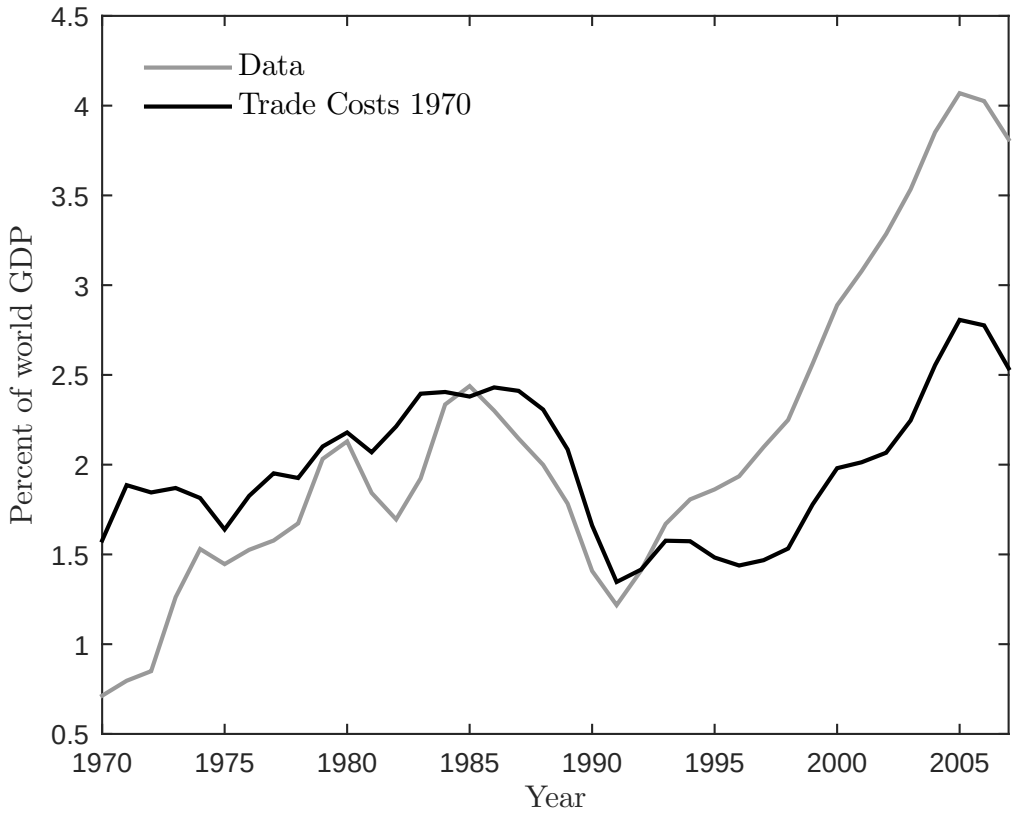
▸ Parameters ▸ Sectoral Demand Wedges (Lemma 1) ▸ Productivities and Trade Costs (Lemma 2)

Counterfactual Exercises

- Shut down the effects of declining bilateral trade costs.
- Counterfactual: $\{R_0 B_{i,0}\}_{i=1}^{I}$ initial distribution of wealth is fixed.
  - Use SS assumption and benchmark calibration $\{R_0 B_{i,0}\}_{i=1}^{I}$.
  - Solve for counterfactual equilibrium "backwards" given $\{R_0 B_{i,0}\}_{i=1}^{I}$. Iterate on $\{B_{i,T+1}\}_{i=1}^{I}$ to find counterfactual equilibrium.
- Exercises:
  1. Fixed trade costs at 1970 country pair Head-Ries index values, $HR^{j}_{ih,1970} = \left(\tau^{j}_{ih,1970}\tau^{j}_{hi,1970}\right)^{\frac{1}{2}}$, and evaluate:
     $\rightarrow$ Evolution of trade imbalances and Welfare gains from changes in trade costs.
  2. Fixed trade costs at 2007 country pair Head-Ries index values, and evaluate trade imbalances.
  3. No period of trade liberalizations: In 1986, agents realize that bilateral trade costs will not fall as expected and will remain constant.

Counterfactuals: 1970's Trade Costs

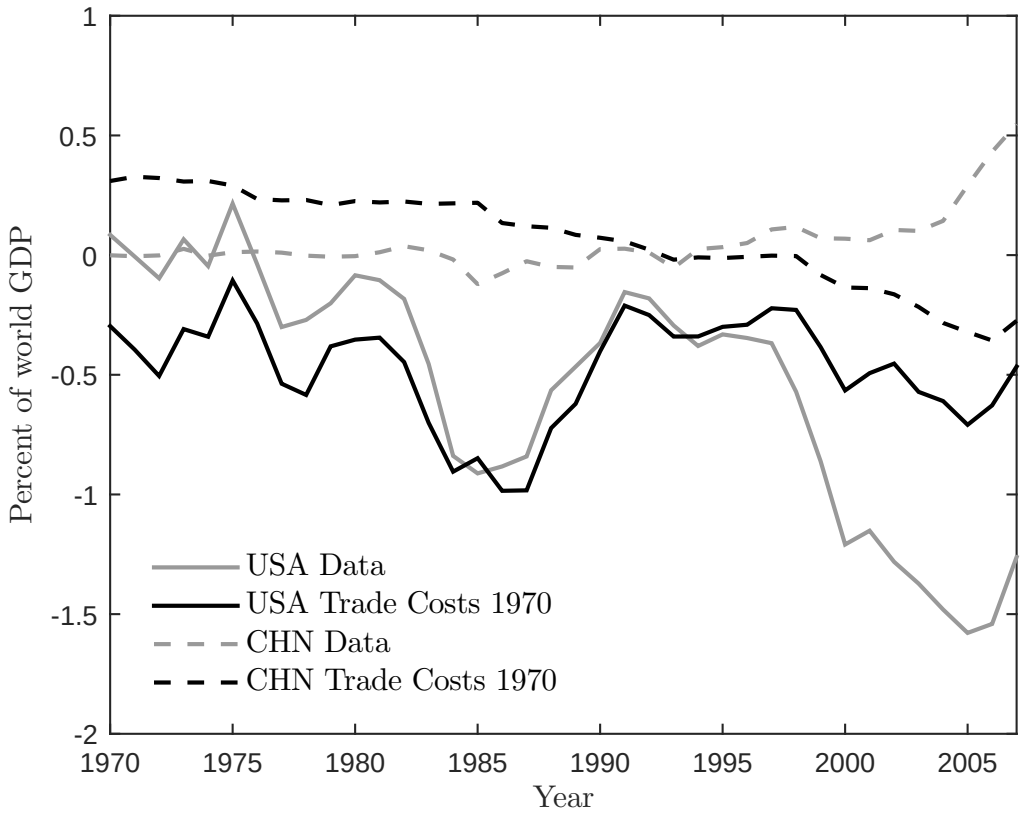
Trade imbalances: World



Data			Counterfactual			Decomposition		
1970	2007	Diff.^{D}	1970	2007	Diff.^{D}	1-(Diff.^{CF}/Diff.^{D})	Diff.$_{1970}$/Diff.^{D}	-Diff.$_{2007}$/Diff.^{D}
0.71%	3.81%	3.1%	1.58%	2.54%	0.96%	0.69%	0.41%	0.28%

Counterfactuals: 1970's Trade Costs

Trade imbalances: China and the US



	Data			Counterfactual		
	1970	2007	Diff.	1970	2007	Diff
US	-0.16%	-1.65%	-1.49%	-0.30%	-0.47%	-0.17%
CHN	0.00%	0.72%	0.72%	0.31%	-0.27%	-0.58%

▸ Other countries

Counterfactuals: 1970's Trade Costs

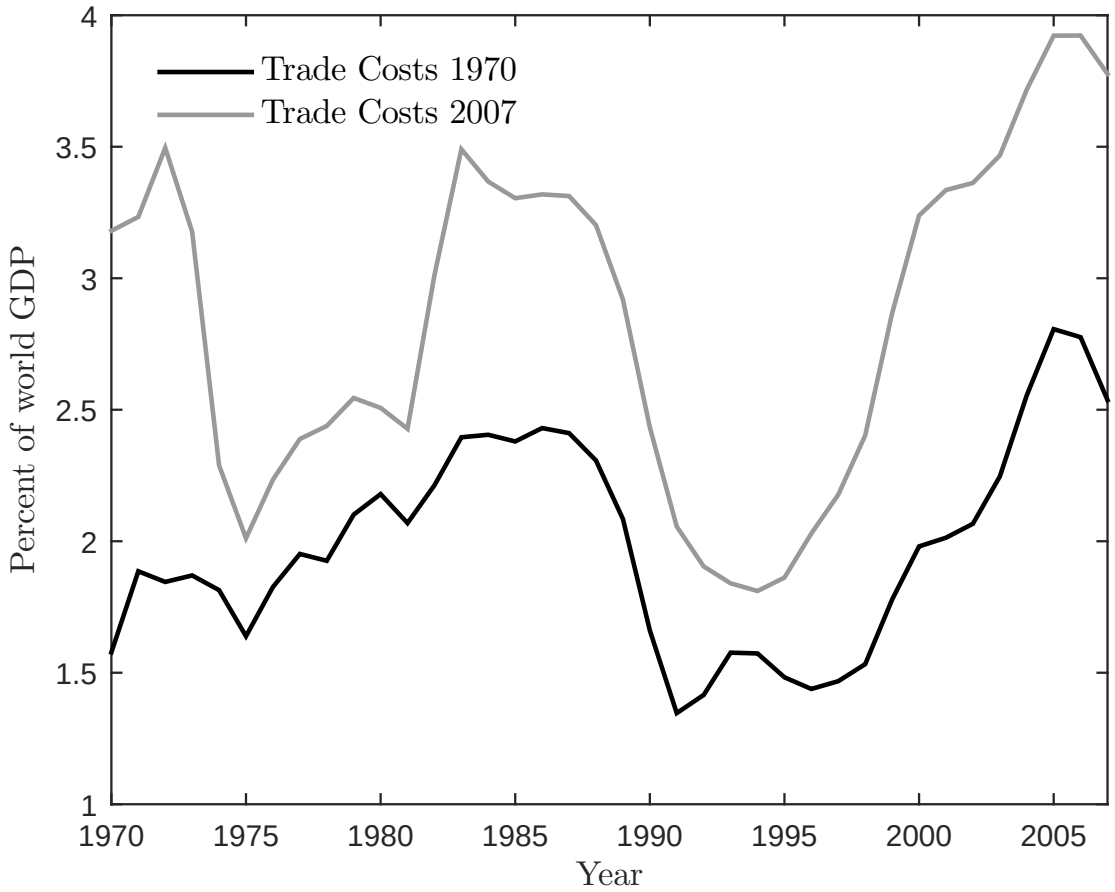
Welfare gains from changes in trade costs

	Total	*Static*	*Non − Static*
AUS	1.11%	-1.88%	3.04%
AUT	4.26%	3.66%	0.58%
BEL	10.85%	8.84%	1.85%
BRA	0.38%	1.29%	-0.90%
CAN	2.02%	2.16%	-0.14%
CHN	10.93%	1.82%	8.95%
DEN	2.79%	0.98%	1.79%
FIN	-1.98%	2.27%	-4.16%
FRA	2.03%	2.14%	-0.11%
GER	2.55%	2.45%	0.10%
GRC	1.75%	1.44%	0.31%
IND	1.26%	1.75%	-0.48%
ITA	1.94%	1.87%	0.07%
JAP	1.25%	2.63%	-1.35%
KOR	11.26%	4.71%	6.25%
MEX	2.80%	2.30%	0.49%
NLD	6.74%	5.85%	0.85%
NOR	1.66%	2.39%	-0.71%
POR	2.80%	4.45%	-1.58%
SPA	2.02%	1.37%	0.64%
SWE	1.80%	2.39%	-0.57%
SWZ	3.18%	2.50%	0.67%
UK	1.97%	0.82%	1.14%
US	1.05%	1.20%	-0.15%
VEN	-2.43%	0.76%	-3.17%
ROW	3.15%	3.03%	0.12%

Gains: x_i s.t. $\sum_{t=0}^{\infty} \delta^t \phi_{i,t} \ln \left(C_{i,t}^{CF} \left(1 + \frac{x_i}{100} \right) \right) = U_i^D$

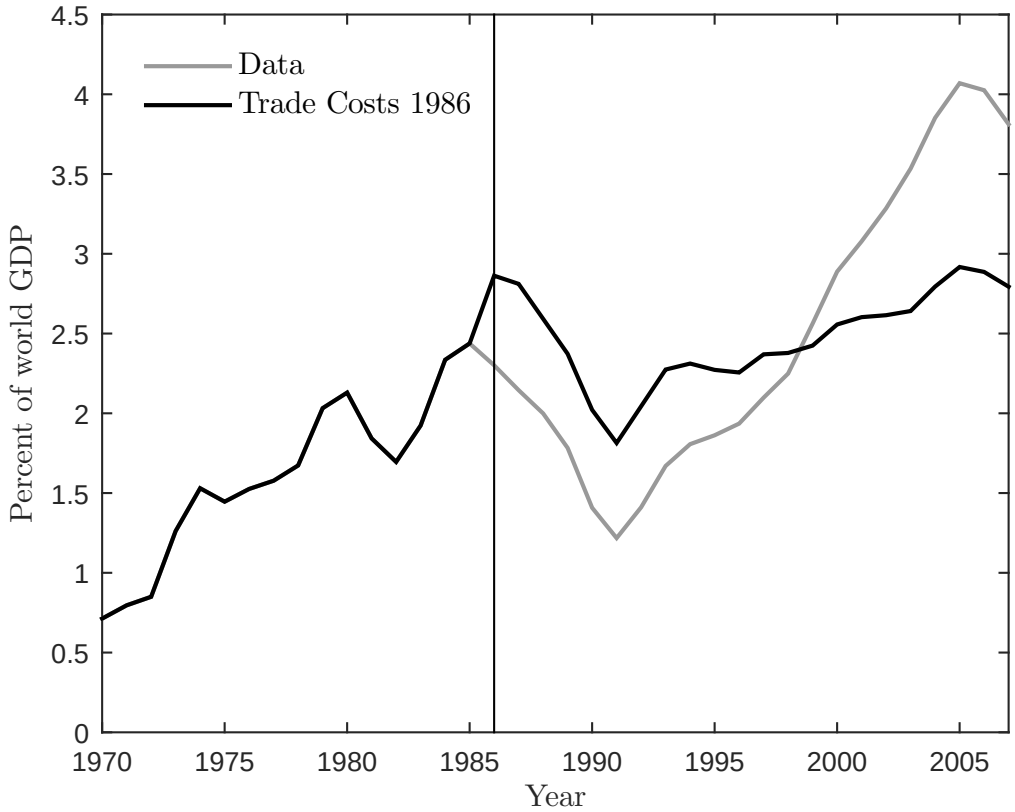
Counterfactuals: 1970 and 2007's Trade Costs

Trade imbalances: level effect



Counterfactuals: No Trade Liberalizations

Trade imbalances



Data			Counterfactual		
1986	2007	Diff.	1986	2007	Diff
2.30%	3.81%	1.51%	2.86%	2.79%	-0.07%

Conclusions

1. Quantitative relevance of changes in trade costs in the surge of trade imbalances.
   - 69% of observed increase due to lower trade costs.
2. Effects of trade costs: level and tilting effect.
   - Decline in trade costs lead to back-loading of imbalances.
3. Heterogenous effects on trade imbalances: large for US and China.

- Most of the increase in imbalances is simply a result of a more integrated world economy.
  - Dynamic quantitative general equilibrium models of international trade and macroeconomics $\rightarrow$ shed light on puzzles [EKN(2016)].
  - Implications of endogenous imbalances for other macroeconomic predictions, e.g sectoral reallocation [Kehoe et al. (2016)]
- Key to understand surge in imbalances lies in a better understanding of forces driving decline in trade costs.

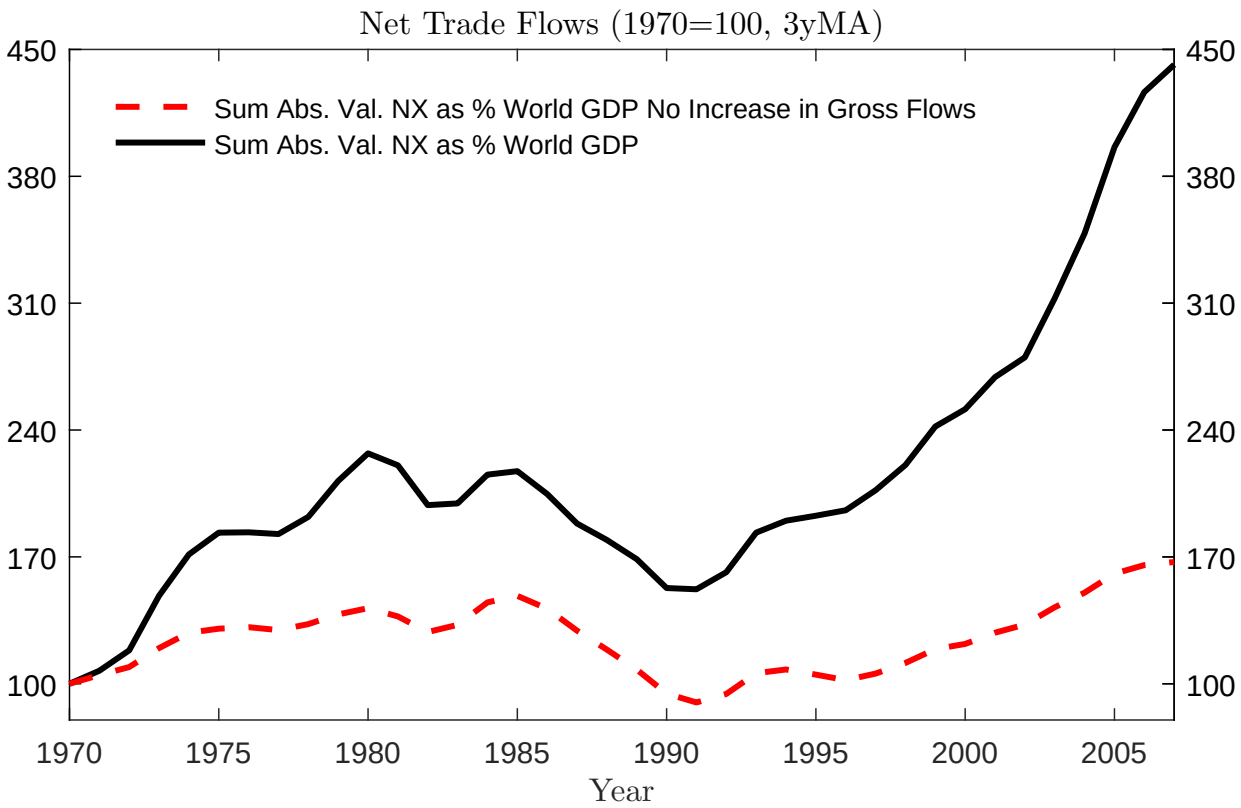
Thank You!

Introduction: Alternative

- Large increase in size of net *Trade Imbalances*
  $\rightarrow$ How much explained by growth in *Gross Trade Flows*?

$$\frac{\sum_{i=1}^{I} |X_i - M_i|}{\sum_{i=1}^{I} GDP_i} = \frac{\sum_{i=1}^{I} |X_i - M_i|}{\sum_{i=1}^{I} X_i + M_i} \frac{\sum_{i=1}^{I} X_i + M_i}{\sum_{i=1}^{I} GDP_i}$$

$X_i = exports$, $M_i = imports$. Back



How Do Trade Costs Affect Imbalances?

The Level Effect

1. Level effect: Consider the case of 2 countries, $i = a, b$, and two periods, $t = 0, 1$. WLOG assume a runs a deficit in 0 that repays in 1 and define the real interest rate such that $(1 + r_{a,t+1}) \equiv R_{t+1} \frac{P_{i,t}}{P_{i,t+1}}$.

Same $R_1 \Rightarrow (1 + r_{a,1}) \frac{P_{a,1}}{P_{a,0}} = (1 + r_{b,1}) \frac{P_{b,1}}{P_{b,0}}$. Then:

→ Zero trade costs $\Rightarrow P_{a,t} = P_{b,t}$ for $t = 0, 1$ implies real interest rate parity

$$(1 + r^{ft}_{a,1}) = (1 + r^{ft}_{b,1})$$

independently of country characteristics.

→ Positive trade costs $\Rightarrow P_{a,t} \neq P_{b,t}$ for $t = 0, 1$

$\Rightarrow$ Deficit in 0 $\Rightarrow P_{a,0} > P_{b,0}$ and surplus in 1 $\Rightarrow P_{a,1} < P_{b,1}$ because of *intertemporal trade consistency*. Therefore,

$$(1 + r_{a,1}) = R_1 \frac{P_{a,0}}{P_{a,1}} > (1 + r^{ft}_{a,1}) > R_1 \frac{P_{b,0}}{P_{b,1}} = (1 + r_{b,1})$$

and in equilibrium higher interest rate for borrowers and lower for lenders dampen imbalances.

▸ Back

How Do Trade Costs Affect Imbalances?

The Tilting Effect

2. Tilting effect: Declining ($\searrow$) rather than flat ($\longrightarrow$) trade costs over time, for instance

tilting trade costs while keeping round-trip costs constant in 2-period case

$\Rightarrow$ *Positive global income effect in the future lead to to increase in world real interest rate.*

a. Countries borrowing in early periods want to borrow less and those lending want to lend more, i.e. substitution effect in same direction.

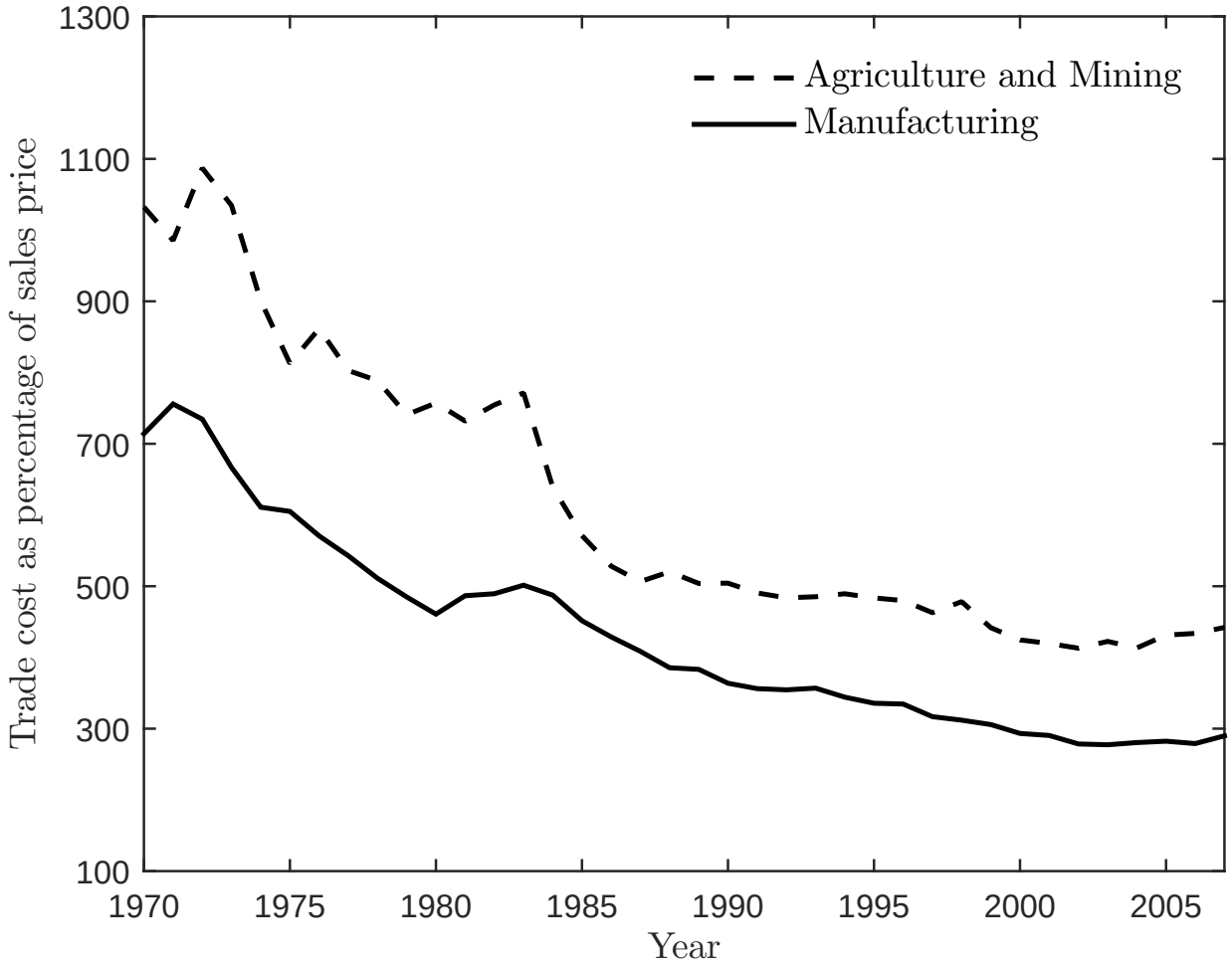
b. However, income effects act in opposite directions $\Rightarrow$ *borrowing countries in earlier periods want to borrow even less*.

Hence, equilibrium imbalances in initial periods are dampened relative to later ones.

▸ Back

Taking the Model to the Data

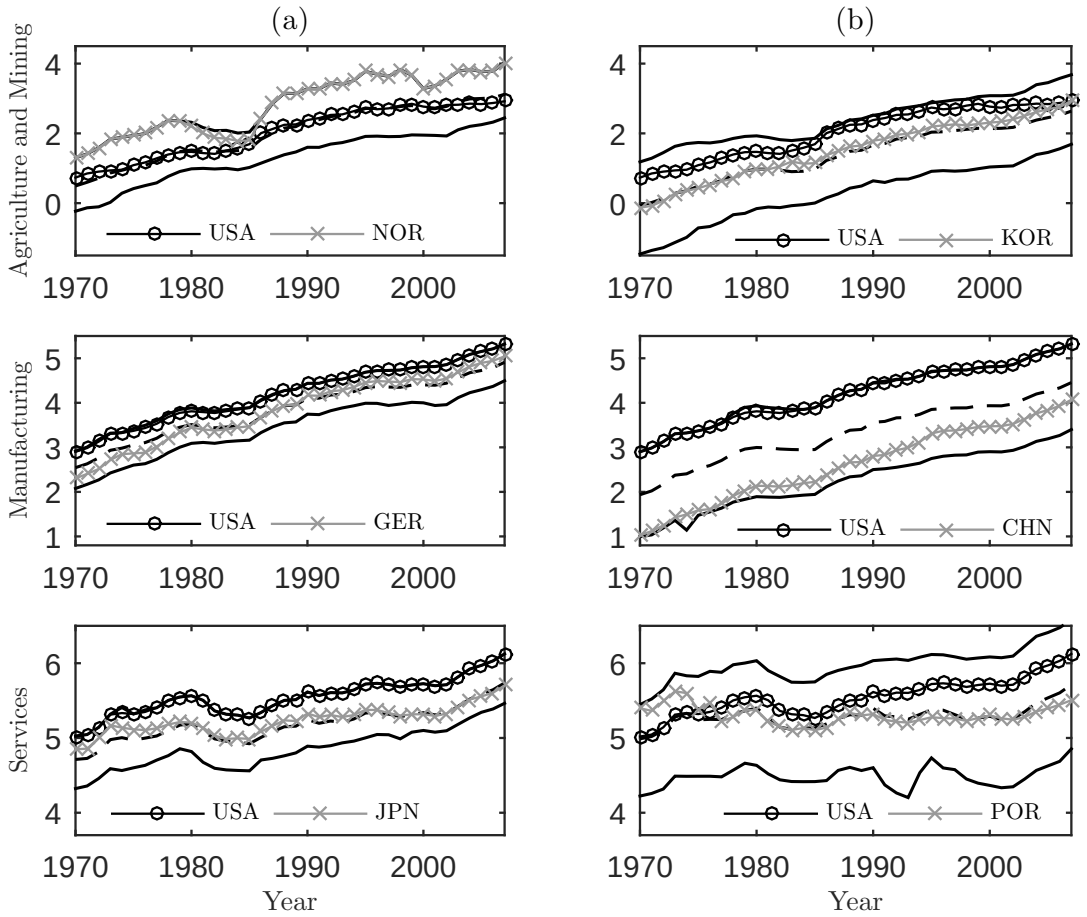
Trade costs



▸ Tade Costs ▸ Back

Taking the Model to the Data

Sectoral productivities



Mean (dashed) and minimum and maximum bands (solid) of $\log(T_{i,t}^{j})^{\frac{1}{\theta}}$. Countries in panel (a): Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Sweden, UK and US. Countries in panel (b): Austria, Brazil, China, Greece, India, Korea, Mexico, Portugal, Spain, Switzerland, Venezuela, and ROW. Back

Taking the Model to the Data

Intertemporal preferences wedges/shifters

- Given $NX_{i,t}$, solve model period by period $\rightarrow$ Recover equilibrium prices and quantities (match Data).
- Euler equation for each i: $\frac{P_{i,t+1}C_{i,t+1}}{P_{i,t}C_{i,t}} = \delta\hat{\phi}_{i,t+1}R_{t+1}$.
- This implies the equilibrium interest rate:

$$R_{t+1} = \frac{1}{\delta}\left(\sum_{i=1}^{I}\frac{P_{i,t+1}C_{i,t+1}}{\hat{\phi}_{i,t+1}}\right)\left(\sum_{i=1}^{I}P_{i,t}C_{i,t}\right)^{-1}$$

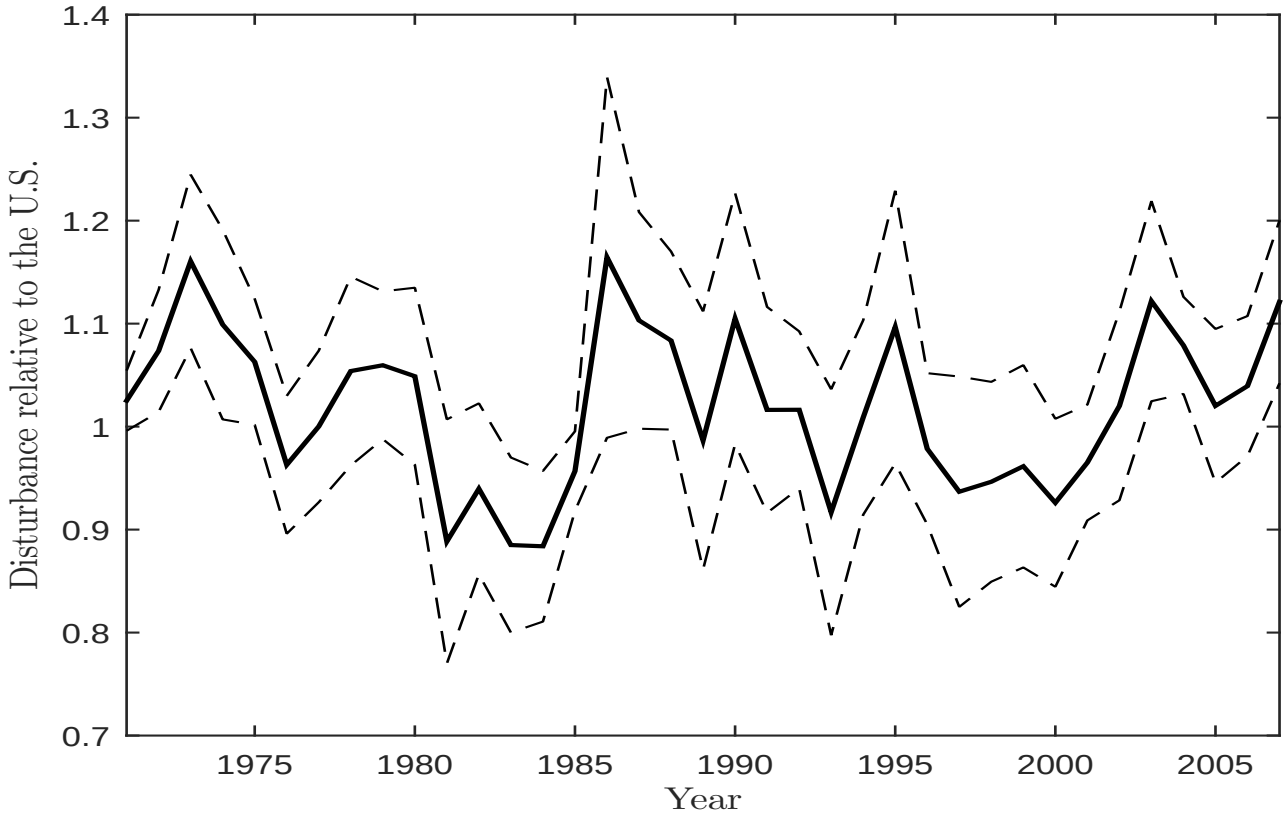
$\rightarrow$ The following set of equations identifies the intertemporal wedges:

$$\frac{P_{i,t+1}C_{i,t+1}}{P_{i,t}C_{i,t}} = \hat{\phi}_{i,t+1}\left(\sum_{i=1}^{I}\frac{P_{i,t+1}C_{i,t+1}}{\delta\hat{\phi}_{i,t+1}}\right)\left(\sum_{i=1}^{I}P_{i,t}C_{i,t}\right)^{-1}.$$

Taking the Model to the Data

Intertemporal preferences wedges/shifters

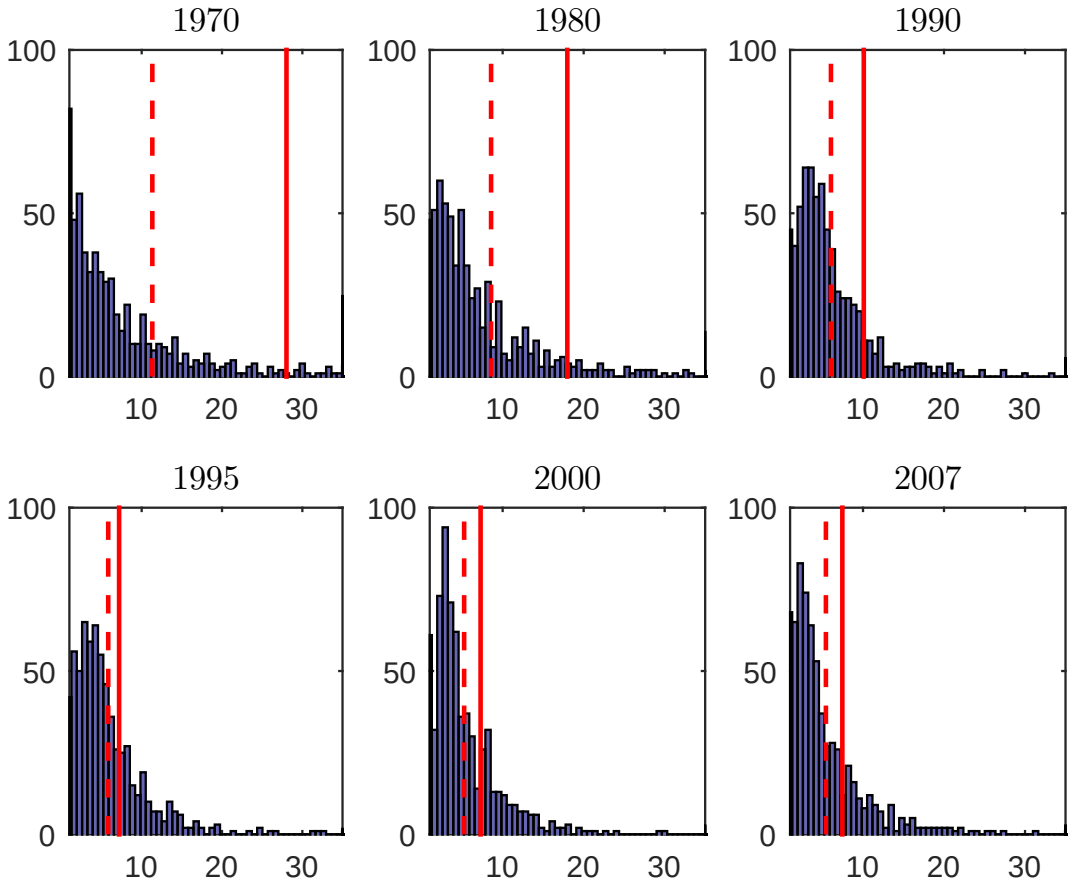
- Mean and one standard deviation bands of $\hat{\phi}_{i,t}$.



▸ OI: Interest Rate ▸ Back

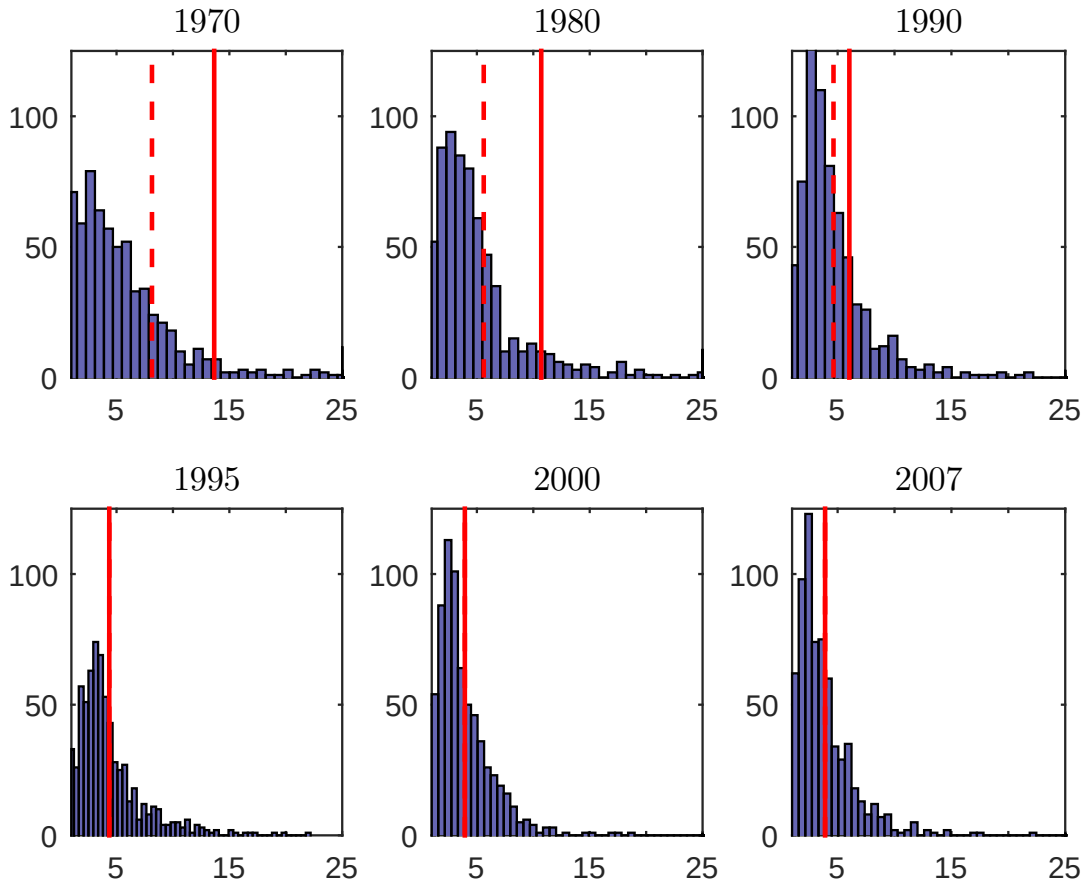
Taking the Model to the Data

Trade Costs: Agriculture and Mining



Taking the Model to the Data

Trade Costs: Manufacturing



Back

Taking the Model to the Data

The model's parameters

Parameter	Value	Variable	Source
β_i^j	-	VA to GO output ratio	Sectoral Data
$\nu_i^{j,k}$	-	Input-output coefficients	Data, Input-Output Tables
φ_i	-	Capital share in value added	Caselli and Feyrer (2007)
θ	4	Trade elasticity	Simonovska & Waugh (2014)
η	2	Elast. of subst. tradables	Caselli et al. (2014)
ψ	0.4	Elast. of subst. consumption	Duarte and Restuccia (2010)
δ	0.95	Discount factor	Standard for annual data

Back

Taking the Model to the Data

- For any $t = 1970, \ldots, 2007$ and $i, h = 1, \ldots, I$, define

$$\mathcal{D}_t = \left\{ \left\{ L_{i,t}, K_{i,t}, NX_{i,t}, GDP_{i,t}, P_{i,t} \right\}, \left\{ E^j_{i,t} \right\}_{j \in \mathcal{J}}, \left\{ P^j_{i,t} \right\}_{j \in \mathcal{J} \setminus S}, \left\{ X^j_{ih,t} \right\}_{j \in \mathcal{J} \setminus S} \right\}_{\forall i,h}.$$

Lemma (1. Sectoral Demand Wedges)

Given time-invariant parameter values and data $\mathcal{D}_t$, there is a one-to-one mapping between observables and sectoral demand disturbances, $\left\{ \mu^j_{i,t} \right\}_{j \in \mathcal{J}}$, given by the following equilibrium conditions and model restrictions:

$$\mu^j_{i,t} = \left(\frac{P^j_{i,t}}{P_{i,t}} \right)^{-(1-\psi)} \frac{E^j_{i,t} - \sum_{k=1}^{J} \left(1 - \beta^k_i\right) \nu^{k,j}_i Y^k_{i,t}}{GDP_{i,t} - NX_{i,t}} \text{ for } j \in \mathcal{J} \setminus S, \text{ and}$$

$$\mu^S_{i,t} = 1 - \sum_{j \in \mathcal{J} \setminus S} \mu^j_{i,t}.$$

▸ Back

Taking the Model to the Data

Lemma (2. Productivities and Trade Costs)

Given $\left\{\mu^j_{i,t}\right\}_{j\in\mathcal{J}}$ *for all* i*, time-invariant parameter values, and data* $\mathcal{D}_t$*; there is a one-to-one mapping between observables and the disturbances* $\left\{\tau^j_{ih,t}\right\}_{j\in\mathcal{J}\setminus S}$ *and* $\left\{T^j_{i,t}\right\}_{j\in\mathcal{T}}$ *in period* t *given by the following equilibrium conditions:*

$$\tau^j_{ih,t} = \frac{P^j_{i,t}}{P^j_{h,t}}\left(\frac{\pi^j_{hh,t}}{\pi^j_{ih,t}}\right)^{\frac{1}{\theta}} \quad \text{for } j\in\mathcal{J}\setminus S,$$

$$\pi^j_{ii,t} = T^j_{i,t}\left(\Gamma^j\frac{c^j_{i,t}}{P^j_{i,t}}\right)^{-\theta} \quad \text{for } j\in\mathcal{J}\setminus S \text{ and } \pi^j_{ii,t}=1 \text{ for } j=S, \text{ and}$$

$$P_{i,t} = \left(\sum_{j=1}^{J}\mu^j_{i,t}\left(P^j_{i,t}\right)^{1-\psi}\right)^{\frac{1}{1-\psi}} \quad \text{and } \tau^S_{ih,t}=\infty \text{ for all } i\neq h.$$

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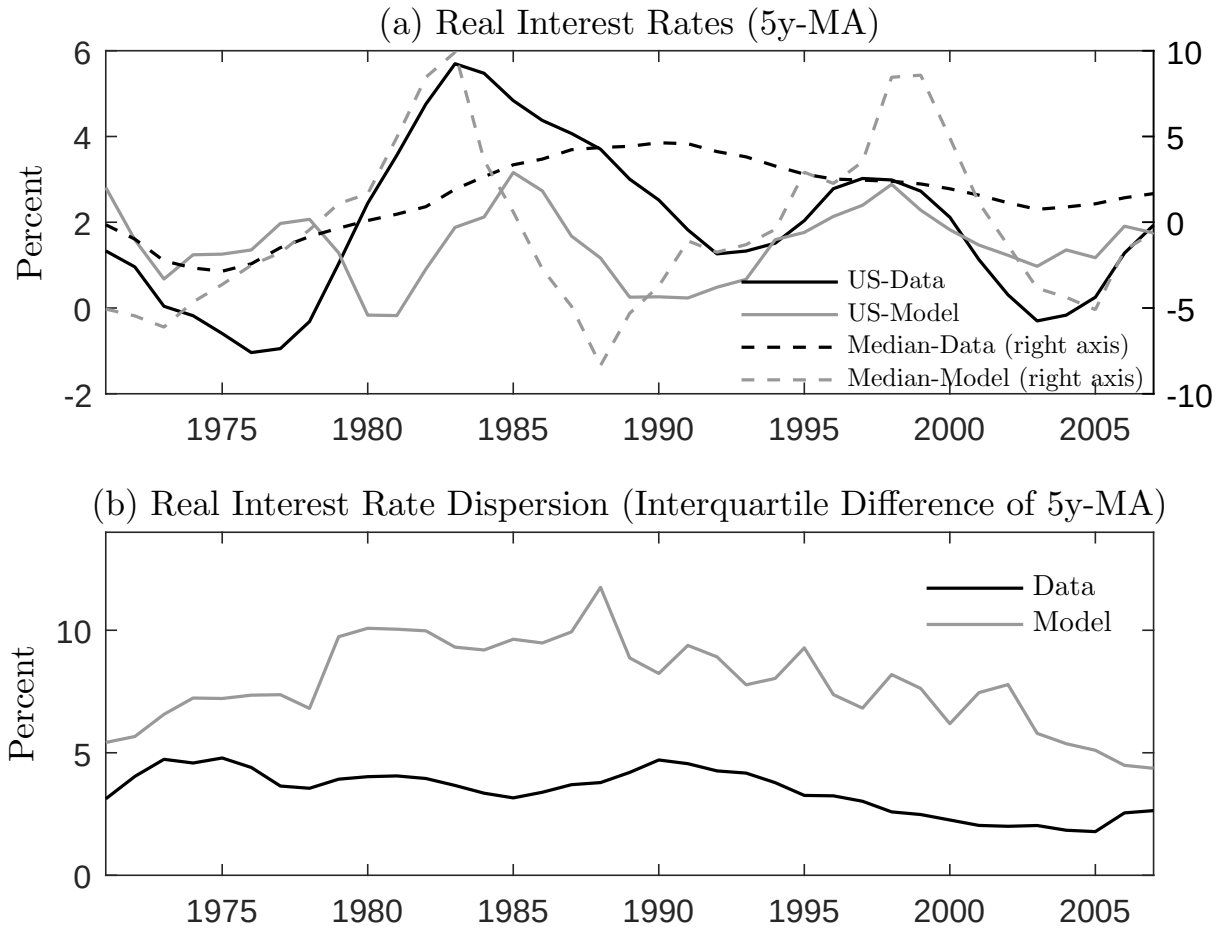
Figure: Interest Rates: Data and Model



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Notes: This figure plots 5-year moving averages for each of the time series considered. Real interest rates were constructed following the methodology in Yi and Zhang (2016). The data sources are the International Financial Statistics published by the International Monetary Fund and Haver Analytics. Data for all periods for the majority of countries are available. Exceptions are Brazil (available for 1980-2007), China (available for 1987-2007), and Mexico (available for 1978-2007).

Counterfactuals: 1970's Trade Costs

Accumulated imbalances

	Data	$\sum_{t=1970}^{2007} \lvert NX_{i,t} \rvert$ Counterfactual	Diff.	$\sum_{t=1970}^{1991} \lvert NX_{i,t} \rvert$ Diff. D-CF	$\sum_{t=1992}^{2007} \lvert NX_{i,t} \rvert$ Diff. D-CF
AUS	0.92%	1.04%	-0.12%	0.01%	-0.13%
AUT	0.39%	0.21%	0.18%	0.02%	0.16%
BEL	0.88%	1.47%	-0.59%	-0.53%	-0.06%
BRA	1.53%	2.13%	-0.60%	-0.74%	0.14%
CAN	1.99%	1.73%	0.25%	-0.15%	0.40%
CHN	2.77%	6.72%	-3.95%	-4.2%	0.17%
DEN	0.76%	0.60%	0.16%	0.00%	0.16%
FIN	0.58%	0.65%	-0.06%	-0.16%	0.10%
FRA	2.10%	1.46%	0.64%	0.22%	0.42%
GER	5.44%	3.26%	2.18%	1.24%	0.94%
GRC	1.54%	1.47%	0.07%	-0.16%	0.23%
IND	1.08%	1.53%	-0.45%	-0.56%	0.11%
ITA	1.94%	1.94%	0.00%	0.02%	-0.02%
JAP	6.81%	6.30%	0.51%	0.36%	0.15%
KOR	1.29%	2.04%	-0.75%	-0.19%	-0.56%
MEX	2.17%	1.73%	0.45%	0.01%	0.44%
NLD	1.91%	1.85%	0.06%	-0.75%	0.81%
NOR	1.51%	1.40%	0.11%	-0.04%	0.15%
POR	1.05%	1.03%	0.03%	-0.02%	0.05%
SPA	1.64%	1.39%	0.25%	-0.23%	0.48%
SWE	1.21%	1.13%	0.09%	-0.01%	0.10%
SWZ	0.97%	1.02%	-0.04%	-0.32%	0.28%
UK	2.61%	2.26%	0.35%	0.10%	0.25%
US	21.39%	18.12%	3.27%	-4.09%	7.36%
VEN	1.08%	2.05%	-0.97%	-0.88%	-0.09%
ROW	15.37%	11.39%	3.98%	3.06%	0.92%

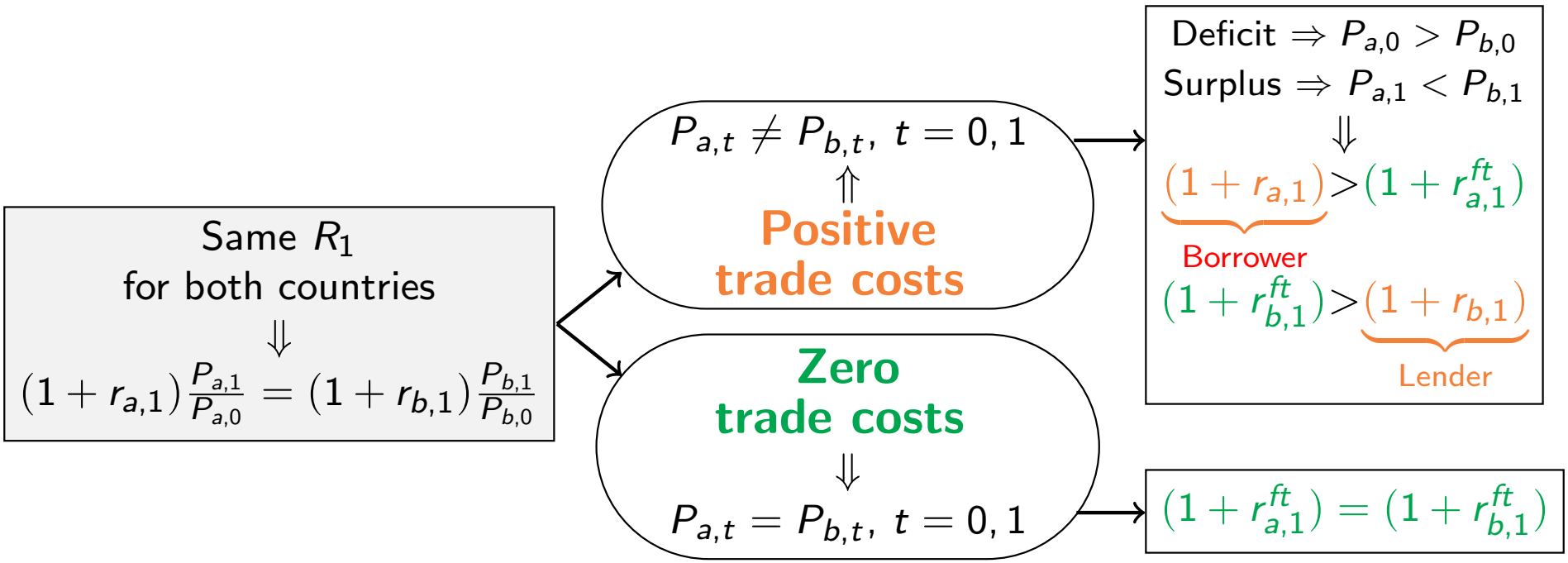
Back

How Do Trade Costs Affect Imbalances?

The Level Effect: Uniformly lower trade costs in every t

$\Rightarrow$ Intertemporal trade is less costly (manifested through differences in real interest rates due to differences in prices) $\Rightarrow$ increase in trade imbalances. (Obstfeld & Rogoff (2000))

- Consider the case of 2 countries, $i = a, b$, and two periods, $t = 0, 1$. WLOG assume *a* runs deficit in 0 that repays in 1 and define the real interest rate $(1 + r_{i,t+1}) \equiv R_{t+1} \frac{P_{i,t}}{P_{i,t+1}}$.



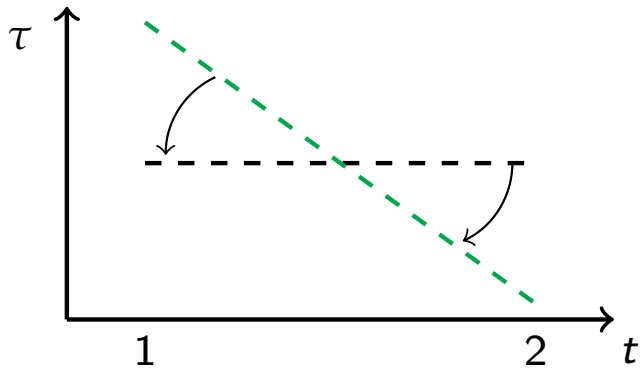
▸ Back Preview ▸ Back

How Do Trade Costs Affect Imbalances?

The Tilting Effect: Declining rather than flat trade costs over t

$\Rightarrow$ Trade is less costly in the future relative to the present $\Rightarrow$ increase future intra- and intertemporal (imbalances) trade relative to the present.

- Consider tilting trade costs while keeping round-trip costs constant in 2-period case.



$\Rightarrow$ Positive global income effect in the future $\Rightarrow$ increase in world real interest rate

Therefore,

a. Countries borrowing in early periods want to borrow less and those lending want to lend more, i.e. substitution effect in same direction.

b. However, income effects act in opposite directions $\Rightarrow$ *borrowing countries in earlier periods want to borrow even less*.

Hence, equilibrium imbalances in initial periods are dampened relative to later ones.

▸ Back Preview ▸ Back